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# CANCER FORUM

## Contents

FORUM

Complementary and Alternative Medicine

# OVERVIEW OF COMPLEMENTARY AND ALTERNATIVE MEDICINE

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## Abstract

The use of complementary and alternative medicine remains controversial, as it has arisen largely from systems that are apart from conventional medicine. However, complementary and alternative medicine is in widespread use in the community and this mandates that medical workers be educated. In particular, its potential interactions with prescribed medicines need to be discussed with patients. Complementary and alternative medicine is most often used to complement conventional therapy rather than as an alternative to it, and most often are directed at symptom relief. Some therapies have become mainstream, such as psychological therapies, and these have been demonstrated to improve quality of life. Other complementary and alternative medicines have been the subject of research. For example, ginger, acupuncture and hypnosis have all been shown to be effective in trials of their use with chemotherapy induced emesis. Studies of prayer, however, highlight the methodological challenges of researching complementary and alternative medicine. Patients' perceptions of complementary and alternative medicines are firmly divided into those who use them as part of a holistic approach and those who reject them, usually on the basis that they are not curative. Little work has been done on the complex interactions with family over the use of complementary and alternative medicine, which can either be divisive or improve cohesion. Finally, the attempts to practise integrative medicine are analysed as a model for the way forward for patient centred care.

The topic of complementary and alternative medicine (CAM) has traditionally been controversial. Conventional Western medicine has over recent decades been based on evidence gained from clinical trials, which informs the risk benefit analysis upon which recommendations to patients are based. Often this data is not available for CAM, yet it is estimated that well over half of patients with cancer use it.[1] Many of these therapies are plant based. The paper by Robotin suggests of the estimated 300,000 'higher plants' available today, just 1% are used as foods, while 10-15% have a documented medical use.[2] Some complementary therapies such as aromatherapy, for example, may never be subjected to clinical trials, since the satisfaction of single patients with adding such therapy to their treatment regimens may be used to justify their use. Other therapies, such as Chinese medicine, have been accepted as effective by generations from that culture, so there would be little impetus to trial them in that setting, although such trials may be needed in the Western culture. Yet others, such as ginger, have been subjected to randomised trials which have defined their efficacy when added to conventional drugs for chemotherapy in induced nausea, and could be integrated into conventional practice.[3]

The papers in this Forum cover the classification of CAM and its evolution and the consideration of psychology and prayer as complementary medicines. Given its widespread use, there is the exploration of teaching our medical students about CAM and at least knowing about potential interactions with conventional drugs. The impact of CAM on patients and their families is important to understand as part of caring for patients with cancer. Finally, we explore the challenges of the integration of some CAM into conventional medical practice.

## Definition

I don't like the term CAM, but its use is widespread and understood. It would be better to use the broader term 'therapies' instead of 'medicine', since this term encompasses both medicine and other CAM, such as mind/body or energy treatments. The terms 'complementary' and 'alternative' do not describe a treatment but how it is used, since the same non-conventional therapy could be administered in addition to, or as a complement to traditional evidence-based medicine, or provided as an alternative to it. Conventional medicine practitioners may, in general, accept a treatment that is used to complement their treatments, but not substitute for them if there is no strong evidence base for the efficacy of the CAM. Once CAMs have been subjected to trials, some will have sufficient evidence of safety and efficacy to be chosen to integrate with conventional medicine, or even become considered as a conventional treatment.

## Classification

There are several classification systems for CAM, such as the United States National Centre for Complementary and Alternative Medicine or the American Cancer Society

classifications (Tables 1 and 2).[4,5] They can be grouped by type of therapy, such as biological therapies including herbs, vitamins and dietary therapies, mind/body therapies such as prayer, music therapy or types of meditation and psychological therapies, energy therapies like Qi Gong or Reiki, or various manipulative therapies such as osteopathy or massage. Further classification by mechanism of action can be tried, but this is often unknown, both for treatments that were adopted into Western medicine empirically (as many early drugs were) and in the case of energy therapies, where the source of the energy is unrecognised in the West. Some have designated CAMs 'natural' therapies, but large doses of an herb or vitamin makes them pharmacological agents with quite 'unnatural' side-effects. Similarly, cytotoxics derived from plants, such as the vinca alkaloids or taxanes with their range of side-effects, would hardly be considered natural.[6,7] CAM can also be classified as part of a system of therapy, such as Chinese medicine or Ayurvedic medicine, or in the West, homeopathy or naturopathy.

Some psychological therapies such as cognitive behavioural therapy or mindfulness, have become classified as part of mainstream treatments, which is the focus of the review written by Koczwara, while other complementary practices such as prayer are sometimes excluded from both, despite it being widely practiced in relation to illness.[8,9]

***Table 1:*** *US National Centre for Complementary and Alternative Medicine Classification* [4]

| Whole Medical Systems | Mind-Body Medicine | Biologically Based Practices | Manipulative and Body-based Practices | Energy Therapies |
|---|---|---|---|---|
| Traditional Chinese Medicine | Meditation | Herbs | Massage | Acupuncture |
| Ayurveda | Prayer | Vitamins | Chiropractic | Reiki |
| Homeopathy | Art | Minerals | Osteopathic Manipulation | Qi Gong |
| Naturopathy | Music Therapies | Dietary Supplements | | Therapeutic Touch) |
| | | Dietary Changes | | |

***Table 2:*** *American Cancer Society Classification*[5]

| Mind, Body and Spirit | Manual Healing and Physical Touch | Herbs, Vitamins and Minerals | Diet and Nutrition | Pharmacological and Biological Treatment |
|---|---|---|---|---|

## Educating health professionals

Because of the widespread use of CAM health professionals need some knowledge of it, even if only to avoid interactions with conventional medicine. This is the issue that Hassed addresses in his paper[10]. It is important that health professionals do not discourage patients from reporting CAM use, which will happen if patients perceive that their health professionals will disapprove. That is not say that conventional health professionals need sanction the use of CAM, but may use a discussion to outline their own evidence based approach. Patients will want to have guidance about CAM, given that there is so much information available to them on these treatments in the public domain. Keeping up with the research into CAM will also inform health professionals when there is sufficient evidence about a CAM treatment to warrant it being considered a conventional treatment option.

When CAMs are administered systemically, there is the possibility of interactions with conventional medicine. Many such potential harmful adverse interactions have not been studied, but particularly where CAMs are metabolised by the same enzymes as conventional medicines the chance of reduced efficacy or increased toxicity is high. Examples cited by Clarke in his paper, include St John's wort or ginseng that may interact with drugs metabolised by CYP3A4, and guarana with agents that are CYP1A2 substrates.[11-14] Pharmacodynamic interactions may occur between agents targeted at the oestrogen receptor in oestrogen receptor positive cancers and herbs containing phyto-oestrogens.[15]

## Research

As part of integrating some CAM with conventional medicines, it is suggested that CAM be subjected to the same clinical research methodologies as conventional therapies which develop similar levels of evidence for benefits and risks. Some have been trialled, including trials on ginger for chemotherapy-induced nausea; acupuncture and hypnosis have been trialled for the same indication.[16,17]

The methodology of such trials can be challenging, as illustrated by Dhillon in her discussion of CAM research.[18] It may be very difficult, for example, to find a placebo treatment to be adequately able to blind a study, as was discovered in trials of marijuana for nausea.[19] Sometimes the paradigm on which the treatment is based may differ. For example, Western medicines derived from plants are developed by purifying the active agent, whereas Chinese medicines may derive activity from the combination of substances within a plant, which in turn makes the accuracy of dosing, sought in the West, difficult to achieve. The idea that metaphysical therapies, such as prayer, where the mechanism isn't studied, can be subjected, or constrained, by randomisation has been hotly debated, as highlighted by Whitford in her paper on intercessory prayer.[20,21]

It can be difficult to obtain funds for CAM research, although groups such as the National Health and Medical Research Council have of recent years earmarked money specifically for CAM research. However, that does not preclude careful observation and recording of the outcome of CAM usage, which may in turn provide the impetus for more widespread trials.

## Integration

There are several centres being created where patients have the opportunity to integrate CAM with conventional medicine. The issues faced are reported in Pirri's paper.[22] What would be the advantage? Given CAM is in widespread use, it may strengthen the therapeutic relationship to be able to improve communication about CAM in a traditional centre and allow patients to pursue their individual choices in a controlled environment. It will reduce the chance of interactions and upskill clinicians. How then would the CAM to be integrated be chosen? It is not just a matter of choosing those which have been trialled and therefore can be also considered part of conventional medicine. One criterion must be that addition of the CAM is safe. The integrated centre will allow observation and recording of any benefit reported by patients of various CAMs, which will be apparent to both CAM and conventional medicine practitioners. The centre will also want to explore the credentials of any practitioner offering CAM.

## Impact on patients and families

The impact of CAM on patients or their families has not been extensively studied and this is a topic reviewed by Eliott.[23] A qualitative study of how patients with cancer spoke about CAM revealed that there were two distinct groups.[24] Those patients who used CAM valued its perceived benefit in terms of their physical or psychological wellbeing, and saw it as part of holistic health care augmenting conventional treatments. They had to access CAM separately from the medical system, hoping their doctors would support their using it. Non-users devalued CAM for their inability to cure and were critical of CAM use as challenging medical wisdom.

O'Callaghan in her paper reports that CAM use increases with time since diagnosis and specific groups who are more likely to use CAM can be identified (eg. younger and more highly educated women).[25,26,27] Most CAM use was for symptom control, with dietary supplements and meditation the most commonly used.[28] In families of patients with cancer, CAM use can be either well supported or a cause of friction, depending on the viewpoint and the success of CAM. There is little known about how families negotiate such treatment decisions.

## Conclusion

The term CAM encompasses many therapies. Most are used as an adjunct to conventional medicines and most often by patients who use them to improve physical and psychological wellbeing. There are cancer centres seeking to integrate CAM into the treatment options available to patients.

Although more research would be desirable to document, under controlled conditions, the benefits and toxicities of CAM, there are challenging design issues to be solved, particularly with CAM such as prayer. Certainly, there should be good documentation of the impact of CAM on the patients who report its use. More research is needed on why patients use CAM and the impact on their families.

CAM cannot be dismissed as natural and therefore without side-effects. Particularly problematic can be its interaction with conventional medicine. Given its widespread use, heath professionals should be educated in the nature of CAM and facilitate discussion with patients about its use. This is turn is likely to enhance the quality of communication between patients and their practitioners.

This collection of papers explores the evolution of CAM. A few have become conventional treatments, such as some psychological techniques, botanical drugs and physical therapies. The biological CAM interactions with conventional medicine are presented. The desirability of gaining more evidence about CAM is expressed, but the methodological challenges that these raise are exemplified by studies of prayer. Educating health professionals about CAM is important, given its widespread use, and being able to discuss CAM with patients may enhance the therapeutic relationship. What research exists on the perceptions of patients and their families about CAM use is presented. Finally, the concept and experience of integrating CAM and conventional medicine presents the challenge into the future.

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# Botanical products in the 21st century: from whence to whither?

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## Abstract

Human cultures have been using botanical products for medicinal purposes since the dawn of civilisation, as with the herbal knowledge of early civilisations subsequently extending to Europe and the Middle East. Of the estimated 300,000 higher plants available today, approximately 1% are used as foods and 10-15% have a documented medical use, although few of them have withstood the scrutiny of pharmacological evaluation. In the developing world plants remain the primary sources of medicine, with more than 60% of the world's population relying on traditional medicine for their health care needs. Botanical products are used in various forms: the entire plant (or parts of it), as herbal materials (plant oils, juices or resins); or as herbal preparations (where purified or extracted compounds are mixed with other ingredients to make pills, powders, or topical preparations). While orthodox medicine uses drugs generally as single chemical entities, traditional medicine commonly uses plants as mixtures. The complexity of these mixtures poses significant challenges to the identification of active compounds and to ensuring the consistency of formulation and quality control of these preparations. This review examines some of today's uses of botanical products in Indigenous cultures, traditional medical systems, as complementary medicine and as sources of new drugs.

Human cultures have been using botanical products for medicinal purposes since the dawn of civilisation, as attested in some of the earliest written documents discovered in China, Sumeria and Egypt.[1-3] The herbal knowledge of the early civilisations has subsequently extended to Europe and the Middle East. By the 1800s, in addition to indigenous herbs, European countries also had a thriving trade in exotic medicinal plants from all over the globe.[2]

Of the estimated 300,000 higher plants available today, approximately 1% are used as foods and 10-15% have a documented medical use,[4,5] but the pharmacological properties of few of them have been thoroughly investigated.[6] In the developing world, plants remain the primary sources of medicine, with more than 60% of the world's population relying on traditional medicine for their health care needs.[7,8]

Botanical products are used in various forms: the entire plant (or parts of it), as herbal materials (plant oils, juices or resins), or as herbal preparations (where purified or extracted compounds are mixed with other ingredients to make pills, powders, or topical preparations).[9] Unlike orthodox medicine, which uses drugs generally as single chemical entities, traditional medicine commonly uses plants as mixtures, where the different components are believed to act in different ways and on different parts of the body to produce the desired effect. The complexity of these mixtures poses significant challenges to the identification of active compounds and to ensuring the consistency of formulation and quality control of these preparations.[1]

## Use of herbal medicines in Indigenous cultures

Indigenous cultures have used natural remedies long before they became known to Western medicine. For example in the 17th century, Peruvian Indians were already using the *Cinchona* bark to treat malarial fevers, while the bark of the willow tree had been used to treat fever and inflammation in many traditional medical systems centuries before the active principle – aspirin – was discovered by Western medicine.[10] Indigenous cultures use medicinal plants to treat commonly occurring health problems such as infections, fever, jaundice, diarrhoea and ailments of the reproductive system.[8] Indigenous healers are more likely to recognise and treat these conditions, so their experience in treating chronic conditions such as cancer or cardiovascular diseases remains limited.[11,12] Furthermore, many cancers with a high burden of disease in the Western world (ie. cancers of the lung, colon, prostate) are less likely to be encountered in traditional cultures.[13]

Indigenous cultures likely to have discovered natural products of import to pharmacology share certain features: an ethnomedical tradition able to record this information; residence in areas with a diverse flora; and a continuity of residence in the same area over many generations.[12] Learning about the healing properties of natural products is based upon an apprenticeship system, with the information passed on orally from one generation to the next. Herbal medications are administered according to spiritual beliefs, without a standard method of identifying these plants available.[9] Until the 1980s, there was little interest in the Western world in preserving Indigenous knowledge of plants and minimal effort expended in assisting communities to preserve this knowledge.[14] Consequently, the knowledge base of indigenous plant use is slowly being eroded, as Western culture and education supersede many local traditions.[1,15] The loss of habitat in tropical forests may lead to many of the plants in use today becoming extinct in the near future, so there is an acute need to ensure species and habitat preservation and to the extent possible, to preferentially use cultivated plants in preference to harvesting them from the wild.[1,16]

## Herbs in traditional medical systems

Sophisticated traditional medical systems, such as Traditional Chinese Medicine (TCM), Ayurvedha, Unani and Kampo, have a history going back for centuries, passed on to subsequent generations through regularly updated and written systems recording medical knowledge and theory.

The millennia-old TCM remains in use by the Chinese medical system today and is recognised in many other East Asian countries. While all TCMs are of natural origin, some 80% of them originate from plants, with the remainder being of animal or mineral origin.[17] To date, over 12,000 medicinal preparations from natural sources have been recorded and over 5000 have been validated as folk medicines in the Chinese traditional medical system.[4]

TCM occasionally uses single herbs (such as ginseng, gingko and ephedra), but more commonly involves multi-component herbal preparations.[17] When the isolation and characterisation of active compounds was carried out successfully, the observed effects often validated their TCM use.[1]

Some studies of Chinese medicinal herbs have confirmed a biological basis for their effect, with some inducing apoptosis, immuno-modulation, or inhibiting telomerase activity or the growth of tumours.[18,19] The evidence about the effectiveness of Chinese herbs is commonly anecdotal, rather than derived from Western style, rigorous clinical trials.[18]

A recent review of randomised clinical trials investigating TCM compounds identified 49 studies, using a comparison group, that investigated the effects of Chinese herbs in cancer treatment.[18] While overall study quality was low, the significant numbers of studies reporting positive findings suggest that Chinese herbs should remain the subject of rigorous study in cancer therapeutics.[18]

Ayurvedhic medicine describes "nourishing and rejuvenation drugs" used for longevity, memory preservation and immunomodulation, with effects mediated via the neuroendocrine axis.[20] Some plants used have complex activities. For example *Glycyrrhyza glabra* root (liquorice), commonly used for minor throat infections, also has antioxidant, chemoprotective and antimicrobial activities, while *Withania somnifera* (Ashwagandha/Indian ginseng/winter cherry) has immunomodulatory, antitumour, cytoprotective and antoxioidant properties.[21]

## From traditional medical systems to Western drug discovery

The use of artemisin, derived from *Artemisin annua* (sweet wormwood, or *Qing Hao*) was first documented in TCM in 168 BC as a treatment for haemorrhoids, and since the 4th century AC as an anti-malarial,[22] but its structure was not elucidated until the mid-1970s. The drug's widespread adoption was further hampered by production challenges (as agricultural production alone was insufficient to provide the required quantities) and the highly variable concentration of the drug in plant extracts.[10]

Difficulties commonly arise in the clinical testing of a natural compound. For example, the versatility of using curcumin both as a spice (turmeric, or *Curcurma longa*) and a drug with a long history of use in Ayurvedha and TCM, makes rigorous clinical testing challenging, as the relative ease of demonstrating effectiveness in preclinical and/or pilot studies can work against the formal validation of effectiveness in rigorous randomised, placebo-controlled double blind studies. This is compounded by the fact that pharmaceutical companies have limited interest in researching a non-patentable agent and the common perception that curcumin is more of a nutraceutical than a 'real' drug.[10]

## Herbs and Western drug discovery

Ethno-pharmacology is a sophisticated approach to drug discovery, involving botany, chemistry and pharmacology, as well as many other scientific disciplines.[23] Its beginnings are credited to two French pharmacists, Pierre-Joseph Pelletier and Joseph Bienaimé Caventou, who in 1820 extracted the active principle from the bark of several species of Cinchona and promoted the use of quinine for the treatment of malaria, thus marking the inception of a new scientific discipline.[10,24]

Historically, ethno-pharmacological information led to drug discovery in various contexts:

- Unmodified plant products where their ethnomedical use suggested efficacy for specific medical conditions ie. foxglove for the treatment of heart failure
- Products where the unmodified natural product provides some remote indication of usefulness (ie. vincristine, which was used by Indigenous cultures for the treatment of diabetes, subsequently found to be an effective anti-cancer agent)[11,25]
- Modified natural or synthetic products, based upon natural products used in folk medicine (eg. aspirin).[6,11]

After the Industrial Revolution, progress in organic chemistry led to a belief that synthetic products were going

to supplant the use of herbs and that natural remedies were relegated to use by poorly educated or lower income people and tied up with religious superstitions.[6]

The advent of synthetic organic chemistry in the 1940s and 1950s led to compound synthesis becoming increasingly popular in drug discovery.[8] With high throughput biochemical screening technologies (which are ill-suited for the screening of natural products) becoming pre-eminent,[26] many old botanical drugs were being removed from officinal compendia.[27]

Interest in natural medicines as a source of new drugs seems to be a cyclical process, with a resurgence of interest occuring in the 1970s, when many pharmaceutical companies developed active research programs into natural substances as a source of potential new drugs.[1,28]

In the 1990s, the ability to readily produce purified human enzymes and receptors tipped the balance again towards drug discovery using artificial assays (such as enzyme inhibition assays and receptor binding assays), replacing time-honoured functional assays (which measured biological activity) and this again marginalised the process of drug development from plants.[26]

It appears that even in the 21st century plants retain an important role in drug development - from 1983-1994, 65% of drugs approved for marketing were based on natural products and 50% of the best-selling pharmaceuticals in the year 2000 were still derived from natural products. [29,30]

An increased exchange of information with China has also rekindled the interest in the use of natural medicines, even in the current era of Western pharmaceutical industry domination.[2]

Furthermore, natural compounds with an identified chemical structure have provided templates for the synthesis of new pharmaceutical products, such as taxol (originally isolated from *Taxus brevifolia)*, which was converted to active analogues such as taxotere and podophyllotoxin (isolated from *Podophyllum peltatum* or *Podophyllum emodii*), which was converted semisynthetically to etoposide and teniposide.[1,13]

Advances in chemical methods, such as high performance liquid chromatography, high resolution mass spectroscopy and X-ray crystallography sped up the process of identification of chemical structures and allowed the full characterisation of these compounds, with thousands of samples now being assayed in one day in automated laboratories.[8,28]

In oncology, some drug companies focus their research on developing specific cytotoxic drugs from plants with little chemical modification, while others focus their work on identifying active principles with more specific inhibitory activities. Research marks the beginning of a lengthy medicinal chemistry process, aiming to produce a simpler molecule than the original natural compound. The new compound is ideally more potent, selective and bioavailable than the natural compound and can be produced in a cost effective manner, albeit with considerable time, effort and financial investment.[31] Some examples where natural products act as industrial intermediates include hecogenin, a steroid obtained from the juice of *Agave sisalana*, which is a synthetic intermediate for cortisone, and cortisol and cephalosporin C, obtained from *Cephalosporium acremonium*, which is the synthetic intermediate for the production of cephalosporin antibiotics.[31]

## Plants as complementary and alternative medicines

The use of plants as herbal remedies remains popular in the Western world, with plants such as Echinacea, *gingko biloba*, St John's Wort and saw palmetto generating annual over the counter sales of tens of millions of US dollars in the US alone.[23] In the European Community, the sale of herbal medicinal products is worth approximately US$7 billion annually, while in the US this has increased 25 fold from 1988 to 1997, from US$200 million to US$5.1 billion.[32]

A public preference for natural products is driving the 'green consumerism' movement, leading to a substantial increase in the use of herbal remedies in the Western world.[30] In 1997, Americans' out-of-pocket expenditures on alternative therapies were conservatively estimated at US$27 billion,[33] with herbal medicines the most commonly used complementary therapies (with 38 million users).[34]

Furthermore, the perception that orthodox medicines are more likely to have adverse effects, create dependency or cause microbial resistance, and the increasing cost of Western medicine, also encourage many to choose self-medication with herbal products.[1] The increase in travel has brought about opportunities to learn more about what used to be viewed as 'exotic' cultures, many of which still have strong traditional medicine roots.[1]

In the Far East (Japan and China especially), mushrooms and mushroom extracts have been key ingredients in TCM. Three polysaccharides extracted from mushrooms (krestin, lentinan and scizophyllum) are being used in Japan in cancer therapy, alongside conventional medicine.[20] The *Ganoderma* species have a history of use in TCM dating back four millennia (*Ganoderma lucidum* is known as *reishi* or *manetake* in Japan and *Ling Zhi* in China) and are now gradually gaining recognition in the West as 'medicinal mushrooms'.[35] The active compounds of these mushrooms have demonstrated anti-cancer and immuno-modulating activities, as well as other medicinal properties relevant to cardiovascular disease, although research into their effectiveness according to Western standards of evidence, remains limited.[35,36] One of these compounds, polysaccharide K (or PSK), was isolated in 1960 and by 1987 accounted for >25% of the total national expenditure on anti-cancer drugs in Japan (where it is used in combination with conventional chemotherapy, mostly for GI cancers), so it seems that in Eastern countries at least, medicinal mushrooms have crossed the divide between traditional herbal medicine use and a pharmaceutical grade product.[35]

## Future role of natural medicines

Some compounds under active investigation today have a long record of use in traditional medicine and may

provide new drug remedies for a variety of conditions. They include green tea (mentioned in ancient Japanese texts), saffron (stigmata of *Crocus sativum*), turmeric and myrrh (the dried resin of *Commiphora myrrha*, mentioned in the Bible).[3] Green tea contains epigallocatechin-3-gallate, shown to reduce the growth of some cancers in experimental animals, while myrrh, traditionally used for its anti-inflammatory effects, is being investigated for its ability to kill cancer cells resistant to other anti-cancer drugs.[3]

It could be possible that treating cancer in the future will involve a combined approach, in which Western medicine (including surgery, chemo and radiotherapy) will be used to destroy the tumour, while other treatments, such as TCM, will address the entire 'unhealthy' condition, so that a change in the body environment could facilitate cure, by addressing disease determinants more broadly and from an alternative perspective.[19]

In order to fulfill the promise of natural medicines, it is critical to adopt commonly agreed criteria for assessing their safety and effectiveness, and to ensure the sustainability of these products. This will remain of particular relevance for developing economies, where plant materials used as traditional medicines could help meet the needs of primary care medicine and lead to improvements in the quality of health care for a large proportion of the world population.[37]

In technologically advanced countries, a multidisciplinary approach to drug discovery, encompassing both the rational exploitation of natural resources and synthetic methodologies, could enhance the productivity of the drug discovery process.[38]

At the dawn of the new millennium, it was estimated that approximately 170 companies and about 40 research institutions were engaged in the process of drug discovery, evaluation and development of natural medicinal products.[39] Meanwhile, international patent applications for natural medicinal substances are increasing, drug development costs are rising and the yields from synthetic pathways in drug discovery are falling. All these factors, coupled with an ever increasing public preference for natural products, suggest that the future of natural medicinal products remains bright indeed.

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# PSYCHOLOGY OF COMPLEMENTARY CARE IN CANCER: MOTIVATORS, BARRIERS AND OUTCOMES

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## Abstract

While the evidence behind effectiveness of complementary therapies is increasing, patients' interest in complementary care is frequently driven by factors other than evidence of efficacy alone and reflects a desire for a different model of care and a different relationship with a health care provider. Patients who seek complementary care tend to be different demographically to those who do not and are more likely female, younger, more highly educated and earning a higher income. Seekers of complementary therapies are more likely to suffer from depression and have poorer physical quality of life. There are multiple barriers to access to complementary care, both provider and patient related. These relate to the insufficient awareness by providers regarding the evidence behind specific therapies or their interactions with conventional care, as well as the expectations placed upon conventional care providers regarding what their role might be. Little is known about how much information patients expect conventional health professionals to provide and there is little agreement on how much would be considered reasonable by the providers themselves. Greater collaboration and communication between complementary and conventional care providers would assist, not only in overcoming the barriers of access, but also building the body of evidence on the potential efficacy of complementary interventions in cancer.

Cancer patients are reported as being among the most common users of complementary therapies.[1-3] Complementary medicine is defined as treatments used alongside conventional cancer care to enhance quality of life and support the wellbeing of cancer patients, but not considered to be treatments for cancer itself.[1] This contrasts with alternative therapies, defined as those used instead of conventional approaches to the treatment of cancer.[1] Until recently both terms have been used together, and often interchangeably, under the umbrella term of complementary and alternative medicine (CAM).[3] Studies have reported the prevalence rate of CAM use by cancer patients to be as high as over 90%.[4-6] The rates vary considerably, depending on the therapies included within the definitions and the populations sampled. In Australia, Begbie and colleagues used reception staff in oncologist specialist consulting rooms to offer a survey of alternative medicine use to more than 500 patients.[7] Results from 319 patients indicated 22% used some form of 'alternative therapy', and 75% of this group used two or more therapies. Relaxation, meditation, diet therapy, vitamins and positive imagery were most widely used. An important finding of this study was that 40% of patients did not discuss their use of other therapies with their physician, raising concerns regarding the risk of interactions of these therapies with conventional anti-cancer treatments that may not be known to the oncologist.

A survey of cancer patients attending a complementary therapy session at the Gawler Foundation in Victoria, Australia, found that few cancer clinicians initiated conversations about complementary therapies with their patients, although 57% of 95 respondents said they had raised this with their doctor after a primary cancer diagnosis, and 70% raised this following a secondary cancer diagnosis.[8] Patients reported clinicians' attitudes towards complementary therapies as mostly negative. Complementary therapies were adopted by 68% of patients after their primary cancer, rising to 87% after a secondary cancer diagnosis. Complementary therapies included naturopathy/homeopathy, Chinese traditional medicine (including acupuncture), dietary supplements and massage. Lifestyle factors such as dietary changes, attending self-help groups, meditation, prayer and spiritual guidance were also reported. Benefits were reported with respect to quality of life.[8] These results are consistent with findings from other countries,[9,10] although results should be interpreted with caution because of the issues of representativeness of the patient sample and the scope of therapies covered. Nevertheless, this body of research provides evidence of the significant consumer interest in these therapies.

In addition to the high individual interest, recent years have also witnessed an increase in the societal expectations regarding the provision of complementary treatments. This has been reflected by greater insurance reimbursement for a number of therapies, for example acupuncture and massage, and recently, in the conduct of a Senate inquiry into the quality of cancer care with particular emphasis on complementary and alternative cancer care.[11] The inquiry led to a number of recommendations, including

establishment of dedicated funding for complementary therapies, increased research into complementary therapies and improved access to and information about complementary therapies.[11] These societal expectations are matched by increasing interest among health care providers as reflected by the establishment of the Society of Integrative Oncology, and emergence of the first integrative oncology centres like the one attached to Sir Charles Gairdner Hospital in Perth.[12]

While the evidence supporting many complementary therapies is increasing,[13] what is not well established is: whether complementary therapy use is beneficial to some or all cancer patients; what motivates patients to seek (or not seek) complementary therapies in their cancer care (and whether those who do and those who do not differ in some characteristics); what are the main barriers to incorporation of complementary therapies into cancer care for patients and care providers and finally; what implications does this have on cancer practice in Australia. This paper will explore these issues with the purpose of developing recommendations regarding how complementary care and research could be better integrated into conventional cancer care. It is important to emphasise that these issues will be discussed from the perspective of complementary rather than alternative care.

## Do complementary therapies improve outcomes?

There is a growing body of evidence supporting the use of complementary therapies in the cancer setting, as summarised in the clinical practice guidelines published under the auspices of the Society of Integrative Oncology.[13] The available evidence is often limited by the methodological issues of studies conducted – many of them are small, non-randomised studies and thus the level of evidence supporting interventions is often low. This seems to be the case even with regards to the most commonly used therapies. Two recent systematic reviews of commonly utilised strategies, massage and reflexology, found that while these strategies showed promise, the lack of rigorous research evidence precluded any conclusions being drawn.[14,15] There is a great need to conduct well designed studies into complementary care to provide evidence necessary for such interventions to be included with conventional care or rejected, especially if inclusion were to be supported by government funding based on agreed standards of cost benefit.

While clinicians require high levels of evidence to accept an intervention, patients argue that for low risk interventions, lower levels of evidence may be acceptable. That is, it may not be important whether the benefit was due to the intervention itself or placebo effect, as long as the benefit was possible.[16] While such an approach may not be sufficient from the perspective of decisions regarding reimbursement for these therapies, this observation highlights the need for a greater understanding of what motivates patients to seek or not to seek therapies, as motivation is only weakly related to the strength of evidence of utility of a particular treatment.

## Motivators to seek (or not seek) complementary care

Given its rising popularity, complementary therapy use is clearly addressing a currently unmet patient need. A body of qualitative research has identified a number of reasons and motivators for its use that add to a greater understanding of what needs are met by complementary care. These include: to improve perceived control over one's cancer and resulting treatment,[10,17-19] reducing the severity of physical symptoms and side-effects, particularly pain, fatigue, nausea and insomnia;[10,19] boosting immune system functioning;[10,17] dissatisfaction with conventional treatment;[18-19] and the related need to obtain a holistic approach to healthcare.[19]

Patients who seek complementary care tend to be different demographically to those who do not by being more likely to be female, younger (under 50 years), more highly educated and earning a higher income.[20-23] Medical variables associated with higher complementary therapy use include poorer health, higher pain, longer time since cancer diagnosis and having a prior history of receiving chemotherapy/ treatment.[20,23] In terms of the psychological 'profile' of complementary therapy users, only cross-sectional studies have been conducted to date and have obtained somewhat mixed findings. Two recent studies have found that complementary therapy users are more psychologically vulnerable, being twice as likely to have symptoms of depression and fear of recurrence.[18,24] This observation is further supported by studies finding that complementary care users tend to be lower in social support, high in intrusive thoughts and higher in anxious preoccupation.[25,26] Yet in contrast to these findings, one recent study found that complementary care users had higher levels of fighting spirit and internal recovery locus of control, and did not differ in psychopathology from non-users.[26] Of note, quality of life has rarely been examined as a predictor of complementary care use, despite this being identified as a primary motivator. Extrapolating from the general population, longitudinal studies have found that those with poorer physical quality of life are more likely to use complementary care,[27,28] with one cross-sectional cancer study finding that patients who seek complementary care have poorer total quality of life.[25] Overall, as the direction of relationships and causation has not been established, it remains unclear whether the elevated levels of depression observed were caused by, or resulted from, complementary therapy use. This area thus warrants further methodologically rigorous, and longitudinal research to more clearly elucidate the psychological characteristics and outcomes of complementary care use.

The patient's interest in seeking complementary care may be further modified by the influence of a cancer clinician. A qualitative study of United Kingdom male cancer patients about their decisions to use (or not use) CAM, information seeking and types of evidence used, concluded that trusted health professionals could play a significant role in helping patients make informed choices.[29] As the standards of evidence used by patients and clinicians to evaluate the benefits or otherwise of CAM may differ,[16] it is possible that patients who do not trust in a physician may be more likely to use therapies against the clinician's advice. This is particularly worth noting as clinicians tend to assume that patients who pursue complementary care are mistrustful of conventional care, and patients themselves fear rejection by their clinicians if they were to admit that they were interested in the pursuit of complementary care.[29] An atmosphere of openness and acceptance of patients' interest in complementary care may facilitate disclosure and shared decision making regarding complementary care.

## Barriers to complementary therapy use

Despite the well established desire by patients to use complementary care,[30] patients and providers encounter significant barriers to incorporating complementary therapy into the care of a cancer patient. To a significant extent these relate to: (1) insufficient awareness by providers regarding the evidence behind specific therapies or their interactions with conventional care; and (2) expectations regarding the role of conventional care providers. As complementary care by definition is 'in addition to conventional care', to ensure its optimal and safe use, including minimising any risks from interaction between conventional and complementary care, conventional care providers need to be able to integrate information regarding complementary care into the overall care of the patient. To do so, they need to be clear about their role in that process and limitations of that role. Little is known about how much information patients expect conventional health professionals to provide and little agreement on how much would be considered reasonable by the providers themselves. Access to reliable information remains limited, reducing the ability of the provider to provide adequate advice and refer clients to appropriate services. The Society of Integrative Oncology, established by cancer care professionals with an interest in complementary care, has published guidelines on standards of complementary care which provide useful information for practising clinicians regarding complementary care in cancer.[13] In Australia, the Clinical Oncology Society of Australia (COSA) has established a Complementary and Integrative Therapies Interest Group, with the aim of developing resources for clinicians regarding standards of care in complementary care and access to relevant resources in this area. Information is available to society members at http://www.cosa.org.au/MembersArea/InterestGroups/CIT.htm

While significant barriers relate to the lack of reliable information regarding evidence for complementary therapies, in some cases access to complementary care may relate to fear on the part of professionals of patient empowerment, increased expectations from the medical profession and the shift from provider driven, paternalistic care, to patient driven care.[31] In order for complementary care to be accepted and incorporated into the conventional care, an acceptance of patients' role in their care is required by the health care profession.

To be sure, some aspects of complementary care are becoming incorporated into conventional care not by explicit acceptance, but rather by a shift from what is considered complementary, outside the mainstream, to conventional and standard therapy. Examples of such therapies that could be considered mainstream, but are clearly complementary, include evidence-based psychological therapies, particularly guided imagery, relaxation and mindfulness meditation.

Barriers to patient access to complementary therapies mirror barriers to other cancer therapies and include time and cost.[32] In addition, a particular challenge for patients is finding a reputable provider who can provide advice regarding therapy and can engage with the conventional provider. Despite common preconceptions, patients are quite concerned about the risk of undermining the therapeutic relationship with their oncologist by pursuing complementary care, and this fear may lead to them abandoning the pursuit of complementary care.[29] It is likely that improvement in communication between complementary and conventional providers and incorporation of complementary care services into conventional cancer care may assist in overcoming these barriers.

## Implications for clinical practice

Increased societal expectation, patient preferences and the need for greater understanding of the interaction between conventional and complementary care, in the setting of established barriers to access, has important implications for conventional care providers. In order for effective incorporation of complementary care, clinicians need to find a way of facilitating access in the evidence-based setting. Clearly, this task is too great to be undertaken solely by conventional health care providers. What is needed is clarity regarding expectations placed on conventional providers and easy access to reputable complementary providers. Professional organisations, like COSA, can play an important role in clarifying standards and collaborating with professional organisations of complementary care providers to ensure adherence to agreed standards of practice and communication between providers. Both conventional and complementary professionals could benefit from greater understanding of their respective contributions to patient care. Cancer professionals would benefit from easy access to evidence for complementary therapies and training in the field of communication with patients regarding complementary care.[33]

No studies to date have explored patient preferences regarding whether the conventional health care system should deliver these therapies and if so, what would be the appropriate model for integration into conventional cancer care. It is also not known what proportion of cancer patients would be interested in complementary care being integrated into their conventional care pathway. Further research in this area is needed.

Finally, many challenges in incorporation of complementary care relate to concerns about therapies used in place of conventional therapies, with the explicit objective of an anti-tumour effect. These therapies, commonly described as alternative medicines, are potentially problematic, as their use is intrinsically linked to rejection of conventional, evidence-based therapies and thus may potentially be harmful and should not be recommended. A clear separation of complementary and alternative approaches may assist clinicians in dealing with these issues.

## Conclusion

Complementary therapy use among cancer patients is common and its nature evolving, along with societal expectations of cancer care as a whole. The motivators to use complementary therapy extend beyond evidence for efficacy alone and reflect a desire for a different model of care and a different relationship with a health care provider. There are multiple barriers to access, both provider and patient related. Greater collaboration and communication between complementary and conventional care providers would assist, not only in overcoming the barriers, but also building the body of evidence on potential efficacy of complementary interventions in cancer.

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# EDUCATING ABOUT COMPLEMENTARY AND ALTERNATIVE MEDICINE

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## Abstract

Considering the prevalence of complementary and alternative medicine in the community and the growing evidence base, health practitioners (and patients) need to develop informed and balanced attitudes, skills and knowledge that are going to assist in making safe and beneficial decisions regarding the use of complementary and alternative medicine. Education regarding complementary and alternative medicine use generally, and for cancer in particular, has tended to be tokenistic and piecemeal at best or, at worst, totally absent or misinformed. Complementary and alternative medicine content is often marginalised rather than being seen as an integral part of the core knowledge and skills that a well-rounded and informed health practitioner requires. This is problematic for a number of reasons, including that the practitioner is less aware of which therapies are potentially useful or harmful and is therefore less able to help patients make informed and safe decisions regarding this aspect of their healthcare. It also potentially impedes the therapeutic relationship and communication between therapist and patient, especially if a patient has a disposition towards complementary and alternative medicine. This paper will review some of the background issues regarding education about complementary and alternative medicine and make suggestions about what should be minimal knowledge and competency for a health practitioner. At a minimum this content should include teaching on the common complementary and alternative medicine modalities, ethics, the economics of complementary and alternative medicine, evidence, safety and risks including interactions, clinical applications, clinical skills in history taking and communication around complementary and alternative medicine, and how to find and assess further information. Rather than being taught as a separate discipline, complementary and alternative medicine is best integrated into the wider curriculum and healthcare delivery based upon integrative medicine principles.

Why does a health practitioner or patient need to know about complementary and alternative medicine (CAM)? There are a number of possible answers to that question, some of which will be examined in this paper, and many other answers will be explored in greater depth by other contributors to this Forum. One answer is that CAM holds a mirror up to conventional healthcare education and practice. Many practitioners feel the need, and have the interest, to know more about CAM but feel that their undergraduate education does not prepare them in this area adequately.[1] It also helps a practitioner to develop critical reflection about what takes place in conventional healthcare and issues such as:

- what constitutes modern medicine?
- clinical research, critical appraisal and evidence-based medicine
- community attitudes to health and illness
- health economics and resource allocation
- communication and the doctor-patient relationship
- inter-professional education, practice and ethics

Considering why people are using CAM may be useful in telling us something about the real or perceived deficiencies with conventional healthcare practised on the illness and practitioner-centred model as it currently is. Increasing numbers of cancer patients are turning to CAM for a range of reasons, such as:

- dissatisfaction with the medical profession, particularly its perceived lack of humanity[2]
- the extended time and holistic nature of the consultations with CAM practitioners
- orthodox medicine has difficulty in successfully managing many chronic diseases and diseases associated with ageing
- the desire for an increased access to information, patient empowerment and a reduced tolerance of medical paternalism[3]
- concerns about the expense, invasiveness or overuse of pharmaceuticals in conventional healthcare
- the rise of the consumer movement and postmodernism[4]
- people finding that CAM is effective for improving wellbeing, managing symptoms or altering the course of disease progression.[5]

CAM use is common among patients with specific illnesses like cancer, HIV and MS, with approximately two thirds of such patients using it.[6,7] CAM patients tend to be younger, female, better educated and from

higher socioeconomic groups. More people wish to look for a wider range of management strategies, consult varying information sources and make up their own minds about which treatments to use.

CAM is a fact of life in modern healthcare. For example, among Australian general practitioners, approximately 90% have referred patients to CAM practitioners and over one in four practise the common modalities like prescribing vitamins and supplements, administer acupuncture or teach meditation and relaxation therapies.[8,9] As such, CAM is a reality which the medical profession cannot afford to ignore. If it attempts to do so, it is more likely to marginalise itself rather than CAM in the eyes of many patients.

## Definitions, science and healthy scepticism

The definition of orthodox or conventional medical practice has rather blurry edges that are constantly moving. Each practitioner and patient will have a different view on this. These edges also vary widely, not only from one country to another, but from one hospital or medical practice to another, and even between clinicians working within the same hospital or clinic. A widely used definition is that orthodox medicine is scientific and evidence-based.[10] Unorthodox medicine – which includes both complementary and alternative medicine – is therefore unscientific and not evidence-based. Although this definition might be accurate much of the time, it does not take long to see that many things done in orthodox medicine are not based upon sound evidence, but upon convention or evidence that is substantially biased by industry funded research. The consistent and widespread publication bias in favour of medications, for example, unobtrusively influences clinicians' treatment decisions. Consider the heavy promotion, high expense, toxicity and hasty uptake of many new cancer drugs.[11]

Then, of course, there is a range of unorthodox therapies which have gathering evidence supporting their use and which have better safety profiles than commonly used conventional treatments. Examples could include St John's wort for depression,[12] Co-enzyme Q10 for hypertension,[13] acupuncture for pain relief,[14] and Saw Palmetto for benign prostatic hypertrophy,[15,16] to name a few. A case could be made that these therapies should be considered as first-line treatments. For example, omega-3 fatty acids are more effective for managing hyperlipidaemia than any pharmaceutical and they have beneficial side-effects and lower cost.[17] Unfortunately, most of these therapies are unlikely to be taught within medical curricula or discussed by clinicians in bedside teaching as valid treatment options.

Thus, using evidence as the defining line between orthodox and unorthodox treatments is not necessarily true. Examples have been given to make a point, but the point from an educator's perspective is not to have students believing that all CAM is helpful or safe, but rather to help students to maintain a healthy scepticism and an open-mindedness that is not blind. If it is challenging for trained health professionals to sort out the wheat from the chaff in relation to CAM, then how much more difficult will it be for patients and their families to make safe, informed and effective decisions regarding their healthcare? 'Science' is done by scientists, and the fact that scientists are human, means that science is as much about people and human psychology as it is about objective scientific facts.

Part of the problem may be that, consciously or unconsciously, we often draw arbitrary, unhelpful and rigid boundary lines within our thinking, with the result being that things which fall within the boundary are accepted unquestioningly, and things that fall outside the boundary are rejected out of hand. It fosters a kind of war-like mentality which closes down healthy dialogue and healthcare professionals from various persuasions become combatants rather than colleagues. Objectivity and truth are most imperilled in such circumstances. Caught in this war are patients, and their families are then pressured to take sides. They may receive so much conflicting advice that they may cease to communicate with their practitioners fully about the management decisions they are making.

The implications for medical education are that teachers need to be informed, need to refer to up-to-date evidence with an open mind, and would do well not to draw artificial and unhelpful boundaries rather than just be interested in what works, what is safest, what is most economical, and what fits with the patient's preferences.

## Integrative medicine

Perhaps a more useful term than CAM is integrative medicine (IM). IM refers to a holistic philosophy and way of practising healthcare which includes orthodox practice, but also places a greater emphasis on wellness, the integration of lifestyle factors and the use of CAM where it is safe, ethical and supported by evidence. In many ways, IM is not alternative practice but best practice. Naturally, the approach to any given health issue will be guided by evidence, practitioner experience and, importantly, patient preferences. In the IM model, CAM does not sit outside or compete with orthodox healthcare, but rather various modalities are interconnected and complementary. IM is an approach being investigated as the way of the future for healthcare. For example, in the United States it has recently been the subject of a US Senate hearing on healthcare, it is being fostered by the Royal Australian College of General Practitioners,[18] and it is the model that has been introduced into the curriculum at Monash University.[19]

There arises a legitimate criticism that modern healthcare in its practice and funding has for too

long under-recognised the importance of the holistic perspective, lifestyle issues and the prevention of illness. It would seem that the greatest aspiration to which modern medicine aspires is merely to help a person over the line from having demonstrable symptoms to no longer having demonstrable symptoms - which does not mean that the illness is not still there nor that the person is well. Many may argue that orthodox medicine largely ignores the importance of higher order wellness. It is in the search for a holistic or wellness approach, or in order to receive lifestyle advice and counselling, that many people seek out CAM practitioners.[20] This is not an argument for a different healthcare system, but rather an argument for a significant renovation of the healthcare we are currently delivering.

## Aim of educating health practitioners

The aim of practitioner education largely follows from defining the aim of clinical practice. If the aim is to produce a well rounded, generic practitioner who understands both the prevention and treatment of illness, and if the future of modern healthcare is to be able to span both illness and wellness, then some significant changes need to be made to the way that most courses approach CAM teaching. Consider the following issues.

Approximately two thirds of the population in most developed countries use one form or other of CAM, whether it be administered by a practitioner or, as is commonly the case, is self-administered.

Some CAM provides useful therapies either aimed at cure, slowing the progression of the illness, ameliorating symptoms, or possibly producing higher level wellbeing. As such, a practitioner needs the knowledge and skills to recommend the CAM that is safe and effective.

CAMs could potentially interact, for better or for worse, with orthodox therapies. As such, a practitioner needs to routinely ask patients about them and know where to find information on which ones interact with which medicines.

Patients may be making decisions about which treatments to use, or whether to use them at all. Apart from having implications for educating patients, it is also difficult to individualise treatments to a given patient without knowing about their views and preferences.

When clinicians are asked about CAMs they are not likely to know the answer if they have had no education in this area. A blanket response of warning against the use of CAM, or a derisory remark that all CAM is ineffective, is likely to be unconvincing and uninformed.

The significant and legitimate concerns about the motives and influence of the pharmaceutical industry on the community and the medical profession cannot be ignored,[21] as it may be driving more people to use CAM in what they perceive to be a more wholesome and unbiased form of healthcare delivery.

Considering that the majority of patients do not wish to turn against conventional healthcare when they adopt CAM, the majority would feel comforted to speak with their medical practitioners about these matters if such conversations could be opened up in a respectful way.

Most training of health practitioners tends to either ignore issues related to CAM altogether or marginalise it. Data from the US, Europe and Japan indicates that medical schools vary widely in their approach and content as far as teaching CAM is concerned. Many do not teach content on CAM at all, whereas others have compulsory familiarisation subjects.[22,23,24] In Canada, a useful initiative has attempted to provide standards and consistency in CAM teaching.[25] The National Centre for Complementary and Alternative Medicine had set up a previous initiative in the US aimed at enhancing education in this area.[26] In Australia, most medical schools teach less than five hours of content on CAM and mostly related to generic issues rather than clinical applications.[27]

When practitioners go out to search for CAM courses themselves, they may find a mixed bag in terms of quality. Much of the educational content on CAM in 'evidence-based' CAM courses is of questionable quality and may not be based upon an objective assessment of the evidence.[28] It behooves an educator to refer to the best evidence available, teach in an objective and unbiased manner and to help students to navigate their way through the maze of information and misinformation available.

Although one could make a case for all students needing to know about the applications of those CAMs which have good evidence supporting their use, detailed knowledge of any particular modality will probably always remain outside the brief of most curricula. For example, it is not expected that medical students will graduate being skilled acupuncturists or herbalists, although they might be expected to know some common and clinically important examples, the indications for the use of these treatments and any major contraindications or interactions. Electives and post-graduate training for interested students and doctors may be the best means to learn about any particular modality in more detail.

On the one hand we need to be open to many of the things that significantly affect health but are much undervalued in medical education, practice and resource allocation. On the other we need to discourage the use and promotion of those healthcare practices and therapies which do not work, particularly when they have significant side-effects and are expensive. Therapies in this latter category have significant potential to prey upon the concerns of uninformed and vulnerable patients. This

responsibility is not one which a medical student's education can afford to ignore.

As the bare minimum for a health practitioner, curriculum to cover in relation to CAM teaching include generic issues such as understanding CAM modalities and classification, as well as the reasons why people use CAM. The ethics, medico-legal issues and economic issues regarding CAM use should be covered. Very important is the consideration of evidence and which therapies are likely to be effective and safe and which are not. The other main area is how discussing and implementing CAM affects the doctor-patient relationship and communication, as well as how the practitioner can assist a patient to make an informed decision and find reliable information.

It would be fair to say that if there is good evidence supporting the benefits and safety of any particular therapy, whether it be complementary or conventional, then that therapy should be known about and recommended. At very least it should be discussed as one of the possible treatment options and the benefits and risk of its use discussed as it would be with any other treatment. Even if practitioners do not feel adequately trained to administer a CAM treatment themselves or to field questions about it, they should still know that it exists and where the patient could go in order to find out that information. The practitioner may play an important role in helping a patient to interpret information that they have found for themselves.

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# INTERACTION BETWEEN COMPLEMENTARY AND ALTERNATIVE MEDICINE WITH CONVENTIONAL ANTI-CANCER MEDICINE

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## Abstract

An increasing proportion of the population use complementary and alternative medicine including herbal medicine. This use is frequently undertaken in addition to their prescribed treatments, often without their physician's knowledge. For many types of complementary and alternative medicine, this concomitant use of treatments is without significant risk of adverse effects. However, for systemically administered complementary and alternative medicine, such as herbal medicine, there are significant risks of adverse drug interactions between herbal medicine and conventional treatments, which may result in either increased drug toxicity or therapeutic failure. It is clear that certain combinations of herbal medicine and conventional medicine carry significant risks of reduced efficacy or adverse effects and the combinations are contraindicated. For instance, in vivo studies have shown that concomitant use of St John's wort with therapeutic agents that are metabolised by the enzyme CYP3A4 has the potential to cause therapeutic failure. In cancer treatments there is also potential for pharmacodynamic interactions between herbal medicine and anti-cancer agents. For example, patients with oestrogen receptor positive breast cancers should be advised to avoid administration of phyto-oestrogen containing herbal preparations. Physicians should be proactive in obtaining a complete medication history, including herbal medicine use, in all their patients receiving cancer chemotherapy, in order to advise them appropriately with a view to making informed decisions about their treatment.

Complementary and alternative medicine (CAM) includes a diverse group of treatments ranging from music therapy, exercise and massage, to systemically administered treatments including nutritional therapies and herbal medicines. The last 15 years have seen a significant increase in the use of CAM. In 1990, a survey in the United States estimated that 34% of the respondents used at least one form of complementary therapy in the previous 12 months.[1] This figure had increased to 42% by 1997.[2] The popularity of CAM use has been mirrored in Australia.[3] In 2004, a South Australian survey reported 52% of respondents had used at least one non-medically prescribed CAM in the previous year. More than 57% of respondents reported using CAM without their health practitioner's knowledge and 50% took conventional medicine on the same day, creating the potential for interactions between conventional medicine and CAM.[3]

In certain diseases such as cancer, there has been an even greater increase in the use of CAM. In 1998, a systematic review of the literature revealed a mean CAM use in 31% among cancer patients.[4] A number of recent studies have suggested this figure may now exceed 80%, although there is variability in use depending on tumour type and ethnic group studied, CAM use being more common in breast cancer patients and individuals from Asian backgrounds.[5, 6] Increased use of CAM in people with cancer is relevant, as even in optimal circumstances there is a low therapeutic index for anti-cancer drugs, which may be further lowered by adverse interactions between CAM and the conventional cancer drugs.

A recent systematic review attempted to identify the principal reasons for CAM use in cancer patients. Although there was a wide range of responses, the most frequent were a perceived beneficial response (38%), wanting 'control' (17%), as a 'last resort' (10%) and 'finding hope' (10%).[7]

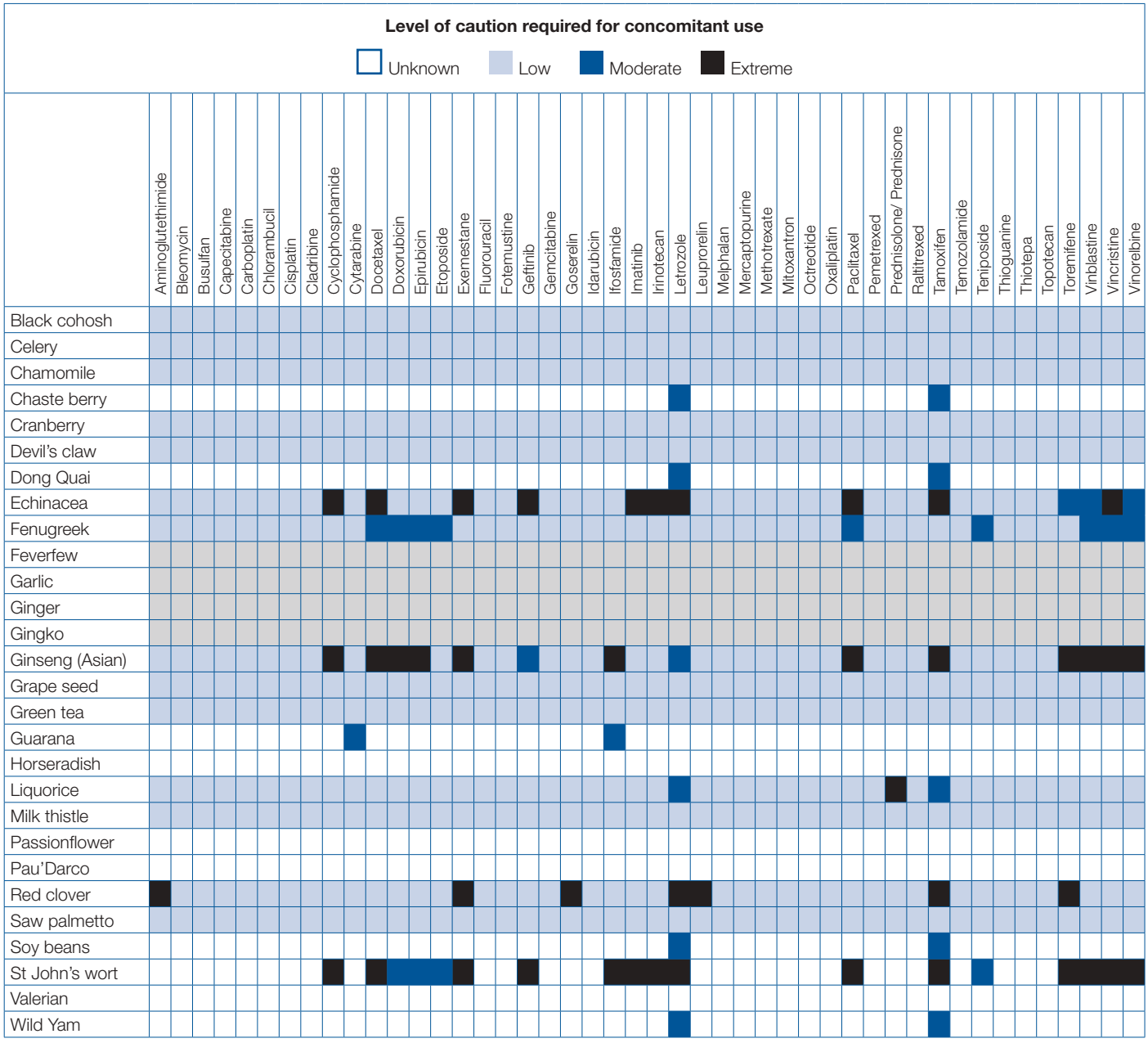
Not surprisingly, CAM is big business. In the US alone, it has been estimated that cancer patients spend over US$30 billion in out-of-pocket expenses on CAM, even though there are relatively few data to indicate the cost-effectiveness of CAM in this treatment setting.[8] This increased use by patients and expense of CAM has highlighted issues in regard to the safety and efficacy of these treatments. This is particularly the case for systemically administered CAMs including herbal medicines, where there is the potential for clinically significant interactions with conventional treatments. In this paper we have provided explanations and examples of proven and potential interactions between CAM and conventional anti-cancer agents, to inform clinicians about these commonly used medicines and highlight the relative dearth of high quality data to guide consumer and healthcare practitioners.

## Mechanisms of CAM-drug interactions

The focus of much of the current discussion has been limited to the more commonly used herbal medicine and those mentioned in recent literature, as causing or having the potential to cause herb-drug interactions

with conventional medicine.[9-12] With many conventional agents, herb-drug interactions may not lead to any serious sequelae. However, for some classes of conventional therapeutic agents that have a low therapeutic index (ie. a fine line between a safe/effective dose and a toxic dose), in particular anti-cancer drugs, even minor changes in drug clearance from a patient's body could produce dramatic effects on patient outcomes. Herb-drug interactions occur via several broad mechanisms, including pharmaceutical, pharmacokinetic (PK) and pharmacodynamic (PD) interactions (Table 1).

***Table 1:*** *Level of caution required for the concomitant use of selected anti-cancer agents with herbal medicines. The coloured classification system was derived by the authors based upon their critical, clinical evaluation of available literature. 'Extreme' caution denotes high potential for adverse reactions confirmed from in vivo studies and concomitant use should be avoided. 'Moderate' caution denotes medium potential for adverse reactions (in vitro studies indicate possible interaction) and concomitant use should only be administered under strict, clinical supervision. 'Low' caution denotes little potential for adverse reactions; in vivo and in vitro studies indicate little potential for interactions and concomitant use may be considered. 'Unknown' caution denotes a lack of available clinical evidence to make an appropriate recommendation.*



PK interactions can result when common or competing pathways of absorption, metabolism, distribution or elimination exist between the constituents of herbal medicine and conventional therapeutic agents. These interactions most commonly involve intestinal and hepatic drug metabolising enzymes (such as cytochrome P450, or "CYP" enzymes) and drug transporters such as the ABC transporters including P-glycoprotein (P-gp), breast cancer resistance protein and multi-drug resistance proteins which are found in numerous healthy tissues including the gut epithelium, liver and central nervous system, as well as, chemotherapy resistant tumour cells.[13] Two of the most important CYP enzymes for metabolism of xenobiotics in humans are CYP3A4 and CYP2D6 (Table 1). CYP3A4 is responsible for the metabolism of numerous therapeutic drugs. For instance, in cancer, CYP3A4 plays at least some role in the metabolism of agents such as the taxanes (docetaxel and paclitaxel), vinca alkaloids (vincristine, vinblastine, vindesine and vinorelbine), camptothecins (irinotecan), the hormones exemestane, tamoxifen and letrozole, and the epidermal growth factor receptor inhibitors (gefitinib and erlotinib).[12] Substrates for the drug transporter, P-gp, among cancer drugs include many of the naturally derived anti-cancer drugs including the taxanes, vinca alkaloids, epipodophyllotoxins and anthracyclines.[14]

Drug interactions can result if herbal constituents induce or inhibit these drug metabolising and transporter pathways, thereby altering the bioavailability or elimination of the conventional therapeutic agent. If bioavailability is increased (ie. increased concentrations of a drug in the body after a given dose) this may lead to increased drug toxicity, while a reduction in bioavailability may lead to compromised therapeutic efficacy. It has been recently proposed by a number of authors that some of the effects on these drug metabolising pathways might be mediated through activation of the pregnane X receptor (PXR), a ligand activated nuclear receptor that is part of the superfamily of nuclear receptors. PXR regulates the induction of CYP3A gene expression by xenobiotics, but may also regulate the induction of other genes involved in drug metabolising pathways, including CYP2B, CYP2C, CYP24, glutathione S-transferases, sulfotransferases, glucuronosyltransferases, and drug transporters, organic anion-transporting polypeptide 1A4, P-gp and multidrug resistance-associated proteins 2 and 3.[15,16] It has been recently shown that PXR is activated by a number of herbal remedies including ginkgo biloba (higher doses), St John's wort, and traditional Chinese remedies including Tian Xian, Wu Wei Zi and Gan Cao, demonstrating that herbal remedies have the potential to have a major impact on drug metabolism.[17-19]

PD interactions may occur when the bioavailable constituents of a herbal compound act in an additive, synergistic or antagonistic manner with a therapeutic agent. It is worth noting that disease states themselves can change the PK or PD of a drug and extrapolating data from healthy volunteers to patients is not always possible.[20] For example, CYP 3A-mediated drug metabolism may be impaired in patients with an acute phase response, as occurs in numerous illnesses including rheumatological conditions, acute infections and patients with advanced cancer, and probably contributes to the marked variability in drug pharmacokinetics and toxicity that has been noted in these circumstances.[21]

Although the potential for herb-drug interactions remains theoretical, for many therapeutic agents the consequences are potentially significant in terms of disease outcome and morbidity; any theoretical interaction should be regarded as clinically relevant.

## Examples of herb-drug interactions

It is not possible to discuss all possible interactions between various types of CAM and conventional anti-cancer treatments. We have chosen to provide representative examples of the types of interactions that are described above to demonstrate that drug-CAM interactions do occur and may lead to adverse outcomes. However, often the potential for interaction with anti-cancer drugs has to be extrapolated from pre-clinical studies or interactions with drugs from other therapeutic classes. These examples emphasise the need to perform well designed PK/PD studies with other CAM and anti-cancer treatments to improve our knowledge of CAM-drug interactions (including an understanding of the possible mechanism) and the safety of cancer treatments.

## Black cohosh (Cimicifuga racemosa)

Black cohosh is promoted for use in the treatment of menopausal symptoms and menstrual conditions, although its efficacy has yet to be conclusively substantiated in clinical trials. It may be misconceived as having oestrogenic properties due to its effect in menopausal herbal medicine products such as Remifemin®. However, black cohosh's effect may be due to more of a dopaminergic, rather than an oestrogenic profile,[22] or the result of constituents that have selective oestrogen receptor modulator activity.[23] Therefore, the theoretical caution in regard to administration of black cohosh in patients with oestrogen dependent tumours may be unfounded.

While there have been no direct in vivo studies, an in vitro study suggests that black cohosh may also influence the efficacy of selected chemotherapeutic agents used in the treatment of breast cancer.[24] Results showed that black cohosh enhanced the sensitivity of mouse mammary cancer cells to doxorubicin and docetaxel, but reduced sensitivity to cisplatin. Whilst the mechanisms of interaction and clinical relevance of this study are not yet clear, caution may be warranted in cancer patients receiving black cohosh in conjunction with chemotherapy. An in vivo study in rats also investigated the use of black cohosh and tamoxifen on implanted endometrial adenocarcinoma cells. It showed that black cohosh did not enhance or reduce the inductive effect of tamoxifen on tumour growth, but may have reduced the metastasising potential of the tumour potentiated by tamoxifen.[25]

A number of randomised studies have failed to show benefit for black cohosh compared to placebo in the treatment of hot flushes or vasomotor symptoms of menopause, which are common problems for women undergoing chemotherapy.[26,27]

A clinical trial has shown that black cohosh may have an inhibitory effect on CYP2D6 activity, but no significant effect on the activities of CYP3A4, CYP1A2 and CYP2E1 in healthy volunteers.[28] Caution may be warranted therefore in patients receiving therapeutic agents metabolised by CYP2D6. A further study, again in healthy volunteers, has shown that black cohosh has no effect on the drug disposition of digoxin, which may be indicative of a lack of effect of the herb on the activity of P-gp.[29] There have also been reports of black cohosh inducing acute hepatotoxicity, leading in some instances to hepatic failure necessitating liver transplantation.[30]

In summary, evidence regarding the potential interaction between black cohosh and therapeutic agents is suggestive, but limited, and further clinical and pharmacokinetic studies are required.

## Fenugreek (Trigonella foenum graecum)

The German Commission E has approved the internal use of fenugreek as an appetite stimulant and topically as a poultice to treat local inflammation. Although no herb-drug interactions have been reported for fenugreek, it has several constituents that could theoretically cause interactions with some medicines. It has been suggested that the coumarin content could theoretically potentiate the anticoagulant effect of warfarin. However, a clinical study in patients with coronary artery disease receiving 5g of fenugreek powder for three months, found no significant effect on blood coagulation parameters, although in vitro investigations showed inhibition of platelet aggregation.[31]

Fenugreek also contains several flavonoids, including quercetin, which has been implicated in CYP3A4 inhibition. One study demonstrated that quercetin increased the bioavailability of verapamil in rabbits in vivo, suggesting CYP3A4 inhibition as a possible mechanism.[32] Another trial showed that the area under the curve (AUC) of cyclosporine (a CYP3A4 substrate) was increased when it was co-administered with quercetin to healthy volunteers (n=8), the highest increase occurring when participants received quercetin for three days prior to commencement of cyclosporine.[33] An animal study also demonstrated that quercetin can increase the bioavailability of orally administered paclitaxel.[34] Increases in area under the AUC and Cmax were observed when paclitaxel was administered with quercetin, possibly as a result of intestinal P-gp and CYP3A4 inhibition. Previous in vitro studies also demonstrated an inhibitory effect of quercetin on P-gp.[35] However, information regarding plasma concentrations and bioavailability of quercetin following oral administration of recommended doses of fenugreek is largely unknown. Thus, there is the potential for interaction between fenugreek and conventional therapeutic agents as a result of the quercetin content. Caution is warranted in co-administering fenugreek together with agents that are CYP3A4 substrates and/or substrates for P-gp.

## St John's wort (Hypericum perforatum)

St John's wort is commonly used for the treatment of mild to moderate depression, as well as other psychiatric disorders such as seasonal affective disorder and mild anxiety.[36] Although its overall mechanism of action is unclear, hyperforin is believed to be one of the constituents responsible for its antidepressant effect. Several in vitro studies have indicated hyperforin acts by inhibiting the re-uptake of neurotransmitters such as serotonin, noradrenaline and possibly dopamine.[37] Despite these findings, St John's wort herbal medicine products with minimal amounts of hyperforin present, have been demonstrated to have some efficacy as an antidepressant suggesting other constituents may also have a role.

St John's wort has been shown to be a potent modulator of several cytochrome P450 enzymes. Its constituents have both inductive and inhibitory effects. In vitro studies have shown that extracts of St John's wort significantly inhibit the activity of CYP 1A2, 2D6, 2C9, 2C19 and 3A4. In vivo studies have shown ST JOHN'S WORT derivatives produce significant induction of hepatic and intestinal CYP3A4 if administered for longer than a two week period, while having no inductive effect on cytochromes P450 2C9 or 2D638 and a possible inductive effect on CYP1A2.[39] In the clinical setting, the predominant effect of co-administration of St John's wort is indication of metabolism with the associated risk of lack of efficacy due to sub-therapeutic concentrations.

Hyperforin, a major constituent of St John's wort, is believed to be responsible for inducing intestinal expression of P-gp, enhancing its drug efflux function.[40,41] Two studies have directly investigated clinically significant interactions between St John's wort and anti-cancer agents. The first of these examined the effect of St John's wort on the metabolism of irinotecan, a pro-drug of SN-38 and a known CYP3A4 substrate.[42] A 42% decrease in the AUC was observed for the combination of irinotecan and St John's wort compared to irinotecan alone. The second study investigated the effect of St John's wort on imatinib and found that the clearance of imatinib increased by 43% when co-administered with St John's wort.[43] CYP3A4 is the major enzyme responsible for the metabolism of imatinib with CYPs 1A2, 2D6, 2C9 and 2C19 contributing to a lesser extent. These studies clearly indicate the potential for clinically significant interactions between St John's wort and anti-cancer agents.

Other trials have demonstrated clinically significant interactions between St John's wort and conventional medicines.[44] Several case reports suggest St John's wort is responsible for interactions with cyclosporine with one case resulting in acute heart transplant rejection.[45] Two possible mechanisms of interaction between St John's wort and cyclosporine include induction of intestinal and hepatic CYP3A4, as well as induced expression of intestinal P-gp drug transporters.

St John's wort has also been shown to interact with fexofenadine, which is not metabolised by CYP enzymes, but is a measure of P-gp function providing further evidence as to the involvement of St John's wort in multiple induction mechanisms.[46] Thus, concomitant treatment with St John's wort and other agents that are CYP3A4 substrates or substrates for the P-gp drug transport system may affect clinical outcomes.

## Phyto-oestrogen containing herbal medicines

Many women self-medicate with complementary medicines to alleviate menopausal symptoms.[47] In vitro studies have been performed investigating the proliferative effects of herbal substances and purified extracts that are marketed for menopausal symptom relief using MCF-7 cultured breast cancer cells. Products containing soy, red clover, dong quai and ginseng have all been shown to produce increases in MCF-7 cell proliferation in the absence of oestrogen.[48] A similar in vitro assay recently published investigating purified genistein, daidzein and resveratrol, all phyto-oestrogens, also showed increases in the proliferation of MCF-7 cells.[49] Research conducted in athymic mice with implanted MCF-7 cells showed that dietary genistein was able to negate the anti-oestrogenic effects of concurrent tamoxifen[50]. These proliferative effects have not been shown in vivo, however since it is unlikely that any such study would be attempted, it would be prudent to advise women with oestrogen receptor positive breast cancers and who are undergoing treatment with anti-oestrogens, to avoid self-medication with any herbs containing phyto-oestrogens.[51, 52]

## Conclusion

The increasing use of herbal medicine and complementary therapies has led to concerns about the appropriate concomitant use of pharmaceutical and herbal medicine. The data we have examined highlight the validity of concerns about potential adverse interactions between CAM and conventional treatments. However, there are enormous gaps in our knowledge because of the lack of well-conducted clinical and pharmacokinetic studies of CAM and conventional treatments in many therapeutic settings. It is imperative that these gaps are filled to ensure that patients receive the safest and most effective therapies.

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# RESEARCHING COMPLEMENTARY AND ALTERNATIVE THERAPIES: FRAMEWORKS FOR EVALUATION

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## Abstract

Complementary and alternative medicine encompasses a vast array of interventions aimed at improving the health of individuals. A large proportion of people use complementary and alternative medicine after a diagnosis of cancer and there is a need to understand these interventions, their efficacy and interaction with conventional medical treatments. The quality and rigour of complementary and alternative medicine research has been frequently criticised. Some deficiencies in reporting of complementary and alternative medicine research can be addressed by improved research design. Further improvements are possible through the use of frameworks for evaluation of complex or whole systems that clearly document the complementary and alternative medicine intervention, placing it in the context of treatment delivery and the philosophical assumptions underpinning the intervention. These frameworks provide guidance as to the staged and systematic development of complementary and alternative medicine interventions. Using these frameworks to document the complementary and alternative medicine intervention development supports the inclusion of the philosophical concepts at the core of the intervention. Doing so is likely to assist in the development of a shared language between complementary and alternative medicine researchers and evidence-based practitioners.

The term complementary and alternative medicine (CAM) has come to encompass a wide variety of treatments ranging from biological agents such as herbs, to the use of meditation, acupuncture, aromatherapy and hypnotherapy. CAM is used by many people after a diagnosis of cancer – around 80% of adults with cancer in the US and 65% in Australia.[1-4] These interventions are increasingly incorporated into routine cancer care in Australia and other western countries.[5,6]

While less invasive forms of CAM, such as meditation, are thought not to interfere with conventional cancer treatments, there is evidence of potential interaction between some herbal medications and some cytotoxic drugs,[7] via biochemical pathways.[8] Other studies have reported that almost half of all people with cancer (47%) use nutritional supplements including antioxidants,[9] yet there are data to suggest that taking antioxidants (including high dose vitamin C) concurrently with radiotherapy or chemotherapy may be harmful.[10] Coupled with apparent gaps in knowledge of CAM among Australian oncologists,[11] there is a real concern that CAM may reduce the effectiveness of conventional anti-cancer treatments and/or increase their side-effects.

Despite their high usage, few CAM have been evaluated in high quality clinical trials and the optimal approach to CAM evaluation continues to be debated in the literature. There is a clear need to evaluate and encourage the development of an evidence-base for CAM, supported by policy and funding changes in the US and Australia.[12] The question now is how should CAM be evaluated?

## Common criticisms of CAM research

While randomised control trials are recognised as the most rigorous approach to providing evidence of intervention efficacy, trials lacking methodological rigour may introduce bias or other confounders, consequently resulting in either under or overestimation of treatment effects.[13] The Consolidated Standards of Reporting Trials (CONSORT) statement was developed to encourage clear and full reporting of randomised control trials that would enable readers to assess the methodological quality of a trial.[14]

Reviews of reporting of CAM trials suggest the reporting quality is poor, consequently making it difficult to interpret results and incorporate them into an evidence-based clinical practice.[13,15] One review of 207 randomised control trials on homeopathy, herbal medicine and acupuncture found their methodological quality to be variable, with the majority having shortcomings in reporting, methodology or both.[16] Most trials of CAM failed to adequately describe the random sequence generation, method of allocation concealment, number of participants dropping out from treatment and the reasons for drop out.[16]

Inadequacies in the reporting of CAM trials may reflect inadequacies in the design of studies. Linde et al reported that blinding in herbal and acupuncture trials was less clearly successful than in homeopathy trials, while random allocation of treatments was less clearly performed in homeopathy trials. Additionally across all three areas, intention-to-treat analysis was rare.[16]

Inadequate design and reporting of CAM research needs to be considered in context with improvements in design and reporting of conventional medicines. Moher and colleagues reviewed the quality of reports of systematic reviews in paediatric CAM, finding that overall the reporting quality was similar between CAM and conventional therapy reviews.[17] This finding, coupled with Linde et al's report of higher quality reporting of CAM research in more recent publications of larger trials in Medline listed journals,[16] suggests that as research design and reporting of conventional interventions improves, it is likely it improves in CAM research too.

## Heart of the problem

Important differences in the philosophical approaches of CAM and western health practitioners exist; these differences, and the lack of a shared language, lie at the heart of disputes about CAM evaluation.

The paradigm CAM practitioners work from differs to that of the western biomedical model, in which mind and body are identified as distinct entities and health systems are viewed mechanistically as cause and effect. CAM retains an integrated approach to mind and body. Aiming to deliver holistic care, CAM practitioners use concepts of disharmony or imbalance to diagnose problems and prescribe treatments, rather than symptoms of organ dysfunction. For some concepts fundamental to CAM practice, there are no equivalents within the western medical practice. Developing a shared language between the two approaches is key to conducting CAM research successfully.

Difficulty also arises in the translation of CAM terminology into scientific English. As CAM practice is based on concepts and terms that lack an equivalent translation or conceptualisation in western scientific thinking and language communication can be difficult. For example, in Chinese medicine the term 'Qi' is used. Translated as 'life force energy'; it is a concept that has not been fully incorporated into western medical models. Qi is not measurable or quantifiable with current diagnostic tools and tests. In terms of treatment strategy, generally, conventional medicine focuses on treating individual organs, body parts, or body systems and predicting specific responses to treatments. CAM treatment emphasises emotion and balance in body function as a whole system, with the expectation that treatment is slow, and occurrs over extended durations without undesirable side-effects.

Understanding the philosophical differences between CAM and conventional western medicine, it is important to understand that the paradigm of illness and treatment used by CAM practitioners is a cornerstone in the development of high quality CAM research. The question is then which methodological approaches will enable the philosophical and language of CAM to be considered within the research design.

## Complex systems approach

As randomised control trials have become established as the gold standard for evaluation of a single intervention, such as a drug, the methodology has been applied to other interventions with varying degrees of success. In 2000, the Medical Research Council (MRC) UK proposed a framework for the evaluation of complex interventions.[18]

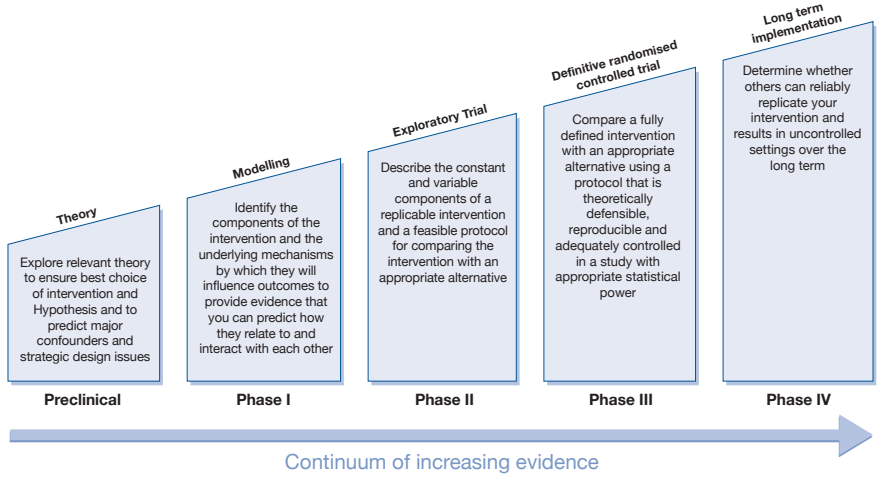
Complex interventions involve several components, or interconnecting parts, required for the intervention to function effectively.[18] In a complex intervention, the individual components may act independently as well as inter-dependently in a way that make it difficult identify the 'active ingredient'. The evaluation of complex interventions requires researchers to define and develop interventions fully.[19] Failing to do this commonly leads to difficulties in interpretation and implementation of research results.

The framework proposed by the MRC equated the development and evaluation of complex interventions with the drug development process in that both have multiple and distinct phases.[19] The phases proposed were:

- Theoretical: identifies evidence to support hypotheses regarding a specific intervention
- Modelling: aims to improve the understanding of intervention components and their relationships. This stage may involve qualitative evaluation, as well as surveys or case studies

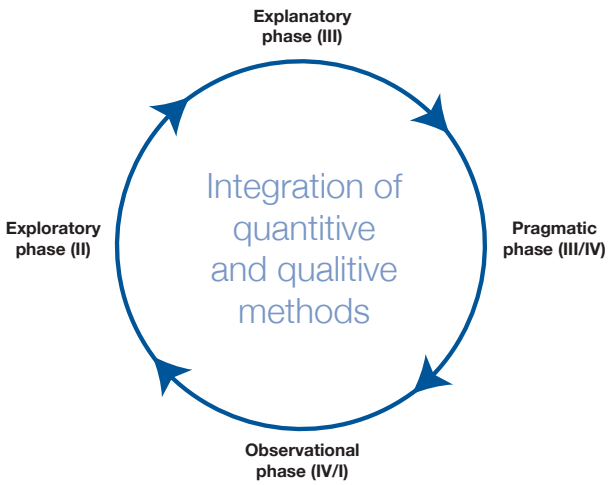
- Exploratory Trial: develops the optimum intervention and study design, including feasibility and acceptability of the intervention
- Definitive randomised control trial: the design phase should include size, unit of randomisation, population and whether concealment is feasible
- Long-term implementation – examines the intervention as it is implemented in practice.

***Figure 1*** *depicts the sequential phases of developing evidence for complex interventions.*




Complex systems research design also recognises that the development and evaluation of these interventions may be iterative rather than linear (Figure 2), with the findings generated in one stage possibly requiring review and re-examination of conclusions drawn in an earlier stage.

***Figure 2*** *depicts an iterative approach to developing and evaluating complex interventions.*




Many CAMs are multi-faceted interventions comprising botanical ingredients, practitioners and their attributes, a personalised schedule of visits and specific belief systems about health and wellbeing. Identifying the active component is difficult and effects of the intervention may be diminished if the intervention is not delivered in its entirety. CAMs and their modes of delivery commonly meet the definition of complex interventions, however their focus is often healing rather than on the disease process.

In order to fully document and evaluate CAM interventions, it is important to be explicit about the fundamental philosophical assumptions underpinning the intervention. One approach to doing this systematically is a Whole Systems Research (WSR) approach.

## Whole systems approach

A stepped approach to the development of CAM research, as suggested by Verhoef et al,[20] is built on the idea of WSR, offering high likelihood of identifying and systematically evaluating potentially useful CAM. The concept of WSR incorporates both qualitative and quantitative research methods to study the effectiveness of an intervention, along with the process, context, outcomes and philosophy.[20] Within this approach, acknowledgement of the philosophical foundations of a specific CAM and an emphasis on the healing process will support better theoretical models of how a specific CAM works and may lead to improved integration of CAM theories and conventional mechanistic approaches. It will certainly contribute to the development of better approaches to assessing CAM.[20]

Verhoef and her CAM research team developed a guideline for CAM WSR research.[20] The WSR CAM guideline recommends the integration of multiple designs and methods, including quantitative methods, qualitative research and case studies to develop innovative CAM designs, suitable to each CAM intervention.

In studying a CAM not previously researched, it is suggested that small qualitative studies are the first step; these studies should be performed in patients with clearly documented medical and psycho-social histories and belief systems. The aim of initial studies is to develop an understanding of the possible effects of CAM (similar to case studies or series). Using the findings from qualitative studies guides the delivery and evaluation of an intervention and the appropriate populations. Determining an appropriate target group for treatment is similar to approaches emerging for optimal use of targeted, biological agents in people with specific genetic mutations.

A three arm design for CAM studies (intervention, placebo control and usual care control), rather than the usual two arm design used in conventional medicine (intervention versus placebo control), has been recommended. Use of a three arm design will improve CAM evaluation by assessment of the CAM placebo effect. However, it will add significantly to the financial costs of the research project. Where blinding of treatments is not possible, this must be acknowledged and

the inclusion of an attention-control group (in addition to standard care alone) needs to be considered. Improving the rationale for a CAM intervention with rigorous qualitative data and incorporating relevant control groups will result in a vastly improved evidence base for CAM and its interaction with conventional therapies.

## CONSORT statement and CAM

The CONSORT statement, first developed and published in 1996,[14] was revised 2001 and 2010.[21,22] The statement aims to improve the clarity of reports of randomised control trial results, thereby reducing bias associated with poorly reported trials. While it is concerned with reporting what was done and found in research, it indirectly affects research design and conduct by encouraging investigators to consider what must be included to ensure transparent reporting of trial results and thereby minimising deficiencies in the research design.

Several extensions of the CONSORT statement have been developed to provide guidance on reporting of harms in randomised trials,[23] herbal interventions,[13,24] non-pharmacologic interventions,[25] pragmatic trials,[26] and trials of acupuncture.[27] During the development of studies evaluating CAM interventions, reviewing the CONSORT statement and relevant extensions is likely to assist investigators in clearly and comprehensively documenting the research and interventions they are seeking to address. Such transparent reporting will reduce the problem of bias resulting from poor reporting and will increase the reproducibility of the intervention.

## Research teams

As discussed earlier, CAM research is frequently criticised for poor research design and limited reproducibility. To address these criticisms, the design of CAM research needs to be improved as discussed above. It is also important that the CAM research team be multidisciplinary, including CAM practitioners, conventional health professionals and academic researchers. The breadth of experience and skills of such multidisciplinary teams will help establish clear clinical questions, optimal research design, conduct and reporting.

The logistics of delivering CAM therapy in the conventional hospital setting can be challenging and may limit the implementation of CAM supported by evidence. Training and motivating CAM research team members is essential in CAM research, as it is in trials of non-CAM therapies. Motivating research staff with CAM education may improve recruitment of participants for the CAM clinical trials when big sample sizes are required.

## Conclusion

In order to support the integration of CAM interventions with conventional western medicine, it is essential to develop an evidence base for the use of CAM. Frequently, the quality and rigour of CAM research is criticised, however, there is evidence of increasing quality of CAM research. Further improvements will be achieved through incorporation of the complex intervention framework or a WSR approach during the study design. Ensuring that CAM protocols comprehensively document the intervention, its context and philosophical assumptions, along with all aspects of the study design and the planned statistical analysis, will support clear and accurate reporting of the CAM study results. Clear reports of study results can be better appraised and integrated into routine clinical practice by clinicians.

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# PRAYER AS A COMPLEMENTARY THERAPY

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## Abstract

The definition of complementary and alternative medicine is broad and evolving. We question whether it should encompass 'prayer' when prayer can be directed at improving health, the mechanism is unexplained and the practice based on personal beliefs. A review of studies on prayer for the alleviation of ill-health by the Cochrane collaboration suggested results remain equivocal. A local randomised blinded study of intercessory prayer in patients with cancer showed a significant improvement in assessments of spiritual and emotional wellbeing, despite small effects. Most studies of prayer use as a complementary and alternative medicine are from the United States where religious affiliation is reportedly high. Classifying prayer within complementary and alternative medicine domains varies by culture but is usually combined with mind/body therapies (ie. meditation), distorting patterns of use. Importantly, complementary and alternative medicine use is not commonly raised with patients' physicians despite such discussions having been shown to enhance communication. Physicians who describe themselves as 'spiritual', as opposed to 'religious', appear more likely to accept complementary and alternative medicine. Including prayer as a complementary and alternative medicine raises difficulties in definition and measurement, but its widespread societal use suggests it should be acknowledged. Physicians should ask their patients about complementary and alternative medicine use as it may actually improve the acceptance and adoption of conventional treatment.

## Defining 'CAM' and 'prayer'

There is much debate over accurately defining complementary and alternative medicine (CAM) and as more therapies and practices appear (or re-emerge) in popular culture, and as more gain scientific merit and become conventional treatments, definitions continue to evolve. Ayers and Kronenfeld state that "the definition of CAM is fluid",[1] while Tippens and colleagues suggest "CAM is a moving target – a point on a continuum of broad acceptance that will eventually be overtaken by increased utilisation or study by conventional health care practitioners".[2] At the very core, complementary medicine is used in addition to conventional therapies, while alternative medicine is practised instead of the conventional. So, can something as primitive and elusive as 'prayer' be considered a CAM?

To answer this question we must first of all define prayer itself. However, this can also be a complex exercise. Maier-Lorentz[3] states:

"The word 'prayer' is derived from the Latin precari, which means 'to entreat'. Prayer may be defined as an intimate conversation with a higher being for the purpose of imploring or petitioning for something or someone."[3]

Prayer can be practised as an individual or as a group. It can be practised inside or outside of the presence of a spiritual healer or place of worship. You or your group can pray for yourself or pray for others, even people you don't know (intercession). You can pray near someone or at a distance (remote). You can pray with or without the knowledge of the recipient; and that is not to say who you are praying to and whether you consistently believe in a transcendent being. Some have even researched prayer as a retroactive phenomenon to see if its practice can impact wellbeing in the past tense, given that time may not be linear in the experience of the divine.[4]

Importantly, for the definition of a CAM, prayer is not always related to appeals for better health,[2] rather we can pray for different things and we can pray in different ways. Appeals for the wellbeing of ourselves or others would classically be defined as a form of petitionery prayer (appeal for a specific need),[3,5] rather than ritual (recitation of prepared prayers) or colloquial prayer, which is "a conversational style of prayer that incorporates petitionary elements, but is less concrete and specific eg. asking for personal guidance...".[5] However, meditative prayer may also be focused on one's health or wellbeing. Although such types of prayer are described as being aimed at developing a personal and intimate relationship with the divine,[5] in modern times, the core components of meditative prayer have been 'packaged' into efficacious, structured psycho-social interventions. Although not specifically a 'prayer' to some, others will engage in such programs using their mediative (or mindful) training to become closer to the transcendent such as during mindfulness-based stress reduction or its cousin, mindfulness-based cognitive therapy, part of the 'third wave' of therapies that emphasise the existential.[6] A recent meta-analysis of mindfulness-based stress reduction for cancer[7] identified good support for the improved mental health of patients using such methods. We have also found mindfulness-based cognitive therapy to significantly improve depression and anxiety in the cancer affected; effects maintained at a three month follow-up.[8]

Prayer, like meditation, can invoke a relaxation response, where measurable impact on the human body can be gauged, such as the heart rate slowing, brain waves

altering and respiration rates lowering.[3] Masters and Spielman point out that because some types of prayer may have a known biomedical explanation for their impact, they cannot strictly be considered CAM.[5] In addition to the relaxation response, psychological mechanisms that may impact a person's health through prayer may include increased social support, hope or decreased distress. These mechanisms may explain the positive impact of praying for oneself or praying for another in their presence or with their knowledge. Conversely, how a person's health is positively impacted by distant (remote) intercessory prayer (for others) is unknown in the conventional biomedical sense, thus it can certainly fall under the umbrella of CAM.

Indeed, many have presented empirical evidence for the impact of intercessory prayer. Cochrane reviews on intercessory prayer published in 2000, 2004 and 2009, assessing up to 10 randomised control trials suggest, however, that results remain equivocal or ambiguous.[9]

In cancer research, we found a positive impact of intercessory prayer on the spiritual wellbeing of newly diagnosed patients in Australia.[10] Nine hundred and ninety-nine patients were randomised to receive either remote Christian intercessory prayer or no prayer, with the intervention being unknown to the patients, thus eliminating expectation bias. This trial was unique as it was in oncology, was interested in the impact of prayer on 'spirituality' and did not pre-define how intercession should be achieved, rather using a well established prayer chain. As hypothesised, results showed that the prayer (intervention) group evidenced a small, statistically significant improvement over time in spiritual wellbeing compared to the control group ($p = .03$, partial $2 = .01$). Of the other quality of life measures, only emotional wellbeing was significantly improved for the prayer group ($p = .04$, partial $2 = .01$) more so than controls. Although effects were small and therefore only clinically meaningful for few of the intervention patients (10.2% showed positive reliable change in spiritual wellbeing), this study did show that the impact of intercession was indeed measurable. It did not seek to explain the mechanism of action. However, there is no clear data available on how well utilised intercessory prayer is for ill health. This is likely to be because it is a particularly difficult CAM to gauge, given it is practised by groups and individuals alike for 'unknown others' for varying periods of time. On the other hand, there is research on the use of other prayer as a CAM.

## Prayer in CAM research

Despite the complexities in definition, prayer has been included in much CAM research, most prominently through study of the US National Institute of Health Survey (NHIS). Prayer has likely been included in US CAM research due to the importance of religion and faith in America.[1] In spirituality research in oncology, only around 7% of US samples report having 'no religion',[11] compared to a much larger 30% in Australia,[12] which is similar to research in Germany at about 30%.[13] However, the proportions and predictors of prayer use from the 2002 NHIS vary according to which study you follow.

In an attempt to compare the rate of cancer survivor CAM and prayer for health use with other groups (the US general and other chronic disease populations), Mao and colleagues utilised the 2002 NHIS data.[14] They identified 1904 as having a previous cancer diagnosis. Controlling for sociodemographics, they found 40% of cancer survivors reported using CAM in the previous 12 months, significantly more than the general population but similar to other chronic disease groups. Importantly, when prayer was analysed, 62% of cancer survivors reported praying for their health, 39% had others pray for their health and 15% participated in prayer groups, showing a significant difference (up to 48% increase) compared to other groups, despite recent or distant (>10 year) cancer diagnoses. Within the cancer group, females and those with breast, uterine, or multiple cancer diagnoses, used prayer more than others. Those within the first year of a cancer diagnosis were also more likely to use prayer compared to those two to five years post-diagnosis.

Ross and colleagues also utilised the 2002 NHIS data to research CAM use in 2262 individuals with a history of cancer.[15] Although this study deemed a larger number of individuals as cancer affected from the same survey data (as compared to Mao et al.[14]), results were similar, indicating that 68.5% prayed for their own health (although they did state that this proportion rose to 88% if they assessed use 'in the previous year'). Sociodemographic factors found to influence the use of prayer included being female, older, non-Hispanic black, married and those living in the west of the US. Those with shorter survival times and those with either breast or colorectal cancer diagnoses were more likely to use prayer for their health compared to other types.

Studies using data on the cancer affected, outside the NHIS, have also found prayer to be one of the most utilised CAMs in the US. In a small survey of CAM use among 105 women with breast cancer, Lengacher and colleagues assessed the use of 33 different CAMs.[16] A total of 49% of these predominantly Caucasian women used prayer or spiritual healing to help deal with stress, highlighting that reasons for CAM use (such as 'stress') probably impact rates, and racial/ethnic differences were important factors in prayer assessment. Yates and colleagues surveyed 752 newly diagnosed US patients (94% Caucasian) about their CAM use, two weeks after completing conventional cancer treatments.[17] A large proportion (91%) reported using at least one form of complementary therapy during treatment, most commonly prayer, relaxation and exercise. Bauer-Wu and colleagues longitudinally assessed complementary medicine use among 173 women with advanced breast cancer, all receiving conventional cancer treatments.[18] Results indicated that across three time points over six months, that 90% of women used at least one CAM and 68% used two or more, with the frequency remaining stable over time. Around 75% engaged in spiritual practices, including prayer on a regular basis.

Similar to US findings, in a rare study of Indigenous Africans, Ezeome and Anarado interviewed 160 cancer patients about their use of CAM at a Nigerian teaching

hospital.[19] At some stage of their current cancer illness, 65% suggested they used some form of CAMs with herbs being the most frequent choice (52%) followed by prayer/faith healing (39%). Apart from this one study, there is very little available data on using prayer as a CAM outside of the US.

## Issues of prayer classifications in CAM research

Although there appear to be more similarities than differences in the proportions of prayer use reported in cancer affected individuals, a few things are clearly apparent from the handful of studies reported above. First, as most data comes from the US, findings are difficult to generalise to other countries given probable differences in religiosity and thus prayer rates. Second, general CAM definitions appear to vary (especially if studies are using samples not obtained through population-based surveys such as the NHIS). For instance, a Norwegian study by Kristofferson et al considered 10 recently published studies of CAM use among breast cancer patients (from various countries) and found 98% use when 'CAM user' was loosely defined.[20] However, this proportion was reduced to only 20% when a CAM user was defined as 'a user of a CAM practitioner'. Third, prayer rates will vary depending on certain factors such as race/ethnicity, gender, age and diagnosis/treatment related variables.

To further highlight the lack of stable, cross-cultural definitions of CAM, the US authority of the National Centre for Complementary and Alternative Medicine which developed the NHIS, reports on 27 different CAM that are grouped into five broad domains, including Group 2 termed 'Mind-Body Medicine' that incorporates prayer alongside mediation, relaxation, yoga, massage etc, based on their 'similarities'.[1] Conversely, in the UK, the House of Lords Select Committee on Science and Technology recommend less categories (three) where prayer is also combined with other 'Complementary Therapies' including meditation, massage and spiritual healing.[21] Therefore, in research, CAM classifications are often based on these country specific systems of measurement, although things do get worse; some researchers classify some CAM as belonging to more than one category, so they make their own judgement call on classifications, or they over inflate the proportion of CAM use in their reports. Still others don't use these national systems at all - they create their own. Based on these and other shortcomings, some researchers are now turning to assessing patterns of CAM use rather than relying on commonly reported CAM categorisations.

Based on all data collected through the 2002 NHIS, Ayers and Kronenfeld conducted a factor analysis to see if the five specified domains of CAM reflected actual patterns of use.[1] Data was based on 30,923 adults who completed the survey, reflecting CAM use in the previous 12 months. Among other important findings, results indicated that prayer should be treated as a separate domain, excluded from the usual 'Mind-Body Medicine' group, highlighting how previous domains of CAM have been inconsistent with its use. These authors suggest an alternative framework for future CAM research, including a category termed 'prayer' that includes measurement of prayer for self and others, prayer in groups and healing rituals.

This idea is clearly supported by others. In one example, Conboy and colleagues state that grouping heterogeneous therapies into CAM domains can hide important differences.[22] They found that in a nationally representative survey of 2055 Americans, that caucasians used more CAM than non-caucasians, and CAM users tended to be better educated, but under both circumstances, there was an exception in the case of the CAM 'prayer'.

## Communication of CAM use with physicians

One important finding in CAM research is the lack of communication of CAM use between patient and physician. For instance, MacLennan and colleagues found that in a state-wide population-based survey of CAM use in South Australia,[23] consistent with two previous surveys, that 53% did not report CAM use to their GP. Furthermore, 49% incorrectly believed that CAMs were independently assessed by a government agency before being sold or provided. The authors stated that: "...lay beliefs are that most CAMs are safe. This is in contrast to increasing reports of adverse effects from CAMs and other problems seen predominantly overseas, such as contamination, adulteration, substitution, variable dosage, dubious quality control and inappropriate labelling."[23]

These issues obviously surround ingestion of nutritional supplements or herbal medicine, etc, and how this impacts conventional medicines (for instance, cancer treatments), rather than the use of prayer for one's health, unless of course prayer is used as an 'alternative' rather than 'complementary' therapy, which could also pose a serious problem. In one study, while interviewing 29 men with prostate cancer who declined conventional cancer treatment, White and Verhoef identified 10 men where spirituality impacted this important choice.[24] Cancer diagnoses appeared to deepen spiritual practices for these men, including improving their personal relationships, strength of spiritual community and gratitude toward life, affecting their decision making; these findings highlight that spirituality may be a prominent theme that should be discussed at diagnosis. But is communication about (complementary) prayer use (especially the importance of prayer for the patient) of benefit to the conventional patient-physician relationship?

Roberts et al assessed communication of complementary medicine use between patients and their oncology physicians in the US.[25] They asked 106 breast and 82 prostate cancer patients how many CAMs they used out a list of 45 therapies. Physicians were asked about their support of CAM. Findings suggested that 84% of patients used at least one CAM, the most prominent being exercise (47%), followed by vitamins, prayer/spiritual practices (43%) and nutritional supplements. Oncologists

were generally supportive of CAM with more than half supporting 15 out of 45 therapies; exercise was the most supported (89%), followed by support groups, massage, meditation, relaxation, biofeedback and prayer (65%). The authors concluded that discussions of CAM between patients and physicians were rare, but importantly, when they did occur, they seemed to enhance relationships.

Yates and colleagues also found that just over half (57%) of their 752 newly treated patients discussed some use of CAM with their oncologist, or to a lesser degree, their primary care physician.[17] However, the types of CAM discussed (such as diet, massage and herbal medicine) were not the most frequently used forms (prayer, relaxation, and exercise). Similarly, in their study of 160 Indigenous African patients with cancer, Ezeome and Anarado found that the majority of patients did not mention CAM use to their doctors (56%), mainly because they were simply not asked.[19]

One interesting study by Curlin and colleagues compared the religious and spiritual characteristics of physicians and CAM practitioners.[26] Naturopaths and acupuncturists were less likely to report having a religious affiliation, but described themselves as very spiritual in contrast to other conventional physicians. Among general internists and rheumatologists, increased spirituality (rather than religiosity) was associated with more personal use of CAM and willingness to integrate CAM into a treatment program. The authors concluded that the future of successful integrative medicine will depend, in part, on the religiosity or spirituality of practitioners.

## Conclusion

Research into the prevalence of CAM use is clearly suffering from the lack of a universal definition. Some researchers have moved toward examining patterns of CAM use in an attempt to solve this issue, suggesting prayer should be classified as a separate domain. However, including prayer use in CAM research still raises many difficulties due to the enormous scope of the definition of 'prayer' itself, including measurement challenges of certain types (such as remote intercession). Despite the inherent problems ahead for CAM researchers, the use of prayer for health seems to have stood the test of time, even as other CAM use has increased. If we are to truly adopt the bio/psychosocial/spiritual model of health, then it appears that physicians should accept society's move toward the integrative and start asking their patients about CAM use. In an antithetical way, this may actually improve adoption and compliance with conventional treatment.

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# INTEGRATING COMPLEMENTARY AND CONVENTIONAL MEDICINE

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## Abstract

Complementary and alternative medicine, for reasons varying from a desire to control symptoms and prevent and treat cancer to high accessibility, has assumed significant importance in cancer treatment and care for many patients. An estimated 14% to 65% of Australian adult cancer patients use complementary and alternative medicine (compared with up to 80% to 91% in Europe and the US). Cancer patients who use complementary and alternative medicine are typically female, younger, more educated and of higher socioeconomic status. Moreover, 33% to 77% of patients do not disclose complementary and alternative medicine use to their physicians. Particular complementary and alternative medicine (eg. herbal medicines, nutritional supplements) have drawn steadfast opposition from clinicians, primarily because they remain unproven in clinical trials. However, some complementary therapies (eg. relaxation, massage) used as adjuncts to conventional medical treatments, have proven beneficial in reducing disease or treatment symptoms and improving quality of life and psychological functioning in high quality cancer clinical trials. Nevertheless, cancer patients problematically perceive complementary and alternative medicine as more 'natural' and safer than conventional treatments. Indeed, there is evidence of harm. Herbal medicine, nutritional supplements and other natural therapies, for instance, may pose direct safety risks because of their potential adverse effects or interactions with conventional anti-cancer treatments and other medications. Consequently, some complementary therapies should not be used under any circumstances irrespective of potential benefit (eg. St John's wort), while others may be beneficial when cancer patients are not undergoing conventional treatments and have no other contraindications. Complementary and alternative medicine may also cause indirect harm (eg. resultant delays in conventional treatment potentially compromise treatment outcomes, quality of life and survival). It is therefore imperative that those involved in the medical care of cancer patients are equipped with the skills and knowledge to help patients appropriately evaluate complementary and alternative therapies. Additionally, due to the safety risks involved, clinicians are strongly encouraged to routinely ask patients about complementary and alternative medicine use. In conclusion, whether termed integrative cancer care or complementary medicine, health professionals in Australia should strongly consider offering evidence-based complementary therapies (or at least safe forms of them) alongside conventional treatments through their own cancer services. Conceivably, this will influence patients to continue with mainstream care and help them avoid any potential harm that may occur with autonomous complementary and alternative medicine use. In this way, optimal holistic care will be ensured for cancer patients by clinicians providing conventional oncology treatment and care.

Complementary and alternative medicine (CAM) continues to evoke fierce debate and divergent views within the medical community. It remains an attractive and commonly used treatment option for many cancer patients regardless of whether their clinicians like it or believe in it. Consequently, it divides health professionals providing conventional cancer care and CAM practitioners offering unconventional care.

The US National Centre for Complementary and Alternative Medicine (NCCAM) defines CAM as 'a group of diverse medical and health care systems, practices and products that are not presently considered part of conventional medicine'.[1] Complementary and alternative therapies must be distinguished, however. Complementary therapies are adjuncts to conventional medical treatment that are increasingly perceived as an important part of supportive care;[2,3] they are often used for symptom management and to enhance quality of life and overall patient care.[4] Alternative therapies, in contrast, are clinically unproven and are used instead of conventional treatments.[2] They can be particularly damaging to cancer patients, as delay or outright refusal of conventional treatment often compromises their likelihood of cure or remission.[5] More recently, the term 'integrative oncology' has emerged and involves a standard of care for cancer patients that utilises safe, evidence-based complementary therapies in conjunction with conventional anti-cancer treatments via a multidisciplinary approach designed to evaluate and treat the whole person rather than the disease per se.[6]

In the most recent population surveys in 2005/06, an estimated 67% of Australians used CAM,[7] which was at least equivalent to prescription drug use,[7,8] and represented out-of-pocket spending of $4.1 billion, with as many visits being made to CAM practitioners as medical practitioners (approximately 68 million each).[9] In adult cancer patients, a systematic review of 21 studies worldwide reported an average prevalence of CAM use of 31% (range: 7-64%).[10] Other studies report even higher prevalence depending on CAM definitions used and cancer populations studied (eg. up to 91% of US patients reported CAM use including

prayer and exercise).[11,12] In Australia, CAM use by cancer patients has varied widely from 14% to 65%.[13,14]

Cancer patients may make the decision to use CAM upon diagnosis, during conventional treatment, in response to disease progression or recurrence, or during remission/survivorship. Cancer patients who use CAM are typically female, younger, more educated and of higher socioeconomic status.[2,15,16,17-19] There are many reasons why cancer patients use CAM (Table 1), including: cancer cure or prolongation of life;[20-29] relief from cancer symptoms and conventional treatment side-effects;[19,27,30,31] to assist conventional treatments;[21,25] boosting immunological function or energy;[16,19,27,30] enhancing physical, emotional and spiritual wellbeing;[15,16,32,33] and maintaining a sense of control or hope.[16,19,20-22,24,25,32,34] Finally, research indicates that 33% to 77% of patients do not disclose CAM use to their physicians,[45] including 40% of cancer patients in one Australian study.[20]

***Table 1:*** *Reasons why cancer patients use CAM.*

| Common reasons | Other reasons |
|---|---|
| Cure or prolongation of life[20-29] | Perceptions that CAMs are natural, beneficial and will cause no harm[35] |
| Symptom relief from cancer and its treatment[19,27,30,32] | Encouragement from family, friends and other cancer patients/survivors[19,28,36-38] |
| Assist conventional anti-cancer treatments (eg. surgery, chemotherapy, radiotherapy)[21,25] | Media influence[39,40] |
| Boost immunological function[16,19,27,30] | Cultural values and beliefs[33] |
| Boost energy levels[16,19,27,30] | Poor cancer prognosis[41] |
| Enhance physical, emotional and/or spiritual wellbeing[15,16,32,33] | Strengthen the body to cope with conventional anti-cancer treatments[3] |
| Maintain a sense of control over their cancer and its treatment[16,19-20,22,24,25,32,34] | Reduce the need for invasive, painful or expensive anti-cancer treatments[3] |
| Maintain hope of successfully overcoming cancer[16,19,20-22,24,25,32,34] | Enhance quality of life[3] |
| | Prevent recurrence following conventional anticancer treatment[42,43] |
| | High accessibility of CAM (eg. due to non-prescription or self-referral)[44] |
| | Greater one-on-one attention from CAM practitioners |
| | Dissatisfaction with conventional medical care[44] |
| | Poor doctor-patient relationship[44] |

## Cancer physicians' concerns and attitudes regarding CAM

Collectively, there is a lack of scientific evidence for the efficacy of CAM in oncology.[10,46-48] Certainly, no CAM has proven effective in reliably curing or suppressing any form of cancer.[6] A useful distinction however, is that between cancer cure and cancer care.[49] Some CAMs (eg. mind/body techniques such as relaxation, acupuncture, massage) have proven relatively effective and safe in relieving disease/treatment symptoms and enhancing quality of life/psychosocial functioning and, thus, are important in caring for patients throughout the cancer experience.[4,6,50-53] Other CAMs (eg. herbs, nutritional supplements, antioxidants) however, have drawn steadfast opposition from oncologists, primarily because they: remain unproven in clinical trials; possess greater health risks due to adverse interactions with prescribed cancer treatments or medications (eg. CAM-drug interactions, surgical complications such as bleeding); and may delay or reduce the efficacy of conventional treatments and, subsequently, compromise the likelihood of cure/remission and shorten survival time (Table 2).[54]

***Table 2:*** *Concerns held by physicians for cancer patients using CAM.*[54,55]

| Primary concerns | Other concerns |
|---|---|
| Specific CAMs are unproven in clinical trials | Financial harm due to the excessive cost associated with CAM |
| Adverse interactions with conventional treatments or medications (eg. CAM-drug interactions, surgical complications such as bleeding) | Psychological harm caused by CAM use (eg. by creating false hope in medically hopeless situations) |
| Reduced chance of cure or remission (due to CAM use delaying or reducing the efficacy of conventional treatments) | Abandonment of conventional treatment |
| Shorter survival time (due to CAM use delaying or reducing the efficacy of conventional treatments) | Patients confusing physicians' willingness to discuss and support their choice to use CAM with actual medical support for them |
| | Litigation against physicians if they (appear to) advocate use of CAM that proves to be a failure |

## Efficacy and safety of CAM

In one population survey, 75% of people agreed that combining conventional medical treatment and CAM was preferable to using either alone.[56] Problematically however, CAM is often perceived by cancer patients as being more 'natural' and, by association, safer than conventional treatments.[35] CAMs can directly harm patients via toxic or allergic reactions to their use alone, interactions with chemotherapy agents and prescribed medications, or contaminants in their manufacturing or from the environment (eg. heavy metals, pesticides, bacteria, fungi).[52,54] Some herbs, nutritional supplements and other botanical agents: have toxic and potentially life-threatening effects (eg. kava, comfrey and black cohosh may cause hepatotoxicity);[57,58] interact with chemotherapy and prescription drugs (eg. St John's wort may result in serotonin syndrome when taken with antidepressants, and reduce the efficacy of chemotherapy involving irinotecan and imatinib);[54,58] or cause complications during surgery (eg. garlic, ginkgo biloba and ginseng may increase bleeding) and radiotherapy (see Table 3 for a summary of direct harm that may result from CAM use).[54,59,60]

CAM may also cause indirect harm to patients (Table 4). Resultant delays in conventional treatment potentially compromise treatment outcomes, quality of life and survival.[61,62] Financial or emotional burden (eg. prolonged denial), or the squandering of precious, limited time that some patients have left also constitute indirect harm. Finally, patients may fall victim to harm as a result of the unsafe practices of CAM practitioners with inadequate training or competence, often owing to the absence of self-regulatory bodies and unsatisfactory government legislation protecting health consumers. Moreover, harm may be exacerbated by: regulatory deficiencies in monitoring the biological potency of herbal crops or use of the correct plant species (causing wide variation in therapeutic efficacy); product standardisation in terms of purity and dosage (resulting in possible substitution/adulteration and incorrect dosing or preparation); and product labelling or advertising.[63]

Despite the long history of most CAMs, rigorous scientific research evaluating their efficacy and safety is a recent phenomenon. A diverse range of CAM is utilised by cancer patients in Australia and elsewhere, and the heterogeneity of these techniques appear to

***Table 3:*** *Safety of complementary and alternative medicine: direct harm resulting from CAM use by cancer patients.*[60]

*CAM = complementary and alternative medicine; MAOIs = monoamine oxidase inhibitors; RCT = randomised control trials; SNRIs = serotonin and noradrenaline reuptake inhibitors; SSRIs = selective serotonin reuptake inhibitors*

| **Direct harm** |
|---|
| *Toxic reactions to specific CAMs per se*<br>• laetrile/amygdalin causes cyanide poisoning, which may result in death<br>• high-dose beta-carotene increases lung cancer incidence and cancer mortality in smokers<br>• ephedrine alkaloids, such as ephedra/ma huang, may cause cardiovascular events including hypertension, tachycardia, heart attack and stroke<br>• chronic use of valerian (≥ 2-4 months) may result in insomnia, as well as withdrawal effects (e.g. delirium, tachycardia) if also used heavily |
| *Allergic reactions to specific CAMs per se*<br>• oral/topical use of garlic may cause contact dermatitis, garlic burns and anaphylaxis resulting in possible death |
| *Adverse CAM-drug interactions with chemotherapy agents*<br>• kava, black cohosh, laetrile/amygdalin and echinacea, among other herbal medicines and nutritional supplements, may increase the risk of acute or chronic liver failure (and resultant death or liver transplant) when receiving hepatotoxic chemotherapy drugs, including cyclophosphamide, methotrexate, camptothecins (for instance, irinotecan), taxanes (for instance, paclitaxel), vinca alkaloids (for instance, vinorelbine) and EGFR-TK inhibitors (for instance, erlotinib and cetuximab) |
| *Adverse CAM-drug interactions with other prescribed medications*<br>• ginseng, garlic, ginkgo biloba, ginger, Lingzhi and St John's wort, among others, may increase bleeding when used concurrently with anticoagulant/antiplatelet medications (eg. warfarin, aspirin)<br>• St John's wort may cause serotonin syndrome (eg. hypervigilance, agitation, muscle twitching, mental status changes, sweating, fever, shivering, rigidity, tachycardia/hypertension resulting in possible shock and death) when combined with prescription antidepressants<br>• valerian may increase the effects of sedatives (benzodiazepines and barbiturates), hypnotics and anxiolytics when used concurrently |

| Direct harm |
|---|
| *Adverse interactions with other CAM*<br>• laetrile/amygdalin combined with dietary intake of fruit seeds (for instance, apricot, bitter almond, peach, apple), raw almonds or megadoses of vitamin C increases the risk of cyanide poisoning and resultant death |
| *Adverse interactions with comorbid medical or psychiatric illnesses*<br>• ginseng, garlic, ginkgo biloba, ginger, Lingzhi, St John's wort and massage therapy, among other CAM, may increase bleeding and risk of resultant death in cancer patients with coagulation disorders<br>• kava, black cohosh, laetrile/amygdalin and echinacea, among others, are potentially hepatotoxic and increase the risk of irreversible liver damage (and resultant death or liver transplant) in cancer patients with liver disorders<br>• ephedrine alkaloids (for instance, ephedra/ma huang) and Siberian ginseng/eleuthero (Eleutherococcus senticosus) possess immunostimulatory properties, thus use increases the risk of cardiovascular events (eg. heart attack) and resultant death in cancer patients with cardiovascular disease<br>• meditation, hypnotherapy and Reiki may exacerbate psychological problems in cancer patients with psychosis, personality disorders and/or other psychiatric illnesses (for instance, schizophrenia, borderline personality disorder and bipolar disorder, respectively) |
| *Adverse effects during or following (cancer) surgery due to CAM-drug interactions (for instance, anaesthetics), inhibition of platelet function, excessive sedation, hypertensive effects, or slow wound healing*<br>• ginseng, garlic, ginkgo biloba, ginger, Lingzhi and St John's wort, among others, may increase bleeding during or following surgery if not ceased at least four to seven days prior to surgery<br>• St John's wort, valerian, garlic and kava, among others, may increase/decrease the effects of anaesthetics administered prior to surgery if not ceased at least four to seven days beforehand<br>• shark cartilage is best avoided prior to surgery as it may slow wound healing postoperatively |
| *Adverse interactions with hormonal therapy or other conventional anti-cancer treatments*<br>• ephedrine alkaloids such as ephedra/ma huang increase the risk of cardiovascular disease in prostate/testicular cancer patients receiving hormone therapy |
| *Adverse interactions with genetic predispositions or tendencies*<br>• laetrile/amygdalin increases the risk of cyanide poisoning and resultant death in genetically predisposed patients with a diminished capacity to detoxify cyanide<br>• atopic patients with a genetic tendency towards hypersensitivity may be more prone to allergic reactions (rashes, increased asthma, anaphylaxis resulting in possible death) when using echinacea |
| *Decreased efficacy of prescription medications*<br>• St John's wort may reduce the efficacy of opioids (for instance, morphine, fentanyl, oxycodone, buprenorphine) for cancer pain in (palliative) patients when used concurrently<br>• St John's wort may reduce the efficacy of antidepressants (for instance, SSRIs such as sertraline; SNRIs such as venlafaxine; tricyclics such as amitryptiline, MAOIs such as phenelzine) when used concurrently |
| *Decreased efficacy of chemotherapy*<br>• St John's wort can reduce the efficacy of irinotecan and increase myelosuppression in advanced colorectal and lung cancer patients; and may reduce the efficacy of imatinib for gastrointestinal stromal tumours, chronic myeloid leukaemia and other malignancies<br>• green tea may reduce the efficacy of bortezomib in multiple myeloma and mantle cell lymphoma patients |
| *Decreased efficacy of radiotherapy*<br>• limited evidence suggests that use of antioxidants may protect tumour cells and reduce the efficacy of radiotherapy |
| *Decreased efficacy of hormonal therapy or other conventional anti-cancer treatments*<br>• female ginseng (Angelica sinensis)/dong quai, red clover and soy exert oestrogenic effects, and may reduce the efficacy of hormonal (anti-oestrogen) therapy for breast and other hormone-sensitive cancers |
| *Adverse effects due to contamination of CAM products in manufacturing or from the environment (eg. by heavy metals, pesticides, bacteria, fungi or other impurities)*<br>• excessive consumption of shark cartilage or fish may result in adverse effects due to toxic levels of mercury and other contaminants<br>• contamination of laetrile/amygdalin manufactured in Mexico (the world's largest supplier) and Chinese herbal medicines by bacteria and other impurities may lead to infection or disease (eg. hepatitis B or C, herpes simplex, varicella zoster, tuberculosis) |

| Direct harm |
|---|
| *Adverse effects due to substitution or adulteration of CAM products with prescription or non-prescription drugs (eg. corticosteroids, hormones, salicylates, antihistamines, caffeine)*<br>• adulteration/substitution of Chinese herbal medicines and nutritional supplements such as laetrile/amygdalin are not uncommon (for instance, unspecified adulteration with corticosteroids may lead to the hormonal disorder Cushing's syndrome and adverse interactions with diabetic and heart medications among others) |
| *Adverse effects or negligible/decreased efficacy of CAM products as a result of not being standardised (ie. in terms of purity and dosage)*<br>• excessive doses of shark cartilage supplements may produce common side-effects (for instance, gastrointestinal symptoms such as nausea, vomiting, stomach upset, constipation/diarrhoea and taste alteration) and more serious adverse effects due to toxic levels of mercury, cadmium and other contaminants, given there is no generally accepted recommended dosage or duration for administration<br>• shark cartilage products typically contain varying amounts of active ingredients, and therefore may not have any biological activity (for instance, liquid shark cartilage preparations reportedly contain over 99% water and less than 1% protein; powdered shark cartilage may contain excessive binding agents and fillers, including collagen, gelatin, talc, magnesium stearate and silica) |
| *Adverse effects or negligible/decreased efficacy of CAM due to product mislabelling or misleading advertising*<br>• mislabelling of Chinese herbal medicines and nutritional supplements such as laetrile/amygdalin are not uncommon in regard to unlisted adulterants and may cause adverse effects (for instance, unspecified adulteration with corticosteroids may lead to the hormonal disorder Cushing's syndrome and adverse interactions with diabetic and heart medications among others)<br>• BeneFin (powdered shark cartilage), SkinAnswer (glycoalkaloid skin cream) and MGN-3 (rice-bran extract) were falsely promoted and marketed by Lane Labs-USA from 1997 to 2004 as effective and safe treatments for cancer and other diseases through books, articles, brochures, websites and employee statements. In 2004, Lane Labs were fined $1 million and ordered to refund customers and destroy all inventory of these products, except for a quantity of BeneFin needed for research purposes. Subsequently, two RCT involving advanced cancer patients demonstrated that BeneFin was ineffective in improving survival or quality of life compared to standard conventional care. |
| *Adverse effects or negligible/decreased efficacy of CAMs as a result of CAM practitioners with inadequate training or competence*<br>• acupuncturists lacking experience or competence are more likely to cause minor adverse effects (for instance, local bleeding and needling pain), as well as major adverse events (for instance, pneumothorax)<br>• the skill of instructors in meditation or relaxation techniques may be important in determining whether the occurrence of paradoxical anxiety symptoms become valuable learning opportunities for teaching management of stress/anxiety or, alternatively, adverse events<br>• massage therapists should avoid applying direct pressure over known tumours to prevent adverse effects in cancer patients; no massage or reduced pressure is also advisable for cancer patients with coagulation disorders, bone metastases, open wounds or radiation dermatitis, and prosthetic devices (for instance, infusaport, colostomy bag, stents)<br>• homeopaths lacking experience or competence may prescribe homeopathic medicines in such ultra-low concentrations that they possess no clinical therapeutic efficacy whatsoever |

**Table 4:** *Safety of CAM: indirect harm resulting from CAM use by cancer patients.*

| Indirect harm |
|---|
| Potentially compromised treatment efficacy, quality of life and survival of cancer patients if CAM use results in the delay, abandonment or complete refusal of conventional anti-cancer treatment[61,62] |
| Decreased likelihood of comprehensive multidisciplinary input in conventional treatment plans and important evidence-based follow-up plans for cancer patients |
| Financial burden due to the excessive costs associated with CAM |
| Psychological distress (eg. due to prolonged denial, by creating false hope in medically hopeless situations) |
| Precious, limited time of some cancer patients (eg. advanced disease patients with poor prognosis, patients with disease progression or recurrence) may be squandered |
| Indirect harm stemming from CAM practitioners lacking experience or competence (eg. misdiagnosis resulting in the delay of appropriate cancer treatment)[63] |
| Compromised clinical trial outcomes if the effects of unknown CAM use by trial patients are misattributed to new conventional anti-cancer treatments being investigated[64,65] |

be reflected in their reported efficacy also.[6,52,60,66-68] Some show considerable promise and in years to come may be integrated into everyday clinical practice, while others are ineffective and, worse still, directly harmful. Subsequently, there is a sizable gap between the use of some popular CAM and the evidence to support that use.

## Future research in CAM and establishing research priorities

Relatively little CAM research has been performed in Australia. Unfortunately, research gaps are the rule rather than the exception in the CAM area. Disincentives to CAM research are not purely financial, but also involve a lack of qualified investigators among CAM practitioners and methodological and ethical difficulties unique to conducting CAM clinical trials. Furthermore, until recently Australia had no national research body to encourage and prioritise CAM research, or co-ordinate collaborative research between CAM and conventional medical practitioners (compared with US NCCAM, UK National Cancer Research Institute, European Commission). A formal collaborative approach to establish common research goals was initiated in 2007 by the creation of the Australian National Institute of Complementary Medicine (NICM) and the inclusion of complementary medicine in the overall health and medical research strategic plan of the National Health and Medical Research Council.[69] The mission of the NICM is to increase complementary medicine research and investment across Australia, effectively linking complementary medicine researchers and practitioners with the broader research community, industry and other stakeholders to provide strategic focus and foster excellence in research.[69,70]

Ultimately, the NICM's primary objective is to translate complementary medicine research evidence (safety, quality, efficacy, cost effectiveness) into clinical practice and relevant policy. To this end, the NICM has established three collaborative research centres: (1) traditional chinese medicine; (2) natural medicines; and (3) neurocognition, and nutraceuticals and herbal medicine, which have secured approximately $8 million in research funding from government, universities and other collaborative partners.[70] Emphasis is currently focused on areas of high disease burden, where preliminary evidence is strong and demonstrates likelihood of positive impact. Cancer is one of those areas and integrative oncology research has been initiated as a result of a partnership between the NICM and National Breast Cancer Foundation.[70] Importantly, this research falls into two high priority areas for cancer patients: (1) complementary therapies in the management of disease symptoms and side-effects of conventional anti-cancer treatments and; (2) adverse effects of CAM-drug interactions during conventional treatments (ie. drug toxicity, therapeutic failure).[70] Other high priority areas that need to be addressed however, include: (3) quality control and labelling of herbal medicines, nutritional supplements and other natural products, and quality control of practitioner-administered CAMs; (4) the role of nutrition and other forms of CAM in cancer prevention, as well as the potential role they serve in cancer survivorship and prevention of recurrence; and (5) the mechanisms of action underpinning beneficial complementary therapies.

## Integrative cancer care in Australia today

Most medical schools offer CAM-based courses and/or training in the US and Europe (91% of US medical schools for the graduating class of 2009, up from 26% in 2001),[71] and many hospitals there offer integrative therapies for patients.[72] However, relatively little has been accomplished to make evidence-based complementary therapies available to (cancer) patients in Australian hospitals, despite growing demand. A few notable exceptions exist, though.

The SolarisCare Foundation Cancer Support Centre was established in 2001 at Sir Charles Gairdner Hospital in Perth, Western Australia. Complementary therapy and supportive care services offered by SolarisCare include psychological and group support, relaxation/meditation, several types of massage therapy and other manipulative and body-based practices, touch therapies and education/information, but purposely exclude therapies that involve ingesting substances (eg. nutritional supplements).[73] Initially met with considerable opposition from some medical practitioners,[74] more than 25,000 free sessions have been provided to over 1800 cancer patients and their carers statewide by a team of over 100 qualified/trained volunteers.[75] SolarisCare has recently expanded its free and paid services to the privately run St John of God Hospital, Subiaco and to rural cancer patients and their carers in Bunbury and other regional centres in Western Australia. Of interest, however, is that 85% of individuals using their services have been women, and 55% have reported a diagnosis of breast cancer.[74,75]

The Peter MacCallum Cancer Centre, Australia's only dedicated cancer hospital, in Melbourne, Victoria, provides complementary therapy and supportive care services to patients and their families in the form of psychological support, different types of massage therapy, relaxation/meditation, stress management and education/information, with some emphasis on music therapy.[76] Also, under construction is the Olivia Newton-John Cancer and Wellness Centre, which is based at Austin Hospital in Heidelberg, Victoria. The centre's 'wellness' therapies and support services will complement the centre's mainstream medical care and treatment, and collaborative research into new anti-cancer treatments with the US Ludwig Institute for Cancer Research.[77]

## Integrating complementary medicine into mainstream cancer care

Integrative cancer care or oncology is a patient-centred approach that nurtures the physical,

emotional and spiritual well-being of cancer patients by integrating safe, evidence-based complementary therapies with conventional anti-cancer treatments. It uses a multidisciplinary approach that assesses and treats the patient as a whole rather than addressing their disease alone. Complementary therapies used by cancer patients are diverse in their origin, premise, practice, efficacy and safety. In Australia, CAMs may be categorised by the Therapeutic Goods Administration (TGA) as registered or listed products. Registered products are prescribed or non-prescribed medications which meet Australian standards of quality, safety and efficacy. Listed products are low risk items that are not routinely evaluated with respect to a manufacturer's claims before marketing, but are subject to a random audit after listing.[78] Listed products consist almost entirely of CAMs, which implies that they are produced according to appropriate standards for quality and safety, but guarantees nothing in regard to their efficacy. Cancer patients and other members of the public are mostly unaware of such distinctions and may believe that a complementary (or alternative) medicine listed by the TGA has been assessed as both effective and safe and approved for use by the Federal Government. Additionally, many complementary therapies have long histories as components of ancient traditional medical practices, but have only been subjected to rigorous scientific investigation in the last 10-20 years. More research is required to evaluate or confirm the efficacy and safety of many of these therapies.

As stated previously, high quality cancer clinical trials indicate that some complementary therapies, used as adjuncts to conventional medical treatments, are beneficial in reducing disease or treatment symptoms and improving quality of life and psychological functioning.[6,52,60,66-68] There is evidence of potential harm also (Tables 3 and 4). Herbal medicines, nutritional supplements and other natural therapies may pose direct safety risks because of their potential adverse effects or interactions with conventional anti-cancer treatments (chemotherapy, radiotherapy, surgery, hormonal therapies) and other medications. Some should not be used under any circumstances irrespective of potential benefit (eg. St John's wort), while others may be beneficial when cancer patients are not undergoing these treatments and have no other contraindications.

It is imperative that those involved in the medical care of cancer patients are equipped with the skills and knowledge to help patients appropriately evaluate CAM, in order to receive benefit while avoiding harm. Unfortunately, most physicians have limited knowledge of the safety and efficacy of specific complementary and alternative therapies and have not had any formal training in the CAM area.[79-82] Furthermore, few oncology health professionals feel comfortable discussing CAM, and are concerned that they cannot effectively communicate with patients or have the skills to help them maintain hope.[35,83-85] Surveys indicate that clinicians desire greater access to evidence-based CAM information, to improve the quality of their care, and to enhance communication with patients.[86,87] Due to safety risks associated with CAM, clinicians are strongly encouraged to routinely ask patients about complementary and alternative therapy use.

Several recommended approaches for discussing CAM with cancer patients have been published,[88-95] including a set of communication guidelines.[96] These approaches and guidelines to effective communication generally involve: (1) eliciting the patient's perspective of his or her illness; (2) being open-minded/non-judgmental and respectful in regard to cultural and linguistic diversity and different belief systems; (3) asking patients questions about CAM use at critical points in their cancer experience; (4) actively listening to patients and responding to their emotional state in exploring the details of CAM use or motivations to use it; (5) discussing relevant concerns while respecting the patient's beliefs and emphasising that 'natural' does not necessarily equate with safety in explaining known safety risks; (6) providing patients with balanced, evidence-based information and advice about specific complementary and alternative therapies; and (7) providing close clinical follow-up and psychological support of patients using CAM, even if they choose therapies which their clinician disagrees with.

## Conclusion

Complementary therapies or CAMs, as they are commonly referred to by patients and clinicians, are much sought after by Australian cancer patients as a means of coping with the physical and emotional impact of their disease and/or treatment. Irrespective of whether doctors like them or believe in them, patients will use them. If health professionals are to provide cancer patients with the best care and advice possible, then they cannot ignore this sign of the times.

Whether termed integrative cancer care or complementary medicine, cancer physicians in Australia should strongly consider offering evidence-based complementary therapies (or at least safe forms of them) alongside conventional treatments through their own cancer services.[74] Conceivably, this will influence patients to continue with mainstream care and help them avoid any potential harm that may occur with autonomous CAM use. In this way, optimal holistic care will be ensured for cancer patients by clinicians providing conventional oncology treatment and care.

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# FAMILY AND COMPLEMENTARY AND ALTERNATIVE MEDICINE

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## Abstract

Families of patients with cancer shape and share in the many and difficult decisions faced following diagnosis, with significant involvement in decisions regarding complementary and alternative medicine. Such decisions may be particularly difficult due to conflicting opinions regarding complementary and alternative medicine and relative lack of medical guidance. Family may act as information seekers, advocates and/or role models, either prompting, enabling or discouraging use by the patient. Complementary and alternative medicine use within a family may promote familial cohesion and functioning, or increase familial distress and conflict. Where outcomes are poor, the ability of the family to care for themselves and the patient may be compromised, adding to the burden of cancer within the community. Some complementary and alternative medicine may offer benefits to family members themselves, either with or without patient use. Evidence is lacking, however, regarding the effect of differences in the experiences or perceptions of complementary and alternative medicine use by individuals in different familial relationships to the patient, or in differences associated with gender, socio-economic or geographical status, ethnic or cultural background, or non-traditional family structure. Morever, little is known about how families negotiate decisions about complementary and alternative medicine, nor of the long-term consequences of these decisions upon family well-being and functioning. Such knowledge would enable clinicians to better advise patients and their families on treatment choices following a cancer diagnosis.

Complementary and alternative medicine (CAM) use is common in cancer patients with evidence that, at least in breast cancer patients, CAM use has increased significantly over time.[1,2] In Australia, prevalence of CAM use in cancer patients has been reported to range from 22% to 82%.[3,4] There is considerable research focusing on the reasons for, and socio-demographic or disease correlates of CAM use.[5,6] Yet despite reported high prevalence rates, discussions infrequently occur in the oncology setting, such that patients are often left to seek information about CAM, and to take responsibility for making safe and informed decisions.[7-10]

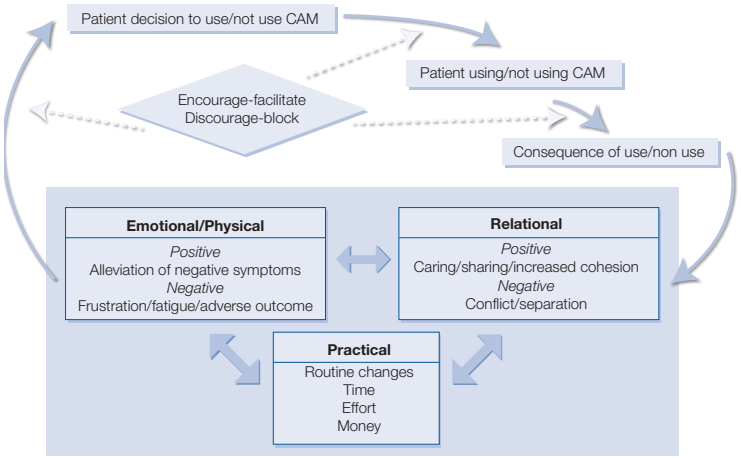
It has been suggested that decisions about CAM are likely to be particularly difficult for patients, in part because of conflicting information as well as varying levels of support for, and divergent perceptions of CAM within scientific and lay discourse.[9-11] In making decisions, patients often rely upon information provided by family members.[11-13] This is unsurprising given familial involvement in cancer care in general - family not only support, but shape and share in patients' decisions, with their involvement in the decision-making process desired and taken for granted.[14,15] Following a cancer diagnosis, both the patient and family seek out information about treatment options, drawing on various sources such as medical staff, family, friends and the internet.[16] Sometimes family members may be, if not more actively involved in searching for information than the patient. Boudioni reported the majority of inquiries about CAM at a British cancer information service came from relatives and friends of patients (48%) rather than diagnosed patients (35%).[17] Evidence further suggests family members can play a crucial role when cancer patients decide to use CAM instead of conventional medical treatment, decisions that may reduce the likelihood of cure.[18-21]

Within the medical literature on CAM, family are most commonly discussed as important sources of information, but often within the category 'family and friends' making accurate appraisal of their status difficult.[3, 22-26] Nonetheless, Bennett's recent survey in New Zealand about information seeking and CAM use in cancer patients indicated that surveyed patients mentioned "family and friends" most frequently as a primary information source.[27] Similarly, a large European survey about CAM use in cancer patients reported that "friends" (56%) and "family" (29%) were most often named as information sources.[28] Although friends appear to contribute information at a higher rate than family, family are likely to be more affected by decisions made, and to have increased opportunities to support or subvert decisions (Figure 1). Despite this, there are few studies explicitly examining familial involvement in making decisions about CAM, and none specifically exploring the consequences of those decisions upon the family.

## Family involvement in CAM decisions

Only one study conducted in Sweden has specifically examined the involvement of family in CAM decisions by cancer patients.[9] Based on interviews with 61 patients and 31 'significant others' (25 family, six friends), four types of

***Figure 1:*** *Familial involvement in patient decision-making about CAM.*




'other' involvement were identified, all of which saw the family as acting to gather and review information. This process was often prompted by family members' concern about the lack of evidence regarding CAM and consequent difficulties for the patient in making safe, informed choices. Some family chose to inform, but not overtly influence the patient's decision, viewing this as a way of offering support and upholding patient autonomy. Others were more proactive in their assistance, particularly where they held concerns that fatigue or distress might lead patients to make a 'wrong' decision. Interventions varied from gentle suggestions to direct action to affect patient behaviour, sometimes taken without patient knowledge or consent (eg. providing dietary supplements without patient knowledge). Some family members reported working collaboratively with the patient, sometimes mutually participating in chosen CAM practices, with positive consequences including increased familial cohesion and reduced anxiety regarding CAM. Overall, patients in this study reported appreciating others' assistance in CAM decision-making, although it sometimes led to tension. Some patients reported being bombarded with advice, causing feelings of resentment, anxiety, confusion and guilt. Furthermore, while most patients invited family to participate in their decisions, some limited their discussions, either for fear of burdening them, or because patients characterised others as unwilling or unable to provide support. Finally, some patients acquiesced with family opinion or efforts, primarily in recognition of the caring it symbolised, some voicing concern that rejection would be perceived as rejection of the informer.

Many of these themes emerge within other qualitative studies examining CAM use, though not explicitly focusing on familial involvement. An interview study about Chinese-Australians noted that most participants consulted a traditional Chinese herbalist because they were prompted to by family members or friends, and another Canadian focus group study of women with breast cancer, reported cases where family offered either financial or emotional support for participants' CAM use.[13, 29] A further Australian interview study about treatment decision-making in palliative cancer patients reported instances where patients stated or implied that familial opinion influenced their decisions regarding CAM.[11] Finally, a single case-study report from Sweden noted extensive familial involvement in a liver cancer patient's use of herbal tea, with her husband administering the tea after identifying, locating and purchasing it via the internet.[30]

Patients' evaluation and uptake of information provided by family, however, may vary dependant on disease or cultural characteristics. In a small qualitative study about CAM decision making in cancer patients, Verhoef et al reported that while new CAM users valued anecdotal information from family and friends, experienced users tempered such advice with their own knowledge, suggesting information from family may become less valued over time, or with increased experience of disease and treatment.[31] Similarly, patient responses to CAM introduced by family may be influenced by cultural beliefs about associations between particular CAM and gender roles.[32] Broom and Tovey documented how one male cancer patient described his wife's introduction of aromatherapy to him, but rejected it, observing: "Well, why would men want to do that?".[32]

Sometimes family involvement in CAM use is problematic. In a qualitative study involving 26 families (including 37 patients with advanced lung cancer and 40 caregivers) Zhang and Siminoff reported three cases in which patients reported familial coercion to take dietary supplements, with a further instance of a daughter physically and verbally insistent that her mother take vitamins.[33] Since it is known family members are often involved in patients' nutritional choices, some have asserted the importance of including and training family members as peer health educators, in order to minimise the possibility of adversely comprising patient wellbeing.[34-36]

There is implicit evidence of familial involvement in cancer patients' CAM decisions in studies assessing 'marital status' in CAM use, though there are differences across studies. For example, Fouladbakhsh et al reported that American cancer patients who were separated or divorced, were more likely to use CAM than married cancer patients, whereas Correa-Velez et al found no difference in marital status, suggesting that CAM use was associated with the number of people living in the house of the cancer patient.[37,38] In an earlier Australian study, Begbie et al found that CAM use was positively associated with being married, also suggesting this might be linked to the number of household members, which in turn could stimulate and encourage people to try new things including CAM.[3]

Further evidence of familial involvement in CAM decisions can be surmised in reports of paediatric cancer patients where parents administer CAM, with mothers typically primary in such decision making.[39,40] A recent systematic review indicated that CAM use, particularly use of herbs and dietary/nutritional supplementation, is common in children with cancer, with prevalence rates up to 91%.[41]

Despite this, parents' decisions to use CAM for their diagnosed child often happens without the involvement of the paediatrician, and data regarding the decision making processes and outcomes for families is sparse.[42] Lorenc et al recently observed that the field of CAM decision making for children (with or without cancer) is under-theorised, recommending the use of qualitative methods to redress this.[43] Adolescent use of CAM during cancer treatment is similarly unexplored. A single study examining the use of CAM by adolescents without a cancer diagnosis reported that parental use of CAM significantly predicted its use in adolescents.[44] It was suggested that some adolescents were explicitly introduced to CAM use by their parents, while others imitated the self-care behaviour of their parents without direct recommendation. Data on such choices within the context of a cancer diagnosis is absent.

## Consequences of CAM use in the family

Little is known about the prevalence of CAM use by family caregivers of cancer patients, of any impact on patient use, or on patient and/or familial wellbeing.[45] A study about CAM decisions by male cancer patients reported that female family members acted as role models and sources of information, prompting patients' use of CAM.[46] Alternatively, some cancer patients who refuse conventional cancer treatment and use CAM instead, may do so because of experiences with close family members affected with cancer who died following biomedical treatment only.[18] Only one American study by Kozachik et al has explored the patterns of CAM use by cancer patients and their family caregivers, following an eight week nurse delivered CAM intervention (guided imagery, reflexology, and reminiscence therapy).[45] This study found that participants who chose to use a single CAM therapy, used it more consistently over time, suggesting that it was easier to integrate a single CAM therapy into day-to-day life rather than several therapies.

Some studies support observations by Öhlén et al that family provision of CAM might have beneficial consequences for the family, increasing familial cohesion through demonstration of caring for and about the patient, and increased opportunity for active involvement in patient care and treatment.[9,47,48] Perceived positive effects of CAM use for the family have been reported by Broom and Tovey, who quote a female cancer patient as saying: "I think that CAM, they're such a benefit. Not just for the patient but for the whole family." [32] Potential benefit of CAM was similarly reported by a female cancer patient using and encouraging her spouse suffering with multiple sclerosis to use CAM, as she was convinced that it might also help him.[47] It seems likely, moreover, that reported high levels of distress in caregivers may be helped through use of CAM found to improve psychological status, wellbeing, or overall quality of life in cancer patients, such as aromatherapy, exercise, guided imagery, massage, music therapy, qigong or tai chi.[49-51]

Some negative consequences for family of patient use of CAM have also been identified, and these may compromise the ability of the family to care for themselves and the patient, adding to the burden of cancer within the community. Broom and Tovey applied an innovative solicited diary/unstructured interview approach to explore CAM users' experiences over time, observing that, for some cancer patients, the use of CAM incurred costs of time, money and effort that sometimes proved onerous for the whole family.[52] This was particularly evident when CAM included adherence to a strict dietary regime. An American population-based study examining psycho-social correlates of CAM use in adults, also reported that perceived spouse/partner strain and family strain were associated respectively with increased use of biologically-based therapies (including special dietary regimes) and manipulative body-based CAM.[53] However, whether partner or family stress prompt CAM use or are a consequence of CAM use is unknown.

## Issues for future research

Clearly there are significant gaps in our knowledge of CAM use within families facing a diagnosis of cancer. In addition to those alluded to above, there has been no examination of whether there are differences in the perceptions or experiences of CAM use in spouses, siblings or children of cancer patients, or the effect of any differences on CAM use by patients, despite evidence in other contexts that adult children can experience more conflict with regard to treatment decision-making than spouses of cancer patients.[54]

Research examining these questions with regard to specific cancer diagnoses and stages, as well as gender, socio-economic status and geographical location is similarly absent, as are studies examining CAM use within non-traditional families (eg. same-sex or step/combined families, single parent or separated families, or those without partners).[32] Similarly, consideration of ethnic differences in familial involvement in CAM use (either with regard to patient or familial use or both) is vital since the familial input into decision-making as well as perceptions about and use of CAM, varies between ethnic and cultural groups.[55-57]

Finally, longitudinal studies investigating the nature, extent, and effect of positive and negative consequences of CAM use within the patient's family, or examining how CAM use is negotiated within the family, are required. Knowing if, or under what circumstances, use of particular CAM (by the patient or other family members) will likely add to familial distress and conflict, or alternatively, promote familial cohesion and functioning – with inevitable impact on patient wellbeing – will enable clinicians to better advise patients and their families on treatment choices following a cancer diagnosis.

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# PATIENTS' PERCEPTIONS OF COMPLEMENTARY AND ALTERNATIVE MEDICINE

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## Abstract

Patients' perceptions of complementary and alternative medicine are not well studied. This review highlights attitudes towards complementary and alternative medicine, particularly for cancer patients. In general, the longer the time since a cancer diagnosis, the more likely it is that someone may use complementary and alternative medicine. In addition, women of a younger age with a higher education are more likely to use complementary and alternative medicine. Most commonly, complementary and alternative medicine is used to treat a range of physical and emotional problems relating to cancer, and only rarely as a means to cure the cancer itself. Dietary supplements, dietary changes and meditation are the most commonly used therapies. Many people perceive that these – and other complementary and alternative medicines – are beneficial for both physical and emotional reasons. However, not all people gain their desired outcomes from using complementary and alternative medicine. There are few reports of negative effects, but these are factors in some people not using or ceasing complementary and alternative medicine. Others do not use complementary and alternative medicines because of disbelief or due to concerns about complementary and alternative medicine benefits or safety. Doctors are not always consulted about complementary and alternative medicine use, but many people hope their doctors are supportive of it.

Understanding patients' perceptions of complementary and alternative medicine (CAM), particularly with regards to cancer care, is a developing area of research. Although numerous studies document the increasing use of CAM in developed countries particularly for cancer,[1,2,3] fewer studies have dealt directly with peoples' perceptions of CAM.[4] Understanding these attitudes should permit greater insight into the reasons for increasing CAM use, and improved understanding of the breadth of patients' needs.

This review considered studies from Australia, New Zealand, North America and the United Kingdom. Because of differing populations, lifestyles and culture, studies from non-English speaking countries, developing countries, Asia and the Middle East were excluded.

Studies were reviewed for information relating directly to predictors of use and general attitudes towards CAM. Additional related aspects considered in this review, and described in Humpel and Jones,[4] are: types and timing of CAM use, reasons for not using or ceasing use of CAM, motivations for CAM use, perceived positive and negative effects from CAM, sources of information on CAM, and communication with doctors.

## Predictors of use and general attitudes towards CAM

People who used CAM before a diagnosis are more likely to use CAM after their diagnosis,[5,6] but the biggest predictors of use are being female, younger and tertiary educated.[6,7,8,9]

Shorofi and Arbon claim women are more likely than men to have a positive attitude towards CAM.[8] Other studies conclude women are 1.9 times more likely than men to use CAM.[9,10] Hedderson et al found that about 80% of women and 60% of men used at least one CAM, and suggested "it may be considered more socially acceptable for women to seek help".[10] But men were more likely to use CAM when their symptom distress scores were higher.

The literature appears to show that the longer the time since diagnosis, the greater the likelihood of CAM use.[5,11] This increase may be due to the need to deal with unwanted side-effects or a desire to seek natural health care.[11] Changed beliefs about health, illness and medical care may lead to CAM use.[5,11] Beyond five years since diagnosis, however, CAM use seems to decline, except in patients with poor prognosis.[11]

In a review of public attitudes to natural medicine, Leach reported that regular CAM users were more likely to be dissatisfied with conventional practitioners than non-users,[1] and that over 40% of users turn to natural therapies because of a perceived failure of orthodox medicine to treat their health problems. O'Callaghan and Jordan,[7] in their survey of 'postmodern predictors' of CAM use, quote one study with a contrary finding: that although dissatisfaction with the doctor-patient relationship and having postmodern values of health are significant predictors, dissatisfaction with medical outcomes is not. O'Callaghan and Jordan conclude that holding postmodern values – such as rejection of authority, and feeling responsible for one's own health – predicts a positive attitude to CAM use.[7]

In Shorofi and Arbon's comprehensive study of CAM attitudes,[8] 46% of respondents had a positive attitude towards CAM, while only 10% had a negative attitude. In this study, patients rated their level of agreement to 18 statements about attitudes towards CAM and allopathic medicine. Examples include: 'CAM is an important aspect of my own family's health care' (36% agree, 25% disagree, 35% unsure) and 'conventional health care services are too impersonal' (27% agree, 44% disagree, 26% unsure).

All statements attracted large numbers of uncertain patients. Over 50% of respondents said that they were unsure about the following propositions:

- Surgical patients can be helped by CAM (41% agree, 5% disagree)
- Some forms of CAM work better than conventional treatment (35% agree, 8% disagree)
- CAM therapies are completely safe (28% agree, 14% disagree)
- Positive effects of CAM are due to placebo effect (12% agree, 24% disagree).

The lowest rates of uncertainty were reported for the following propositions:

- Both mind and body must be treated for the patient to regain complete health (78% agree, 6% disagree, 14% unsure)
- Patients should have the right to choose between conventional treatments and CAM therapies (74% agree, 7% disagree, 17% unsure).

## Types and timing of CAM use

Taking dietary supplements, making dietary changes and practising meditation were consistently the most common types of CAM used by cancer patients in a range of studies.[2,4-6,8,12-14] One study surveyed women at high risk for breast cancer, and out of 489 CAM users, 81% used dietary supplements, 51% used physical therapies and 44% used mind/body therapies.[15]

Other commonly cited CAMs (between about 10% and 40% of patients in a range of studies) include spirituality,[12,14] herbal medicine,[5,9,12,14] relaxation,[6,13,14] imagery,[5,12,14] massage and aromatherapy.[6,8,12,14,15] Acupressure, yoga, chiropractic,[4,8] and music therapy,[8] had relatively high usage, but were only cited in one or two studies.

Patients use CAM post cancer diagnosis, during treatment and during recovery. Humpel and Jones found that 13 of 19 patients started using CAM at the time of their diagnosis and six during or following treatment.[4] Evans et al reported that men using CAM tended to do so at different points in their life, depending on health needs, as well as at different stages of their diagnosis, treatment and recovery.[3] CAM use following conventional treatment was particularly important, as this time was "a trigger point for anxiety [and] conventional care may have little to offer at this time".[3]

## Motivations for CAM use

Miller et al found that expectations for CAM use varied widely depending on the therapy being used.[5] In addition, the literature reports numerous reasons for CAM use across many studies. Most usually, people adopt CAM to:

- improve physical wellbeing[2-4,13]
- improve emotional wellbeing[2,3,13]
- reduce side-effects from conventional treatment [2-4,11,13,14,16]
- improve quality of life. [3,14,16, 17 -

Fewer numbers of people hope their CAM use will:

- prevent cancer from returning[2,4,11,14]
- assist in treating cancer [2,14]
- reduce cancer symptoms [2,14,16,17]
- boost the immune system. [2-4,11]

Other general reasons for using CAM include:

- having a sense of control [4,5,17-19]
- being more holistic/less toxic [3,4,19]
- feeling more hopeful[18]
- curing the cancer/better survival.[3-5,11,14,16,17,19]

Kremser et al concluded that women sought CAM as a means of coping holistically with the impact of breast cancer.[2] Most did not expect a cure, but hoped to manage the impact of the disease on their emotional and physical wellbeing. Other studies found that likely users had expectations that CAM would improve quality of life and symptoms, rather than cure cancer or prolong life.[14,19]

Salminem et al suggested that some people feel responsible for having cancer or their high level of cancer risk.[2] These patients are said to be more amenable to CAM use. Markovic et al calls this type of person a 'consequential user' of CAM.[11] Field et al found that women at high risk of developing breast cancer are also high users of CAM (55%), but for other reasons besides cancer prevention.[15] Only 6% used CAM specifically to prevent cancer. This result was unexpected and differs from similar studies.

A minority of people did hope CAM would cure cancer.[3-5,11,14,16,17,19] Markovic et al label these people 'exploratory users'.[11] These individuals are more likely to use radical treatments such as oxygen therapy or apricot kernels, or meditation, to try to cure their cancer.[11] Miller et al also found that small numbers of patients hoped for a cure (using meditation, diet, supplements, herbal medicine, shark cartilage, high-dose vitamin C, mental imagery, Gerson therapy and reiki).[5] The majority, however, used therapies to feel in control and to assist treatment.

Markovic et al suggest that 'Informed users' place equal merit in conventional medicine, but hope to

maximise their health outcomes by using CAM.[11] A finding in Sibbritt et al's study of elderly Australian women with cancer was that those who went to a CAM practitioner accessed conventional services as much as non-users of CAM.[20] This suggests that CAM users seek something that conventional health is not providing. One need possibly not being met through conventional care is a patient's desire to feel in control.[5]

Evans et al found that some men were dissatisfied with the process of conventional cancer care, rather than the treatment itself; this led to them using CAM alongside conventional treatment.[3] These men accepted and valued conventional treatment but used CAM for additional support. Many men also wanted a therapist with whom they could communicate well. They found this need met by CAM therapists rather than time poor oncologists.[3]

## Reasons for not using or ceasing CAM

Most studies consider why patients use CAM rather than why they don't. The only non-user in Humpel and Jones' study identified herself as a non-believer, with there being no proof that CAM worked.[4]

Lack of knowledge is an important factor in non-use of CAM.[11,16] Markovic et al suggested that due to the rareness of gynaecological cancer, affected women's friends and family have no experience with the cancer and therefore aren't able to give advice or suggestions.[11] This tends to happen among many women with breast cancer.[2]

O'Connor and White found that out of 357 people, 202 were unlikely to have a consultation in the next two months.[21] Laziness, lack of availability and lack of knowledge about a therapist or CAM, were given as reasons for non-use of CAM. Seventy-seven people were unwilling to have a free CAM trial. These people were less likely to believe CAM would improve their health than those willing to have a trial.

Lack of knowledge about CAM and belief that CAM was ineffective meant that 38% and 16% of respondents respectively in Lewith et al's study did not use CAM.[16] Other factors limiting use were lack of availability (22%), concern about interactions between CAM and conventional treatment (20%), opposition from a doctor (10%), and concern CAM was harmful (9%).[16] Cost was also a barrier to use.[16,18] Markovic et al attributed low levels of CAM use to the majority of participants in that study being from a lower socioeconomic background.[11]

## Perceived positive and negative effects from CAM

Only a few studies report on perceived outcomes from using CAM. Verhoef et al states that "the lack of appropriate outcome measures to assess the benefits of integrative health care has been identified repeatedly and continues to plague integrative health care research."[22] Patterson et al assessed whether a range of therapies improve wellbeing.[23] In this study, of those seeing CAM practitioners, 92% claimed their well being improved, mind/body therapies conferred improvement for 82%, dietary supplements 88% and herbs was 86%.

Miller et al found that 63% of patients felt CAM gave them psychological benefits and 41% physiological benefits.[5] A majority would recommend the treatment they had and use the same therapy again themselves. However, 29% thought CAM provided no benefit.

Salminem et al found that 25% of women reported no improvement from a change in diet.[12] However, 50% felt their condition had improved, while 25% were unsure. Harris et al's survey of 1034 people with cancer determined that 72% were satisfied with their CAM use, 25% were uncertain and 4% were dissatisfied.[6] A similar result was reported by Chrystal et al,[14] where 71% of patients thought CAM beneficial and 6% found CAM unhelpful.

Participants in Humpel and Jones' study revealed general responses to CAM use, such as having more energy, and feeling more positive and healthier.[4] Others were unsure if there were any benefits. Six patients (31%) reported some negative effects, including weight loss and a reaction to herbs. One patient stopped using herbs due to concern about cancer recurring; another stopped using CAM because of no perceived benefit.[4]

A participant in Verhoef et al's study reported an improvement in physical wellbeing, with massage or a natural health product most likely to cause these positive outcomes.[22] Some participants cited emotional improvements, including feelings of greater control, more optimism, reduced anxiety and greater resilience. Others believed that CAM helped them remain cancer free.

## Sources of information on CAM

Kremser et al's study found that most women with breast cancer talked to their doctor (67%), their friends (67%), other women with breast cancer (61%) and family (54%).[2] Women using CAM for menopause mainly got information from friends, but the internet, books, magazines, colleagues and general practitioners were also used.[18] Other studies have put the rate of information coming from friends and family at about 30%.[4,17] CAM practitioners were also nominated frequently.[2,4]

The internet is a common (25%-30%) source of information,[2,4] although Wilkinson et al's study of men with prostate cancer did not find this (4%).[17] Magazines and newspapers are also influential, while television and radio are less so.[2]

## Communication with doctors

Wilkinson et al reported that only 41% of men with prostate cancer had informed their oncologist of their CAM use, and older patients were less likely to discuss the topic.[17,20] A possible reason is that older people may fear their oncologist's disapproval.[20] One woman in Humpel and Jones' study admitted this.[4]

Richardson et al found that half of patients claimed they didn't discuss CAM because they weren't asked about it.[19] Similarly, Shorofi and Arbon reported that patients did not routinely discuss CAM with doctors.[8] The authors found that about 20% of CAM users would discuss CAM if they were asked.

Despite finding that 67% of women reported they had discussed CAM with their doctors, Kremser et al also found that many women felt that there was little opportunity for discussion of their CAM use with their doctors.[2] Salminem et al also found that patients wanted to talk about CAM with doctors, and Gollschewski et al concluded that the level of support from a general practitioner was a major influence in a woman's decision to take CAM for menopause.[12,18]

Some studies showed that people considered general practitioners to have a negative view of CAM.[4,18] Miller et al found, however, that doctors' support was perceived to be high for exercise, acupuncture, meditation, relaxation, hypnotherapy and use of antioxidants, but low for herbs and high-dose vitamin C.[5]

In a review of cancer patients' experiences using CAM, Smithson et al found that there was a desire for better integration of CAM and conventional medicine.[24] Moreover, patients didn't expect doctors to believe in the philosophy of CAM, but wanted their doctor's approval and to know that their CAM choices were reasonable and safe.

## Conclusion

The literature shows that people's perspectives on CAM vary widely and that many people are uncertain about their own attitudes towards CAM and orthodox medicine. While the majority of people with cancer tend to use CAM to manage physical and emotional side-effects and improve quality of life, there are also a few people who use CAM in the hope that they will cure cancer or prolong their life. This finding, however, is rare. For many people, CAM seems to offer positive emotional outcomes, helping them feel more in control, increasing their optimism and improving their resilience. This suggests that CAM, for some people, addresses needs that are unmet by conventional health care. Conversely, not all people who try CAM find it beneficial. The literature suggests that while many people do talk to their doctors about CAM use, this rate would increase significantly if doctors initiated conversations and had an open approach about CAM.

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# Medical Oncology Group of Australia Cancer Achievement Award

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## Inspirations and influences for a life in clinical trials

Thank you to Medical Oncology Group of Australia (MOGA) and Novartis, and thank you to those people who nominated me for this award. It is a privilege and an honour to receive it, and I appreciate this opportunity to speak on my last 20 years in clinical trials research. I would like to reflect on how some early experiences and my mentors have shaped my research; on how the work in establishing the Clinical Trials Centre and the clinical trials research has involved such a large number of people working collaboratively, and what has motivated me and several others in clinical trials research in trying to change clinical practice for the better.

Professor Marvin Zelen, Director of Biostatistics at the Dana Farber Cancer Institute and Harvard School of Public Health in Boston, was my fellowship supervisor at Harvard and a major influence on the career path I have taken. Other colleagues at Harvard include Rich Gelber, Steve Lagakos and Milton Weinstein.

At Harvard, Marvin Zelen encouraged me to undertake clinical decision analysis. This led to a project looking at the value of single-agent versus combination chemotherapy and the trade-offs between toxicity and survival in advanced ovarian cancer.[1] The decision analysis included estimating the effects of treatments on cancer outcomes, as well as assigning values to various outcomes, based on interviews with Dana Farber staff. The recommendation from the analysis was that combination chemotherapy was the preferred treatment provided there were at least moderate survival gains associated with it, but if there were not, then the additional toxicity would not justify this therapy. So the decision really depended on the survival estimates from randomised trials, but also depended on patient preferences concerning the toxicity-survival trade-off. So this study stimulated other questions. One was how to combine effects on survival with quality of life. Rich Gelber and others were doing research in this area using the outcome, TWIST (Time Without Symptoms and Toxicity). We also included time with toxicity and time after progressive disease, but assigned lower values or weights to these periods. Depending on the weights assigned, combination chemotherapy was either preferred or not preferred to single agent therapy, in a so-called threshold utility analysis.[2] With Paul Glasziou, we then applied these approaches more broadly in quality adjusted survival analses or Q-TWIST.[3,4] This work also stimulated a series of patient preference studies, initially looking at the trade-off of toxicity from adjuvant therapy for breast cancer compared with the additional survival benefit.[5] This work and subsequent studies by Martin Stockler, Andrew Martin, Peter Grimison, Vlatka Duric and others have demonstrated that the survival gains from adjuvant therapy can be relatively small relative to side-effects, but these preferences are also important in that they vary from one person to another.[5–7] What this example illustrates is that what first seemed a problem in assessing trade-offs, became an opportunity for further research and has led to many important results by a larger group of researchers over the years.

My next example also arose from this same problem and related to false-positive results from published trials. Are published trials representative of all trials or do unpublished trials have different results? When we compared them in our ovarian cancer study, the published trials showed a significant survival benefit for combination chemotherapy over single-agent chemotherapy, whereas for the trials listed on a trials register (but not necessarily published), there was no significant difference.[1] In the context of the decision analysis, if you believed the evidence from the published trials you would recommend the combination chemotherapy, but if you believed the information sourced from the registered trials, there was insufficient evidence to recommend it. What we advocated was that rather than basing a review of the evidence just on the published trials, we should be prospectively registering all trials to provide unbiased estimates of treatment effects.[8]

Twenty years later, prospective registration of all clinical trials is now required by all leading medical journals and many regulatory authorities. As a result, most clinical trials are now registered in advance, and systematic

reviews of the trial evidence are much less likely to be prone to publication bias. In Australia, we now have over 4300 trials registered on the Australian New Zealand Clinical Trials Registry (ANZCTR, set up with a National Health Medical Research Council Enabling Grant). Not only are they linked internationally through the World Health Organisation's platform to ensure that all studies can be identified worldwide, but they are also linked to specialised registries, such as in cancer, so that patients can see which trials are ongoing, potentially boosting patient participation.

A third example of another problem occurred in relation to an Australian trial I undertook with Martin Tattersall, Alan Coates and others comparing two approaches to informed consent.[9] In the individual approach, patients were given all information the clinician considered was important. 'Total disclosure' involved a one page informed-consent form, including all possible side-effects of therapy (compared with up to a 25 page consent form for some studies today). Our trial showed that patients who received more detailed information were more knowledgeable about their treatment, but also more anxious and less willing to take part in trials. Rather than saying that one approach was right or wrong, this illustrated that there were trade-offs involved.

An interesting problem arose in interpreting the results from this trial, which had multiple outcomes that were correlated with each other. These outcomes appeared significant if considered individually – with P values less than 0.05. However, if you adjusted each result for multiple comparisons using the Bonferroni adjustment, you would have regarded most of the results as non-significant. The problem was that this appeared not appropriate for correlated outcomes, and it motivated me to look further into the Bonferroni procedure, which in this case was too conservative. So I did some work on a modified Bonferroni procedure, now called the 'Simes test'. The procedure ranked all the P values from 1 to k and then compared the jth P value with the level j/k times the significance level, and then declared the test significant if any P value was less than that level. In this analysis, I tried to prove a theorem, which was that when all the tests were independent, this procedure would have a type I error probability exactly equal to the alpha significance level. The reason for mentioning this here is not to get into the mathematics of it, but to say that I spent several months and lots of mathematical calculations to prove this theorem. I submitted a paper to Biometrika with three pages to demonstrate the proof. One of the referees said it was a nice paper, but you can actually do the proof in three lines rather than in three pages, provided a nice little proof, and didn't want to be referred to by name, so all I could do was acknowledge the very helpful support from my referee.[10] I also included a conjecture that when tests were not independent, this result would be normally (but not always) conservative, and did some simulation studies to show that it was the case. But I then left a conjecture in the paper asking whether a proof would work for most families of tests. That generated a whole lot of interest, leading to, now, about 500 citations, as various people use the concept to solve fairly complex mathematical problems. Journal editors used to send me these papers to referee because I wrote the original one, but many years ago I called a halt because it was all getting far too complex. It is interesting where things can take you. Since then, this has led to other statistical procedures which are now used in the Hochberg procedure, which you will see in clinical trial protocols. Another implication from these discussions of multiple comparisons is that researchers will often need to seek independent confirmation of their findings in other trials — yet another rationale for systematic reviews of all the relevant evidence.

What are some of my thoughts from this early experience at Harvard? First, when you are faced with a problem, see it as an opportunity for developing new methods or for leading to further research. I think many practical problems we face in clinical research today, be it in biostatistics or in molecular biology or whatever, can benefit from that same philosophy.

After my time in Boston, Professor Zelen encouraged me to take on a significant role in doing the kinds of things that we had been doing in the US in terms of clinical trials, and he gave me confidence to pursue that endeavour. And I think these are useful lessons for me, and others. When I came back to Australia, I worked at the Ludwig Institute at the University of Sydney. My career has been enormously influenced by Martin Tattersall and others, including Alan Coates, Dick Fox and Paul Glasziou at the Ludwig. I was encouraged to write a position paper for the National Health Medical Research Council on the need for a national clinical trials centre. When expressions of interest were sought, people persuaded me to apply for the same centre that I was advocating, which led to its establishment in 1988. That centre has grown over the years to about 150 staff collaborating with hospitals and other trial sites, through many of the major cancer cooperative trial groups in Australia and other groups. It is based at the University of Sydney over two campuses, with clinical trials research teams led by several people including Tony Keech, Val Gebski, Wendy Hague, Burcu Vachan, Deborah Schofield, Lisa Askie and Martin Stockler.

Our mission at the Clinical Trials Centre is to improve health outcomes, practice and policy, using clinical trials research. We have a range of programs, including undertaking trials, evaluating evidence, career development, education and training activities for clinical trials, strategies for translating research into practice, quality-assurance programs, and clinical trial methodology, including biostatistics, quality of life and health economics assessments. Collectively, our trials have recruited over 60,000 patients, in cardiovascular disease, cancer and neonatal disorders, as well as other smaller trials in other areas. Our trials are part of international collaborations whose studies have recruited over 170,000 patients. Cardiovascular disease trials research tends to involve large numbers of patients and a smaller numbers of trials. In cancer, there are more trials, but with small to moderate numbers

of patients. The role of the Clinical Trials Centre is to work collaboratively as either a coordinating centre or a statistical centre with many other players.

In relation to cancer trials, I want to acknowledge that this is an enormous collaborative effort. It involves people who set up and are managing each of the cancer cooperative groups, people within the team at the Clinical Trials Centre, clinical investigators and site coordinators, international collaborative groups, and the patients and participants. There are 13 cancer cooperative trial groups in Australia and the Clinical Trials Centre has worked closely with eight of these. I have been actively involved with the ANZ Breast Cancer Trials Group, whose research was one of the first activities of the Clinical Trials Centre. Many people there, including John Forbes, Alan Coates, members of the Board and others, do great work. Likewise, I've had a major role in the Australian Gastro-Intestinal Trials Group, and I must acknowledge everybody in that group, particularly the chair, John Zalcberg.

An important theme for us at the Clinical Trials Centre is to see how we can translate the evidence of clinical trials into better practice. We want to evaluate the evidence in terms of undertaking clinical trials, look at ways of combining the evidence in systematic reviews, and see that evidence translated into guidelines and protocols and, ultimately, improvements in health.

Some recent examples of studies we have been privileged to be part of include: the MAX trial, which showed improvements in progression-free survival for bevacizumab in addition to chemotherapy for patients with colorectal cancer;[11] the CO.17 trial of molecular targeted therapy for colorectal cancer;[12] and the CALYPSO trial of the international gynaecological groups with the Clinical Trials Centre as the statistical centre.[13] The germ-cell trial (with the ANZ Germ-Cell Trial Group and now the Australian and New Zealand Urogenital and Prostate Cancer Trials Group (ANZUP)), recently published by Peter Grimison and others, showed ongoing survival advantages of the chemotherapy regimen developed in the US.[14] The Sentinel Node versus Axillary Clearance breast cancer surgical trial of over 1000 patients, led by the Royal Australasian College of Surgeons, showed significantly less lymphoedema and better quality of life for sentinel-node-based management, and also led to changes in practice by integrating the procedures for surgical training in the trial protocol.[15] Less toxic capecitabine treatment was shown to lead to longer survival in a trial of the ANZ Breast Cancer Trials Group.[16] A trial involving both Australasian Gastro-Intestinal Trials Group and the Trans-Tasman Radiation Oncology Group, showed possibly better progression-free survival associated with preoperative chemoradiotherapy for some oesophageal tumours;[17] then a systematic review confirmed the advantage of chemoradiotherapy,[18] which is now one of the standard treatments.

The talents of many people will be required to address future challenges and to continue to champion this research. I have been privileged to work with and continue to work with many research fellows, PhD students and study coordinators, and I am very much looking forward to following their careers.

Finally, to come back to my reflections from my time at Harvard. First, in terms of problems that you might be faced with in research or practice, see these as an opportunity for developing new methods or new approaches. Second, for the mentor, don't underestimate the importance of giving encouragement and inspiring confidence; this was a huge influence on my career.

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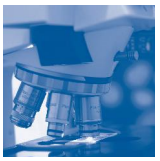


# SUPPORT FOR RESEARCH 2011

The state and territory cancer organisations, which comprise the member bodies of Cancer Council Australia, are the major sponsors of cancer research and related activities in Australia. Grants are made following competitive, peer-reviewed assessment of funds derived from donations and bequests.

In 2011, the value of these grants is over $50 million.

Please note: for research grants spanning more than one year, only funds to be dispersed in 2011 have been included.

## CANCER COUNCIL AUSTRALIA

### Sally Birch Fellowship in Cancer Control

| | | |
|---|---|---|
| G Howarth<br>School of Agriculture, Food and Wine | Novel, naturally – sourced bioactive factors: therapeutic application of chemotherapy-induced intestinal muscositis and inflammatory bowel disease | $100,000 |
| **TOTAL RESEARCH FUNDED** | | **$100,000** |

## CANCER COUNCIL ACT

### Research grants

| | | |
|---|---|---|
| A Fahrer<br>The Australian National University | Chromosome condensin and the regulation of cell development | $50,000 |
| **TOTAL RESEARCH FUNDED** | | **$50,000** |

## CANCER COUNCIL NSW

### New research project grants

| | | |
|---|---|---|
| Robert C Baxter<br>University of Sydney | The role of sphingosine-1-phosphate in haematopoietic stem cell egress from the bone marrow | $199,659 |
| Tracy Bryan<br>University of Sydney | G-quadruplex stabilisers as cancer therapeutics | $97,508 |
| Megan Chrircop<br>University of Sydney | Drynamin as a new drug target for the treatment of glioblastoma | $120,000 |
| Peter Greer<br>University of Newcastle | Does the initial treatment plan predict doses delivered to normal tissues during prostate radiation therapy | $116,598 |
| Beric Henderson<br>University of Sydney | Regulation of APC intracellular dynamics and function | $120,000 |
| Viive Howell<br>University of Sydney | New opportunities for the study of ovarian cancer through characteristation of mouse models | $97,508 |
| Tao Liu<br>University of NSW | The critical role of the histone demethylase JMJD1A in cancer | $110,250 |
| Richard Lock<br>University of NSW | Predicting the in vivo sensitivity of paediatric acute lymyphoblastic leukaemia to BH3-mimetic drugs | $109,750 |
| Karen MacKenzie<br>University of NSW | The prognostic and therapeutic significance of dyskerin and telomerase enzyme activity in neuroblastoma | $117,508 |
| Finlay Macrae<br>Melbourne Health | The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers | $119,490 |

## New research project grants

| | | |
|---|---|---|
| John Rasko<br>Universityof Sydney | The role of small non-coding RNAs (sncRNAs) in alternative splicing | $119,658 |
| John Rasko<br>Universityof Sydney | Dissecting the multi-component machine that controls chromatin architecture | $120,000 |
| Phillip Vial<br>University of Sydney | A next generation detector for radiotherapy treatment verification with dual capability for simultaneous imaging and dosimetry | $115,376 |
| Xu Zhang<br>University of Newcastle | Targeting pro-survival mechanisms to sensitise human melanoma to immunotherapy | $119,750 |
| Robyn Ward<br>University of NSW | Laterally spreading tumours of the colorectum: an alternative pathway of colorectal cancer development in the Western world | $120,000 |
| **Total New Research Project Grants** | | **$1,803,055** |

## 2011 Priority-driven Collaborative Cancer Research Scheme

| | | |
|---|---|---|
| Robyn Ward<br>University of NSW | Role of dietary compounds on PGC-1alpha methylation in colorectal cancer | $97,352 |
| **Total 2011 Priority-driven Collaborative Cancer Research Scheme** | | **$97,352** |

## Continuing Research Project Grants

| | | |
|---|---|---|
| Leonie Ashman<br>University of Newcastle | Tetraspanin proteins in prostate cancer progression and prognosis | $113,000 |
| Mark Baker<br>Macquarie University | A colorectal cancer “interactome” paradigm that influences patient survival | $100,000 |
| Mary Bebawy<br>University of Sydney | Microparticle-mediated transfer of P-glycoprotein in conferring multidrug resistance in cancer | $119,375 |
| Linda Bendall<br>University of Sydney | The role of sphingosine-1-phosphate in haematopoietic stem cell egress from the bone marrow | $120,000 |
| Tracy Bryan<br>University of Sydney | Recruitment of human telomerase to telomeres | $120,000 |
| Jennifer Byrne<br>University of Sydney | The molecular basis of cell transformation produced by TPD52 overexpression | $90,750 |
| Sharon Chen<br>Westmead Hospital | Randomised trial of diagnostic strategies for invasive aspergillosis in at-risk haematology patients: Funding extension | $67,875 |
| Roger Daly<br>Garvan Institute of Medical Research | Tyrosine kinase profiling of human basal breast cancers | $115,250 |
| Anna deFazio<br>University of Sydney | Pathways of malignant progression in ovarian cancer | $115,250 |
| Megan Fabbro<br>University of Sydney | Dynamin inhibitors as new anti-cancer drugs | $114,500 |
| David Goldstein<br>University of Sydney | LAP07: Randomised multicentre phase III study in patients with locally advanced adenocarinoma of the pancreas: gemcitabine with or without chemoradiotherapy and with or without erlotinib | $28,386 |
| David Gottlieb<br>University of Sydney | Adoptive immunotherapy for the prevention of Varicella-zoster virus reactivation post stem cell transplant | $95,750 |
| Peter Greer<br>University of Newcastle | Real-time dose monitoring for patient safety in radiation therapy | $120,000 |
| Nikolas Haass<br>Centenary Institute | The role of melanoma stem cells in melanomagenesis | $116,000 |
| Derek Hart<br>University of Queensland | RNA loading of tumour associated antigens and the activation of blood dendritic cells for prostate cancer immunotherapy | $32,601 |
| Andrew Haydon<br>Monash University | SCOT - Short Course Oncology Therapy. A study of adjuvant chemotherapy in colorectal cancer | $32,855 |
| Christopher Jolly<br>University of Sydney | Understanding AID-induced cancer: Unravelling complex mutation and repair pathways | $116,000 |

## Continuing Research Project Grants

| | | |
|---|---|---|
| Maija Kohonen-Corish<br>Garvan Institute of Medical Research | Functional characterisation of the putative tumour suppressor gene MCC in colorectal cancer | $120,000 |
| Trevor Leong<br>University of Sydney | Randomised phase II/III study of preoperative chemoradiotherapy versus chemotherapy for resectable gastric cancer | $6076 |
| Tao Liu<br>University of New South Wales | Targeting Myc onco-protein degradation for the treatment of Myc-induced malignancies | $106,500 |
| Guy Lyons<br>University of Sydney | Restoring epithelial differentiation to squamous cell carcinomas | $120,000 |
| Kerrie McDonald<br>University of Sydney | The role of IQGAP1 in actively migrating glioma cells and its regulation by miR-124 | $110,750 |
| Bettina Meiser<br>University of NSW | Too much, too soon? The impact of treatment-focused genetic testing in patients newly diagnosed with breast cancer | $22,020 |
| Michael Murray<br>University of Sydney | Development of personalised dosage protocols for tyrosine kinase inhibitiors in oncology patients | $95,550 |
| Matthew Naylor<br>Garvan Institute of Medical Research | Role of beta1 integrin in prostate development and carcinogenesis | $116,000 |
| Geraldine O'Neill<br>University of Sydney | The signalling switch function of the pro-metastatic, adhesion adaptor protein HEF1 | $116,000 |
| Michael Poulsen<br>Princess Alexandra Hospital | Phase II efficacy study of chemo-radiotherapy in PET staged II-III merkel cell carcinoma of the skin | $10,139 |
| Stuart Tangye<br>Garvan Institute of Medical Research | EBV-specific CD8+ Tcells in anti-tumour immune responses in patients predisposed to developing lymphoma | $116,000 |
| Matthew Williams<br>University of Wollongong | A dosimetric Inter-Comparison of Australian Radiotherapy IMRT Systems (ICARIS) | $88,375 |
| Jane Young<br>University of Sydney | Quality of life outcomes and cost effectiveness of pelvic exenteration for people with advanced rectal cancer | $21,101 |
| Zu Dong Zhang (Avery-Kiejda)<br>University of Newcastle | Targeting p53 isoforms, ?40p53 and p53ß, to promote chemo-sensitivity in human melanoma | $115,000 |
| **Total Continuing Research Project Grants** | | **$2,781,103** |

## New Research Program Grants

| | | |
|---|---|---|
| Philip Hogg<br>University of NSW | Metabolism inhibitors for the treatment of brain and pancreatic cancer | $450,000 |
| Murray Norris<br>University of NSW | Toward cure of childhood ALL: improved diagnostics, therapeutics and prevention strategies | $450,000 |
| Chris Ormandy<br>Garvan Institute of Medical Research | Personaling breast cancer management by discovering the transcriptional basis for tumour phenotype | $449,992 |
| Roger Reddel<br>Westmead | Alternative lengthening of telomeres: from basic biology to drug discovery | $450,000 |
| **Total New Research Program Grants** | | **$1,799,992** |

## New Strategic Research Partnership Grants

| | | |
|---|---|---|
| Andrew Biankin<br>Garvan Institute of Medical Research | Genotype guided cancer therapy (Genomic Theranostics) | $300,000 |

## Continuing Strategic Research Partnership Grants

| | | |
|---|---|---|
| Jacob George<br>University of Sydney | Epidemiology, prevention and management of liver cancer in NSW: Towards a strategic research partnership | $250,000 |
| Lyle Palmer<br>University of Western Australia | Clinical Outcomes and Genetic Epidemiology of high grade Glioma: COGEG | $237,904 |
| David Whiteman<br>Queensland Institute of Medical Research | PROBE-NET : Progression of Barrett's Esophagus to Cancer Network | $213,646 |
| Bettina Meiser<br>University of NSW | Psychosocial impact of hereditary cancer and the development and evaluation of effective patient education and decision support strategies | $7900 |
| **Total Strategic Research Partnership Grants** | | **$1,001,550** |

## Research Program Grant - in Pharmacogenomics

| | | |
|---|---|---|
| Susan Henshall<br>Garvan Institute of Medical Research | Building capacity in pharmacogenomics across NSW: PRIMe (Pharmacogenomic Research for Individualised Medicine) | $300,000 |
| **Total Pharmacogenomics Program Grants** | | **$300,000** |

## International Cancer Genome Consortium (ICGC)

| | | |
|---|---|---|
| Andrew Biankin<br>Garvan Institute of Medical Research | Role of dietary compounds on PGC-1alpha methylation in colorectal cancer | $500,000 |
| **Total ICGC Grant** | | **$500,000** |

## Other Research Programs

| | |
|---|---|
| Cancer Trials NSW (CTN) | $1,320,000 |
| Cancer Epidemiology Research Unit (CERU) - Internal + External (Excluding NHMRC funding) | $4,055,936 |
| Centre for Health Research & Psycho-Oncology (CHeRP) | $830,000 |
| 45 and Up Cohort Study | $300,000 |
| Hepatitis B Project | $300,000 |

## Commissioned Research Projects

| | |
|---|---|
| An investigation of food and beverage promotion in relation to children's sport: awareness and attitudes of young people, parents and organisers as well as potential policy guidelines to improve promotion of healthy food and beverage options. | $26,631 |
| The effects of food marketing on children and parents. TV, print and web advertising of food and its influence on product perceptions, likelihood of purchase or request for purchase. This study will also examine exposure to food promotion and promotional messages and their relationship to previous experiences with the products. | $27,500 |
| Food labelling and consumer understanding. | $80,000 |
| Eat It To Beat It Post-Program CATI - examines fruit and vegetable consumption, attitudes and knowledge of fruit and vegetables. | $136,000 |
| Impact of tobacco retail outlets on smoking behaviours | $75,951 |
| Influence of peer to peer networking on smoking behaviours | $60,000 |
| Consumer understanding of Vit D messages | $39,452 |
| Evaluation of cancer legal referral service | $35,000 |
| Multiple perspectives on sexuality and intimacy post-cancer, leading to the development and evaluation of supportive interventions | $30,000 |
| **Total Other Research Programs and Commisioned Research** | **$7,316,470** |
| **TOTAL RESEARCH FUNDED** | **$15,599,522** |

# CANCER COUNCIL QLD

Cancer Council QLD

## Research Grants 2010-2011

| | | |
|---|---|---|
| K Alexandrov<br>The University of Queensland | Development of Rab prenylation inhibitors as anti-cancer therapeutics | $100,000 |
| D Anderson<br>Queensland University of Technology | A behavioural intervention for managing menopausal symptoms in women with breast cancer | $57,250 |
| J Clements<br>Queensland University of Technology | Understanding the functional role of KLK4 in prostate cancer progression: an integrated systems biology approach | $98,250 |
| J Hooper<br>Queensland University of Technology | Understanding a potential mediator of metastasis | $100,000 |
| G Tiralongo<br>Griffith University | Regulation of cancer cell surface sialylation: Towards the development of a novel anti-metastasis drug | $99,706 |
| N Saunders<br>University of Queensland | The role of osteoclasts in the development of ostesarcoma metastases | $100,000 |

## Research Grants 2010-2011

| | | |
|---|---|---|
| P Simpson<br>University of Queensland Centre for Clinical Research | Improving the outcome of patients with invasive lobular carcinoma of the breast | $84,491 |
| G Leggatt<br>University of Queensland | Suppressor NKT cell trafficking to epithelial pre-cancer | $91,250 |
| T Florin<br>Mater Medical Research Institute | Investigating a novel model of hepatic veno-occusive disease in order to safely prescribe 6-thioguanine | $100,000 |
| A Lam<br>School of Medicine | Solving the Jigsaw: Interactions between angiogenic and mitogenic genes in thyroid cancer | $98,000 |
| K MacDonald<br>Queensland Institute of Medical Research | Analysis of a novel regulatory T cell induced by alloreactivity | $100,000 |
| D Richard<br>Queensland Institute of Medical Research | Functional interplay between hSSB1 and the MRN complex | $100,000 |
| B Gabrielli<br>University of Queensland | Synthetic lethality screen targeting a defective checkpoint in melanoma | $100,000 |
| G Boyle<br>Queensland Institute of Medical Research | A novel marker for the detection and treatment of metastatic melanoma | $99,250 |
| M Brown<br>The University of Queensland | The role of the BRCA1 3'UTR in breast cancer | $96,250 |
| C Nelson<br>Queensland University of Technology | S-allylmercaptocysteine as an adjuvant therapy in the treatment of prostate cancer | $91,250 |
| S Vuckovic<br>Mater Medical Research Institute | Impaired human myeloid dendritic cells in multiple myeloma-infiltrated bone marrow | $100,000 |
| J Nikles<br>The University of Queensland | n-of-1 trials of pilocarpine vs placebo for dry mouth in palliative care patients | $82,445 |
| A Barbour<br>Princess Alexandra Hospital | Genome-wide analysis of oesophageal cancer: towards biomarkers of response and outcomes of therapy | $80,538 |
| M Parat<br>The University of Queensland | Does PTRF-cavin control endothelial cell migration and angiogenesis? | $100,000 |
| D Markovich<br>The University of Queensland | Sulfate's role in ageing | $100,000 |
| S Kisely<br>The University of Queensland | Why are psychiatric patients more likely to die of cancer? An epidemiological study of cancer incidence and staging | $38,125 |
| C Schmidt<br>Queensland Institute of Medical Research | Analysis of the anti-tumour immune response and its target antigens in resected Stage III B/C melanoma | $96,250 |
| **2011-2012** | | |
| J Bowles | The Nodal/Cripto signalling pathway in male germ cell development: relevance to testicular germ cell tumours | $100,000 |
| I Frazer | Investigating the mechanisms by which immune cells (particularly T cells and NKT cells) target and eliminate cells expressing tumour antigens | $97,394 |
| E Hacker | The response of human melanocytes in vivo to sunlight | $84,200 |
| N Hayward | Identification of novel methylated tumour suppressor genes in melanoma | $99,736 |
| G Hill | Therapeutic targeting of adhesion and costimulatory pathways after transplantation. | $100,000 |
| R Khanna | Novel immunotherapy for herpes virus infection in stem cell transplant patients. | $97,508 |
| K Khanna | Understanding the contribution of DNA repair genes in breast cancer metastasis | $99,736 |
| F Macrae | The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers | $100,000 |
| N McMillan | Development of nanoparticle mucosal delivery systems for siRNA-based cancer therapies | $89,000 |
| J Neuzil | Transcription factors from the FoxO family regulate apoptosis induced by mitochondria-targeted drugs | $100,000 |
| L Richards | Suppression of high-grade glioma by Nfib overexpression | $98,226 |

| | | |
|---|---|---|
| R Sturm | Investigating the BRN2/MITF axis in melanoma sphere formation and as a therapeutic target for metastatic melanoma | $87,508 |
| J van der Pols | Sun protection and vitamin D | $42,925 |
| G Walker | Pilot study to assess the role of "classical" and oxidative UVR-induced DNA adducts in melanoma induction | $100,000 |
| P Yates | Achieving needs-based end-of-life services: A prospective, longitudinal study of pathways for advanced cancer patients | $100,000 |
| J Young | Exome capture, miRNA and next generation sequencing in probands with hyperplastic polyposis | $100,000 |
| M Francois | A novel role for SOX18 in regulating neo-lymphangiogenesis and tumour metastasis | $100,000 |
| R Newton | Efficacy and safety of high versus low intensity resistance exercise, with an without compression for management of lymphedema in breast cancer survivors | $50,175 |
| M Roberts | Skin bioavailability and targeted skin delivery by topical application | $85,000 |
| **Total Research Grants** | | **$3,844,463** |

## Strategic research partnership grant (2009-2013)

| | |
|---|---|
| R Gardiner<br>University of Queensland | $250,000 |
| **Total strategic research partnership grant** | **$250,000** |

## Fellowships

| | |
|---|---|
| **Senior research fellowships** | |
| G Walker<br>Queensland Institute of Medical Research | $126,280 |
| M Kimlin<br>Queensland Institute of Medical Research | $137,208 |
| J Young<br>Queensland Institute of Medical Research | $133,566 |
| K MacDonald<br>Queensland Institute of Medical Research | $118,995 |
| **Senior research fellowships** | |
| G Walker<br>Queensland Institute of Medical Research | $126,280 |
| **Senior clinical research fellowship** | |
| K Fong<br>Prince Charles Hospital | $173,593 |
| **Fellowships Total** | **$689,642** |

| | |
|---|---|
| **PhD Scholarships**<br>**2011-2013** | |
| Donald McLeod<br>Queensland Institute of Medical Research | $30,000 |
| Bryony Thompson<br>Queensland Institute of Medical Research | $30,000 |
| **2010-2012** | |
| KM Chia<br>University of Queensland | $26,450 |
| A Neill<br>Queensland Institute of Medical Research | $24,450 |
| **2009-2011** | |
| PT Nguyen<br>University of Queensland | $26,450 |
| H Corbett<br>University of Queensland | $24,450 |
| **PhD scholarship program total** | **$161,800** |

## Other grants

| | |
|---|---|
| Travel grants and travelling fellowships | $80,000 |
| Australian paediatric cancer registry | $108,000 |
| **Other grants total** | **$188,000** |

## Clinical trial data manager grants

| | |
|---|---|
| Holy Spirit Northside Private Hospital | |
| Gold Coast Hospital | |
| Greenslopes Private Hospital | |
| Mater Hospital | |
| Nambour General Hospital | |
| Premion | |
| Princess Alexandra Hospital | – Division of surgery<br>– Haematology and medical oncology department<br>– Radiation oncology department |
| Radiation Oncology Services | – Mater Centre |
| Royal Brisbane and Women's Hospital | – Gynaeoncology<br>– Medical oncology<br>– Radiation oncology<br>– Surgery (Brisbane Colorectal Group) |
| Royal Children's Hospital | |
| The Prince Charles Hospital | |
| The Wesley Research Institute | |
| Toowoomba Hospital | |
| Toowoomba Regional Cancer Research Centre | |
| Townsville Hospital | |
| **Data managers total** | **$1,225,060** |

## Epidemiology and psycho-oncology research programs

| | |
|---|---|
| Prostate cancer and supportive care outcomes trial | |
| Vitamin D and prostate cancer | |
| Prostate cancer sexuality intervention | |
| Trial of a telephone-delivered rehabilitation program for colorectal cancer patients | |
| ProsCan for Life | |
| Breast Cancer Outcomes Study | |
| Chemobrain Study | |
| Descriptive Epidemiology Reports | |
| Geographical inequalities in Survival from Colorectal Cancer | |
| Beating the blues after cancer | |
| **Epidemiology and psycho-oncology research programs total** | **$3,334,174** |
| **TOTAL RESEARCH FUNDED** | **$9,693,139** |

## CANCER COUNCIL SA

### Research grants

| | | |
|---|---|---|
| Dr Deborah White<br>University of Adelaide | Developing a patient specific approach to the treatment of CP-CML with tyrosine kinase inhibitors: investigating the factors which determine response to nilotinib and dasatinib | $92,508 |
| Professor Peter Mackenzie<br>Flinders University | Regulation of drug and xenobiotic UDP glucuronosyltransferases | $89,508 |
| Dr Yeesim Khew-Goodall<br>University of Adelaide | Inhibiting cancer-associated fibroblasts activation in breast cancer by miR-29 | $92,508 |
| Dr Natasha Harvey<br>University of Adelaide | Defining the role of macrophages in lymhangiogenesis | $92,508 |
| Dr Steve Paltoglou<br>University of Adelaide | Using the von Hippel-Lindau tumour suppressor protein to stabilise microtubules | $73,394 |
| Professor Junia Melo<br>IMVS | Transcriptional and post-transcriptional regulation of the BCR-ABL gene in chronic myeloid leukaemia | $104,736 |
| Dr Paul Drew<br>University of Adelaide | Dissecting out what influences the progression from non-dysplastic Barrett's oesophagus to invasive oesophageal adenocarcinoma | $86,394 |
| Dr Julie Clarke<br>CSIRO | The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers | $104,736 |
| A/Professor Andreas Evdokiou<br>University of Adelaide | Exploiting tumour hypoxia as a therapeutic target for skeletal malignancies | $92,508 |
| Professor David Watson<br>Flinders University | Identification of biomarkers of response and toxicity to chemoradiotherapy | $49,558 |
| Professor Michael Roberts<br>University of South Australia | Skin bioavailability and targeted skin delivery by topical application | $85,000 |
| **Total research grants (Note: $500,000 funded by the SACRC)** | | **$963,358** |

### Senior research fellowships

| | | |
|---|---|---|
| L Butler | Androgen signalling in the normal human breast: role and implications for breast cancer risk, Dame Roma Mitchell Cancer Research Laboratories, Adelaide University Hanson Institute | $100,940 |

### Research fellowships

| | | |
|---|---|---|
| N Moore | Medroxyprogesterone acetate (MDA) action in the normal human breast: implications for breast cancer risk in users of homran replacement therapy, Dame Roma Mitchell Cancer Research Laboratories, Adelaide University Hanson Institute | $87,284 |

### W Bruce Hall cancer research fellowship

| | | |
|---|---|---|
| T Bianco-Miotto | Epigenetic mechanisms and therapies in prostate cancer, Dame Roma Mitchell Cancer Research Laboratories, Adelaide University Hanson Institute | $87,284 |
| **Total Fellowships** | | **$275,508** |

### South Australian Cancer Research Collaborative (SACRC) - to commence 1st July 2011 — $500,000

### SA Cancer Data Development Project — $150,000

### Other research programs

| | |
|---|---|
| Chair in Cancer Behavioural Research** | $324,000 |
| Organisational Grants | $45,157 |
| Travel grants and distinguished visitors | $15,000 |
| Student vacation scholarships | $15,000 |
| Data managers program | $222,579 |
| Microarray bioinformatics | $44,247 |
| SA Cancer Genome Facility | $105,000 |
| **Total of other research programs** | **$770,983** |
| **TOTAL RESEARCH FUNDED** | **$2,659,849** |

## Research administered by Cancer Council SA

| | | |
|---|---|---|
| **Peter Nelson Leukaemia Research Fellowship** | | |
| H Ramshaw<br>IMVS Hanson Institute | | $100,000 |

All figures are budgeted figures, when appropriate based on 1 FTE

**Academic positions

# CANCER COUNCIL TASMANIA

## Research Grants

| | | |
|---|---|---|
| G Woods<br>Menzies Research Institute | Evaluation of the ability of Vitamin D and metallothionen to protect against UV radiation induced skin cancer | $70,000 |
| J Dickinson<br>Menzies Research Institute | Risk Variants in Integrin Genes, and their role in prostate tumour development | $10,000 |
| J Dickinson<br>Menzies Research Institute | Epigenetic regulation of the integrin, ITGA2 in tumour development | $10,000 |

## Small Grants Program

$40,000

To be announced May 2011

## Chemist Warehouse Emerging Researcher

$8000

To be announced May 2011

## Funded by David Collins Leukaemia Foundation (DCLF)

| | | |
|---|---|---|
| A Holloway<br>Menzies Research Institute | Regulation of the Leukaemia Inhibitory Factor Receptor by RUNX1 | $49,500 |

## Cancer Council Tasmania Fellowship

$115,000

To be announced May 2011

## Other

| | | |
|---|---|---|
| Launceston General Hospital,<br>Royal Hobart Hospital | Clinical trials data managers | $69,500 |

## Scholarships

**Jeanne Foster scholarships** $5000

To be announced May 2011

**Athena Karydis Foniadakis scholarship** $5000

To be announced May 2011

| | | |
|---|---|---|
| **Cancer Council Tasmania Honours** | UTAS Honours student | $10,000 |
| L Howson | | |

**CancerPLUS** $3000

To be announced May 2011

| | | |
|---|---|---|
| **TOTAL** | FUNDED BY DAVID COLLINS LEUKAEMIA FOUNDATION | **$49,500** |
| **TOTAL** | FUNDED BY CANCER COUNCIL TASMANIA | **$345,500** |
| **TOTAL FUNDING** | | **$395,000** |

## CANCER COUNCIL VICTORIA

### Fellowships

| | | |
|---|---|---|
| **Carden fellowship** | | |
| D Metcalf Walter and Eliza Hall Institute of Medical Research | Regulatory control of normal and leukaemic cells | $235,000 |
| **Colebatch fellowship** | | |
| K Phillips Peter MacCallum Cancer Centre | Reducing the burden of breast cancer | $144,500 |
| **Lions fellowship** | | |
| A Ng Walter and Eliza Hall Institute of Medical Research | Identification of genetic factors involved in haematopoeisis and the development of blood cancers | $16,000 (approx) |
| **Early Career Clinical Cancer Research Fellowship** | | |
| K Herbert Peter MacCallum Cancer Centre | The use of novel therapies in haematopoietic stem cell transplantation | $25,000 |
| **Total fellowships** | | **$420,500** |

### Research grants-in-aid

| | | |
|---|---|---|
| R Anderson Peter MacCallum Cancer Centre | Regulation of breast cancer metastasis by bone morphogenetic protein 4 | $100,000 |
| L Bach, G Rice Monash University | Insulin-like growth factor binding protein-6 and ovarian cancer | $97,508 |
| C Christophi, E Ager, P Angus, V Muralidharan Austin Health | Mechanisms of renin angiotensin system-regulated growth of colorectal liver metastases | $99,744 |
| P Ekert, A Lopez Murdoch Childrens Research Institute | Transcriptional and post-translational mechanisms regulating apoptosis in cytokine receptor signalling | $100,000 |
| K Harvey Peter MacCallum Cancer Centre | Phosphorylation-mediated regulation of the Hippo tumour suppressor pathway | $100,000 |
| D Izon, A Wei St Vincent's Institute | Identification of leukaemia-initiating cells in mixed lineage leukaemia | $100,000 |
| B Jenkins Monash Institute of Medical Research | Novel regulation of microRNAs by cytokine signalling pathways in gastric inflammation and cancer | $99,236 |
| M Kershaw, P Darcy, Peter MacCallum Cancer Centre | Investigations into differential responses to immunotherapy of orthotopic tumours compared to subcutaneous tumours | $100,000 |
| F Macrae, A Boussioutas, J Clarke, D Topping, S Toden, P Lynch, A Spigelman, M Appleyard, P Hollington, H Ee, D Cameron Melbourne Health | The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers | $100,000 |
| B Mann, A Skandarajah, A Rose, B Chua, J Forbes Melbourne Health | PROSPECT -- Post-operative Radiotherapy Omission in Selected Patients with Early breast Cancer Trial | $97,264 |
| B Parker, P Hertzog Peter MacCallum Cancer Centre | Silencing of Irf7 expression in breast cancer cells as a mechanism of immune escape during metastasis | $97,508 |
| M Smyth, M Teng Peter MacCallum Cancer Centre | Immunoregulation of the tumour microenvironment | $96,394 |
| **Total new research grants-in-aid** | | **$1,187,654** |

## Continuing research grants-in-aid

| | | |
|---|---|---|
| D Bowtell, A Möller<br>Peter MacCallum Cancer Centre | Hypoxia signalling in the tumour microenvironment | $100,000 |
| I Campbell, K Polyak<br>Peter MacCallum Cancer Centre | Identification of epigenetic and miRNA targets in primary ovarian cancer associated fibroblasts | $100,000 |
| L Campbell, H Nandurkar, R MacKinnon<br>St Vincent's Health | The identification of a leukaemia gene up-regulated by snytenic chromosome 20 deletion in acute myeloid leukaemia | $100,000 |
| J Cebon<br>Ludwig Institute for Cancer Research | Regulatory T cells specific for human tumour antigens | $90,250 |
| C Clyne<br>Prince Henry's Institute of Medical Research | Characterising the cancer-promoting role of LRH-1: Molecular mechanisms and animal model | $98,250 |
| A Dobrovic<br>Peter MacCallum Cancer Centre | Somatic DNA methylation and cancer predisposition: A new approach to identifying individuals at risk of cancer | $99,000 |
| P Fuller, A Drummond<br>Prince Henry's Institute of Medical Research | Molecular pathogenesis of granulosa cell tumours of the ovary | $100,000 |
| Y Haupt<br>Peter MacCallum Cancer Centre | A role for E6AP in the regulation of p53 in response to stress | $100,000 |
| R Hicks, G McArthur, J Desai<br>Peter MacCallum Cancer Centre | The role of glucose metabolism in oncogene addiction | $98,250 |
| M Hinds, C Day<br>Walter & Eliza Hall Institute of Medical Research | Structure and interactions of apoptosis regulators | $100,000 |
| JP Liu<br>Monash University | Investigating the control mechanisms of telomere maintenance in cancer: a new interaction between telomerase and GAPDH | $100,000 |
| W Phillips<br>Peter MacCallum Cancer Centre | Molecular mechanisms of action of PI3-kinase mutations: Studies in single cells using a novel microinjection approach | $100,000 |
| J Price, K Hunter, J Wilce<br>Monash University | Role of heat schock factor-1 in breast cancer metastasis | $100,000 |
| L Purton, K W Ng<br>St Vincent's Institute of Medical Research | Roles of retinoic acid receptors in bone and haemopoiesis | $100,000 |
| G Risbridger<br>Monash University | Defining the relationships between estrogens, prostatitis and prostate cancer | $100,000 |
| J Rood, M Brown, G Carter<br>Monash University | Clostridium-directed enzyme prodrug therapy (CDEPT): an innovative approach to treating cancer | $96,250 |
| J Rossjohn, J McCluskey<br>Monash University | A structural and functional investigation into tumour rejection by NKT cells | $99,250 |
| S Selemidis, E Williams, G Drummond<br>Monash University | Novel pharmacological targets for suppression of tumour angiogenesis | $100,000 |
| C Slape, D Curtis, S Jane<br>Melbourne Health | Molecular analysis of myelodysplasia in the Nup98HoxD13 mouse model | $100,000 |
| M Southey, D Goldgar<br>University of Melbourne | Identification of the breast cancer susceptibility gene on chromosome 4 with next generation sequencing | $99,125 |
| T Stewart<br>Peter MacCallum Cancer Centre | Use of anti-CCL2 mAb therapy as an adjuvant to reduce tumour growth and tumour-induced immunosuppression | $100,000 |
| M Wright<br>Monash University | The role of tetraspanins in adaptive cellular immunity | $100,000 |
| **Total continuing research grants-in-aid** | | **$2,180,375** |

## Venture grants

The Venture Grants Scheme was developed to foster a pathway for 'blue-sky' research – good ideas that might not attract conventional research funding but that, if successful, would have important outcomes. One of the original five projects continues in 2011

| | | |
|---|---|---|
| A Brumby, P Humbert, H Richardson,<br>Ian Street | Drosophila as a novel tool for anti-cancer drug discovery | $218,619 |
| **Total venture grants** | | **$218,619** |

## Postdoctoral research fellowships

| | | |
|---|---|---|
| C de Graaf<br>Walter & Eliza Hall Institute of Medical Research | Genetic pathway to megakaryocote commitment in hematopoietic progenitor cells | $33,754 |
| S Hubbard<br>Monash Institute of Medical Research | Cell surface markers for identifying endometrial cancer stem cells | $33,754 |
| C Allison<br>Monash Institute of Medical Research | Modulation of anti-tumour and inflammatory signalling during gastric cancer | $67,508 |
| F Grusche<br>Peter MacCallum Cancer Centre | Control of tissue growth and cancer by Hyperplastic Discs and the Hippo pathway | $67,508 |
| Two fellowships to be appointed mid-year | | $67,508 |
| **Total postdoctoral research fellowships** | | **$270,032** |

## Postgraduate research scholarships

| | | |
|---|---|---|
| K Alsop | Peter MacCallum Cancer Centre | $14,555 |
| M Anaka | Ludwig Institute for Cancer Research | $13,985 |
| J Chia | Peter MacCallum Cancer Centre | $19,424 |
| M Christie | Ludwig Institute for Cancer Research | $38,407 |
| F Day | Ludwig Institute for Cancer Research | $38,335 |
| S Hakim | Monash University | $29,110 |
| E Valente | Walter & Eliza Hall Institute | $28,978 |
| C Wong | Peter MacCallum Cancer Centre | $4,005 |
| Three ‘science’ and one ‘medical’ postgraduate scholarship to commence January 2011 | | $125,500 |
| **Total postgraduate research scholarships** | | **$312,299** |

## Other

| | |
|---|---|
| 20 summer Vacation Studentships were awarded | $27,650 |
| Support for medical and scientific activities | $328,000 |
| **Total other** | **$355,650** |

## Clinical research

| | |
|---|---|
| Cancer Council supports clinical research via the Cancer Trials Management Scheme, which aims to increase clinical trial recruitment by funding on-site trial coordinators. In 2011, grants totalling 855,000 will be awarded to more than 25 research sites across the State. | **$1,053,000** |

## Victorian Cancer Biobank

| | |
|---|---|
| The Victorian Cancer Biobank (Biobank) is an infrastructure platform that supports cancer researchers in academia and industry. The Biobank supplies biospecimens from cryostorage and supports clinical and translational research studies by providing the service of processing samples according to study specific protocols. | **$2,300,000** |

## Cancer control research

| | |
|---|---|
| Cancer Epidemiology Centre | $2,744,000 |
| Victorian Cancer Registry | $2,495,000 |
| The Melbourne Collaborative Cohort Study (Health 2020) | $1,825,000 |
| Centre for Behavioural Research in Cancer | $3,922,000 |
| Knowledge Building (Tobacco Control Unit) | $802,000 |
| **Total cancer control research programs** | **$11,788,000** |
| **TOTAL RESEARCH FUNDED** | **$20,086,129** |

## CANCER COUNCIL WESTERN AUSTRALIA

### Research Project Grants 1st year

| | | |
|---|---|---|
| B Iacopetta<br>University of Western Australia | DNA methylation of the normal colonic mucosa as a biomarker for development of the CpG island methylator phenotype of colorectal cancer | $76,394 |
| R London<br>University of Western Australia | The balance of proliferation and cell death signalling in growth, differentiation and transformation of liver stem/progenitor cells | $90,054 |
| B Robinson<br>University of Western Australia | Determining the phenotype and function of cells in the tumour environment that suppress CD8 T cell function and proliferation during anti-PD-L1 tumour therapy | $85,000 |
| P Dallas<br>Telethon Institute for Child Health Research | The role of deregulated microRNA expression in the pathogenesis of medulloblastoma | $79,736 |
| G Lee<br>University of Western Australia | Fibroblast Growth Factor 9: A novel target in mesothelioma | $90,000 |
| R Newton<br>Edith Cowan University | Efficacy and safety of high versus low intensity resistance exercise, with and without compression for management of lymphoedema in breast cancer survivors | $50,175 |
| L Fritschi<br>University of Western Australia | Improving exposure assessment in studies of shiftwork and flight crew work | $78,494 |
| P Hart<br>Telethon Institute for Child Health Research | UV-induced vitamin D3 and control of skin inflammation and allergic airways disease | $90,000 |
| B Callus<br>University of Western Australia | Inhibition of death-receptor triggered apoptosis by the Yes-associated protein (YAP) and its role in tumorigenesis | $90,000 |

### Research Project Grants 2nd year

| | | |
|---|---|---|
| U Kees<br>Centre for Child Health Research | Microenvironmental interactions in acute lymphoblastic leukaemia mediated by connective tissue growth factor | $70,000 |
| F Pixley<br>University of Western Australia | CSF-1R regulated macrophage motility and infiltration and the role of c-Cbl | $70,000 |
| **Total research grants** | | **$869,853** |

### Edward and Patricia Usher Vacation Research Scholarships

| | | |
|---|---|---|
| R Brown<br>University of Western Australia | Regulation of the PI3K/Akt and ERK pathways in melanoma cancer cell lines by microRNAs | $3000 |
| E Rozali<br>University of Western Australia | A potential role for paraspeckles in prostate cancer | $3000 |
| R Forsyth<br>Curtin University of Technology | Risk of computed tomography exposure induced cancer in WA | $3000 |
| Y Chong<br>University of Western Australia | Snake venom L-amino acid oxidase: understanding its role in apoptosis and the probing of its use as an anti-tumour agent | $3000 |
| C Field<br>Murdoch University | Identification of immune activation of dendritic cells by melaleuca alternifolia (tea tree) oil treatment in vitro | $3000 |
| S Leong<br>University of Western Australia | Comparing two different methods of rating occupational physical activity in the Breast Cancer Environment and Employment Study (BCEES) | $3000 |
| T Hodson<br>University of Western Australia | Advanced computer simulations of radiotherapy equipment and radiation interactions | $3000 |
| J Thum<br>University of Western Australia | An investigation of the dental care received by people with head and neck cancer undergoing radiotherapy | $3000 |
| C Perkins<br>University of Western Australia | Downstream targets of p53 in murine liver progenitor cell transformation | $3000 |
| **Total vacation research scholarship** | | **$27,000** |

## Suzanne Cavanagh Early Career Investigator Grants

| | | |
|---|---|---|
| P Cormie<br>Edith Cowan University | Feasibility and efficacy of resistance exercise in prostate cancer survivors with bone metastases | $25,080 |
| D Dye<br>Curtin University of Technology | Melanoma cell adhesion molecule (MCAM): translating cell adhesion into melanoma metastasis | $25,004 |
| M Cruickshank<br>University of Western Australia | Characterising the tumour suppressor properties of the novel repressor protien RP58 | $25,000 |
| S Shahid<br>Curtin University of Technology | Towards improving cancer outcomes for Aboriginal Australians: Cancer service providers experiences with Aboriginal people in Western Australia | $24,800 |
| **Total early career investigator grants** | | **$99,884** |

## Research Fellowships

| | | |
|---|---|---|
| L Milne | Telethon Insitute for Child Health Research | $20,000 |
| R Ganss | WA Institute for Medical Research | $20,000 |
| E Ingley | WA Institute for Medical Research/UWA | $100,000 |
| B Callus | WA Institute for Medical Research | $80,000 |
| R McLaughlin | University of Western Australia | $100,000 |
| **Total** | | **$320,000** |

## Ancillary PhD Scholarships

| | | |
|---|---|---|
| J Girschik<br>University of Western Australia | Lifetime sleep quality as a risk factor for developing breast cancer | $12,000 |
| G Levin<br>Edith Cowan University | Mental health, cognition and quality of life in cancer survivors: the effect of physical exercise | $12,000 |
| B Hug<br>University of Western Australia | Advanced radiotherapy techniques - development and modelling of advanced radiation guided technologies | $8000 |
| **Total PhD top up scholarship** | | **$32,000** |

## John Nott Cancer Fellowship Travel Support Fund

| | | |
|---|---|---|
| K Aronson<br>Queens University, Canada | To visit WA to collaborate with local researchers on the topics of the genetic and environmental causes of breast cancer | $5000 |
| **Total John Nott Travel Grant** | | **$5,000** |

## Professorial Chairs

| | | |
|---|---|---|
| Chair of Palliative and Supportive Care | Edith Cowan University | $115,000 |
| Chair of Behavioural Cancer Research | Curtin University of Technology | $140,000 |
| Chair of Clinical Cancer Research | University of Western Australia | $306,356 |
| **Total professorial chairs** | | **$561,356** |

## Other Research Grants

| | |
|---|---|
| Cancer Council Crawford Rural Cancer Research Initiative | $150,000 |
| Bone Tumour Registry | $18,000 |
| Travel Grants | $15,000 |
| Priority-driven Collaborative Cancer Research Scheme | $60,000 |
| **Total other research grants** | **$243,000** |
| **TOTAL RESEARCH FUNDED** | **$2,158,093** |

# Clinical Oncological Society of Australia 37th Annual Scientific Meeting

The Annual Scientific Meeting of the Clinical Oncological Society of Australia (COSA) has become an unmissable event on the calendar of Australian professionals involved in all aspects of cancer care, as evidenced by record attendance in Melbourne in November, at the new Convention Centre.

Almost 2000 people participated in the various pre and post-meeting symposia and workshops, as well as the main scientific program centered on the theme 'Cancer and Beyond'.

Innovations in 2010 included the inaugural trainee workshop 'Everything you need to know about breast cancer', where the COSA philosophy of multidisciplinary care was reinforced using the model of multidisciplinary education, an innovation of our COSA President Bruce Mann. Trainees from medical, radiation and surgical oncology, as well as nursing and allied colleagues, had a packed program of lectures, multidisciplinary clinics and 'Meet the Expert' sessions. A spaced education research program was attached to this event.

COSA has gained greatly in the past few years from partnering with relevant organisations during the meeting. Combining the 2010 meeting with the ANZ Breast Cancer Trials Group was highly successful, as was the partnership with Multinational Association of Supportive Care in Cancer.

Highlights of the main meeting included such varied activities as: the well recognised Australian author, Helen Garner, reading from her novel The Spare Room in the 'Focus on Carers' session; the launch of the Australian Neuroendocrine Tumour Guidelines; the discussion on 'survivorship' issues of sexuality, workforce, nutrition and 'starting over'; and the sessions dedicated to cancer pain, mental health and cancer, safety in cancer care delivery, just to pick out a few.

Our international faculty was of the highest quality, and despite many suffering long trips due to the A380 aeroplane crisis, their contribution was exceptional, from the singing and dancing breast surgeon Mark Kissin, to the practical and reassuring palliative care specialist Sara Booth, the fascinating and challenging Isabel White and the authority and charm of breast cancer experts Edith Perez, Anne Partridge, Mark Robson and Rowan Cheblowski. The many other international guests were equally as impressive and greatly valued by the audience. As the author of this report and the conference convenor, may I indulge and say that my favourite plenary talk was that of our supportive care guest Matt LoScalzo, discussing how we should value the resilience of patients and families and celebrate their achievements and coping skills, rather than solely focusing on unmet needs and burdens.

Our national speakers proved that Australian research and clinical practice is on par with world's best. The quality of the invited presentations was matched by that submitted through the abstract process. The COSA Annual Scientific Meeting is now recognised as a significant meeting in which the presentation of new data and major research projects is competitively assessed. Both the oral and poster sessions were of a very high standard, and the multitude of prize winners (with thanks to our award sponsors) recognised work of major importance across all fields.

The conference dinner was a time to relax after long days of learning and discussion, and enjoy entertainment from our 'COSA's Got Talent' competitors, as well as the 2010 Tom Reeve Oration, delivered by John Forbes. The inaugural Presidential lecture gave the audience a chance to hear from one of Australia's most prominent and pioneering translational researchers, Professor Donald Metcalf. The final event of the conference, the 'Hot Topic' debate, chaired by media personality Adam Spencer, pitched prevention against treatment in a hilarious yet thought provoking session.

My thanks as convenor go to the organising committee and to all those who contributed and attended, as well as our record number of corporate sponsors. I particularly would like to acknowledge the unwaivering support of Marg McJannett and Bruce Mann. The 2011 ASM is on track to continue to deliver excellence in a forum that is comprehensive, stimulating, varied and seemlessly integrated across our multiple disciplines – everything that COSA stands for as it grows from strength to strength.

Eva Segelov
Conference Convenor

*Professor John Forbes receiving the Tom Reeve award from Professor Bruce Mann (COSA Past President) at the Annual Scientific Meeting conference dinner.*

# AUSTRALIAN BEHAVIOURAL RESEARCH IN CANCER

## Centre for Health Research and Psycho-oncology (CheRP), New South Wales

### *"Any concerns or worries that I may have as a carer are dismissed, most days I feel invisible": A longitudinal analysis of cancer caregivers' unmet supportive care needs*

It is recognised that partners and caregivers of cancer patients confront a range of psychosocial challenges, yet psychosocial services to help partners and caregivers meet the demands of their new role are lagging in comparison to those available to patients. This analysis aimed to identify the level and type of unmet supportive care needs of partners and caregivers of cancer survivors, identified through a population-based sample of cancer survivors participating in CHeRP's Cancer Survival Study. Participants completed a self-report survey at approximately six (n=547), 12 (n=521) and 24 (n=442) months post survivor diagnosis. Unmet needs were measured by the Supportive Care Needs Survey – Partners and Caregivers. Half of the partners and caregivers experienced at least one moderate/high unmet need at six months post-diagnosis, with almost one third still experiencing moderate/high unmet needs two years post-diagnosis. On average, participants reported 4.6, 2.9, and 2.1 moderate/high needs across these time points. Many of the top ranking needs remained the same across time, including 'managing concerns about cancer coming back' and 'reducing stress in the person with cancer's life'. However, at 12 and 24 months, some information and cancer care related needs became less prevalent and were replaced by needs focusing more on the health and wellbeing of the partners and caregivers themselves (eg. 'looking after their own health'). Understanding the level and type of unmet needs is critical for evidence-based health care planning and resource allocation.

### *FamilyFIT: An innovative approach to increasing physical activity in children*

It is well established that regular participation in physical activity (PA) provides children with physical, psychological, social and emotional benefits. The more PA undertaken, the greater the benefits. However, despite these benefits, a significant proportion of Australian children do not achieve recommended levels of PA for health (60+ minutes moderate to vigorous PA each day). Parents and the family environment play an important role in influencing children's PA behaviours, but there is a lack of evidence regarding effective strategies that engage parents to promote child PA. To address this gap, families with primary school-aged children will be recruited into a pilot randomised control trial to evaluate the feasibility (acceptability and deliverability) and preliminary efficacy of a family focused community based intervention (FamilyFIT) designed to increase child and parent PA levels. Parents will be provided with information, skills and tailored resources to support parenting strategies which influence activity behaviour, and establish a home environment conducive to PA. Children and their parents will participate in fun, skill-based PA activities together. Recruitment of families will commence in 2011. PA will be measured via self-report and objectively using activity monitors. This project is funded by a Hunter Children's Research Foundation/ Hunter Medical Research Institute grant and a University of Newcastle/Centre for Health Research and Psycho-oncology PhD scholarship.

## Behavioural Research and Evaluation Unit (BREU), South Australia

### *Evaluation of the impact of the SA Health Smoke-free Policy on SA Health staff*

On 31 May 2010, a Smoke-free Health Services Policy was introduced in South Australia prohibiting smoking (by staff, consumers and visitors) on all SA Health sites, including buildings, structures, outdoor areas and in government vehicles. To determine the impact of this new smoke-free policy on SA Health staff, the Tobacco Control Research and Evaluation program is administering surveys to assess changes in smoking behaviour, perceived exposure to second-hand tobacco smoke, and attitudes towards the policy. Surveys of SA Health staff have been conducted at baseline and at three months post implementation, with a further follow-up survey planned at 12 months post implementation. A preliminary report analysis of the survey compared to baseline data is currently underway.

### *Evaluation of the Speaker's Bureau bowel cancer presentations*

The Speaker's Bureau is a program which contracts paid speakers to conduct presentations to community and work groups on a range of cancer control topics. To evaluate one of the topic streams, 'bowel cancer screening', attendees were asked to participate in three surveys, before and after the presentation, and a telephone follow-up survey three months later. An interim study reporting selected results of the pre and post-presentation surveys was conducted.

Over the data collection period (April to July 2010) there were 295 attendees to 14 bowel cancer screening presentations. Response rates for the pre and post-presentation assessments were 88% and 83% respectively. The majority of attendees were female (80%) and were within the recommended age group for screening ie. 50 years and older (85%). Prior to the

course, 66% of attendees reported they were aware of the Faecal Occult Blood Test (FOBT) (prompted awareness) at the pre-presentation assessment, and 28% of all attendees reported they had an FOBT in the last two years. The results suggested that attending a 45 minute presentation on bowel cancer screening had an immediate positive effect on attendees' knowledge of the preventability of bowel cancer and their intentions to screen.

## Centre for Behavioural Research in Cancer (CBRC), Victoria

### *Impact of publication of Australian treatment recommendations for DCIS on clinical practice: A population-based, before-after study*

Ductal carcinoma in situ of the breast (DCIS) is a non-invasive disease considered a precursor to invasive breast cancer. Australian treatment recommendations for the management of DCIS were released in September 2003. To understand the influence of the treatment recommendations on surgeons' management of DCIS, a population-based patterns of care study was conducted. The study examined the clinical management of all new cases of pure DCIS diagnosed in Victoria in two 12-month periods: (i) immediately prior to the release of the recommendations (n=342; 97%); and (ii) three years after their release (n=371; 98%). Surgeons treating DCIS were also surveyed regarding their awareness of the treatment recommendations and their level of agreement with key recommendations (n=63; 58%). The proportion of cases undergoing image guided biopsy, or breast conservation surgery (BCS) did not change between surveys nor did extent of surgical margins. Compared to the baseline period, more BCS cases were referred to a radiation oncologist (67%/58%) and more received radiotherapy (53%/44%) post-treatment recommendations. With the possible exception of adjuvant radiotherapy, most cases of DCIS diagnosed in the year prior to the publication were treated according to recommendations. The increase in the use of radiotherapy for DCIS cases treated by BCS may reflect the influence of the treatment recommendations on this practice. However as only around half of BCS treated cases received radiotherapy in 2006/07, results also suggest there is some uncertainty among surgeons regarding the use of this therapy for all BCS treated cases. This paper has been published in the *European Journal of Surgical Oncology.*

### *Parent's responses to nutrient claims and sports celebrity endorsements on energy-dense and nutrient poor foods: an experimental study*

Food marketing techniques have come under scrutiny for their probable contribution to promoting unhealthy eating and childhood obesity. This study, aimed to explore parents' responses to common strategies for marketing energy dense and nutrient poor (EDNP) child-oriented foods. A between-subjects online experiment tested whether nutrient claims and sports celebrity endorsements on the front-of-pack of EDNP foods led parents to prefer and rate these foods more favourably. A total of 1551 parents of children aged 5-12 years, who were the main household grocery buyers, were recruited from a national online panel. Results indicated parents were significantly more likely to prefer EDNP products if they included a nutrient claim or sports celebrity endorsement. Parents also perceived the promoted products to be more nutritious than those without promotions. Sports celebrity endorsements enhanced parent perceptions of typical consumers of the product, perceptions of product healthiness and quality, and purchase intentions. These findings indicate that parents are negatively influenced by the presence of nutrient claims and sports celebrity endorsements on EDNP food products. Consequently, efforts to reduce the persuasive impact of food marketing should focus on both parents and children. This paper is in press in *Public Health Nutrition.*

## Centre for Behavioural Research in Cancer Control (CBRCC), Western Australia

### *Physical Activity and Nutrition for Seniors (PANS)*

This National Health Medical Research Council funded project is a home-based program for insufficiently active adults aged 60 to 70 to increase levels of physical activity and improve dietary intake. The program is a 12 month RCT, based on the Social Cognitive Theory and the Precede-Proceed Model for seniors of low and medium socio economic status (intervention n=300; controls n=300) from 60 Perth suburbs. The six month intervention consisted of a booklet and supplementary materials (calendar, exercise chart, pedometer) providing dietary and physical activity information, and encouraging goal setting. Program group guides (consultants) provided regular specific advice and feedback to participants via telephone and email. Process evaluation was conducted, along with pre-post self-report data collected on psycho-social, physical activity, dietary and anthropometric measures and demographics. Process evaluation of the booklet and supplementary materials was very positive. Participants found the booklet easy to understand, liked its layout/appearance and found it motivating and encouraging. Participants used the calendar to record physical activity and found the exercise chart to be a visual reminder for the exercise program. The post-program evaluation is currently taking place via self-report questionnaires. Measures of physical activity and nutrition will be analysed, as well as the differences in the results between the intervention and control subjects.

### *Plain tobacco packaging research*

Plain packaged cigarettes are scheduled to come into effect in Australia on 1 January 2012. The tobacco industry has funded, to the tune of $5 million, an umbrella organisation known as the 'Alliance of Australian Retailers' which purports to represent small tobacco retailers opposed to its introduction. Through mass media advertising, the alliance has argued that the implementation of plain packaged cigarettes will increase transaction times, errors made by shopkeepers and customer frustration, ultimately leading to smaller profits and loss of jobs. We are examining the validity of these claims by empirically testing transaction times with both coloured and plain cigarette packets. Data is currently being collected by observing the time taken for participants to select specified cigarette packets from both plain and coloured cigarette pack displays. On repeated occasions, each participant is asked to select a specific cigarette pack from a large display of either plain or coloured cigarette packs arranged in alphabetical order. Each 'transaction' is timed and any errors noted. Preliminary results suggest that there is little difference between the two pack types, plain packaging resulting in less errors.

## Viertel Centre for Research in Cancer Control (VCRCC), Queensland

### *CanChange study*

The CanChange study is a randomised control trial of a telephone delivered intervention to improve lifestyle factors and overall quality of life for colorectal cancer survivors. Recruitment of participants commenced in February 2009 from the Queensland Cancer Registry and a final sample of 410 participants has been randomised to an intervention or 'usual care' control condition. The intervention focuses on symptom management, lifestyle and psychosocial support using telephone delivered health coaching sessions from a study-trained health professional ('health coach'), additional educational resources, a pedometer and motivational postcards. Control participants receive standard Cancer Council educational materials. Intervention delivery for all participants was completed in October 2010. Baseline and six month data collection has been completed and follow-up data collection is ongoing, with final study results available in 2011.

### *CanPrevent study*

Individuals with a family history of colorectal cancer have a significantly elevated risk of developing colorectal cancer. Epidemiological studies indicate that first degree relatives of survivors have a 1.6 to 8 times higher lifetime risk of colorectal cancer than those without a family history. CanPrevent is a telephone delivered lifestyle support program for first degree relatives of colorectal cancer survivors that aims to promote healthy lifestyle behaviours and screening uptake to assist participants reduce their cancer risk. The first phase of the study involves conducting two focus groups with first degree relatives of colorectal cancer survivors to gain insight into their knowledge of colorectal cancer, screening practices and motivations for making lifestyle changes. Phase 1 of the study has been completed and the findings will assist in the development of the program. The second phase will be conducted in early 2011 and involve a pilot study with n=20 participants. Participants will receive telephone-delivered health coaching sessions from a study-trained health professional ('health coach'). Phase 2 of the study will test the acceptability and short-term effectiveness of the intervention.

### *Beating the Blues after Cancer study*

The aim of the Beating the Blues After Cancer study is to assess the efficacy and cost-effectiveness of accessible and affordable psychological interventions for distressed cancer patients and carers. By comparing two different support options, the study will determine the best possible way to help people affected by cancer. The study began in September 2009 and recruitment was completed in August 2010, with 690 participants recruited from two helplines randomly allocated to one of two support options – five tele-based sessions with a psychologist or one tele-based session with a nurse counsellor. To date, 611 participants have completed their intervention sessions and this phase is scheduled for completion at the end of November. In addition, follow-up assessment is taking place at three, six and 12 months after initial assessment, comprising a short telephone interview and self-report survey. The final data collection phase is scheduled for completion by October 2011. Data cleaning of the baseline assessment data took place in September and the data is currently being analysed.

# NEWS & ANNOUNCEMENTS

## Obesity time bomb ticking for nation's high school students

In February results of a national survey released by Cancer Council Australia and the Heart Foundation reveal the severity of Australia's overweight and obesity crisis.

The survey found one in four Australian high school students was overweight or obese, 85% were not doing adequate physical activity, 76% were not eating enough fruit and vegetables and 51% made food choices based on advertising.

The survey of 12,188 students in years eight to 11 across 237 schools provides the first truly national sample for a physical activity survey of young Australians since 1985.

Chair of Cancer Council Australia's Nutrition and Physical Activity Committee, Kathy Chapman, said the report provided compelling evidence for the Australian Government to implement a comprehensive obesity strategy, as recommended by the National Preventative Health Taskforce.

"Australia's high obesity rates are a cancer time bomb. Overweight and obesity significantly increases cancer risk and unless we address the problem, common cancers such as bowel and breast are set to surge," Ms Chapman said.

The research findings can be viewed at http://www.cancer.org.au/policy/Publications/NaSSDA.htm

## Bowel cancer screening

The Government's National Bowel Cancer Screening Program ended on 31 December 2010, with Cancer Council Australia calling on the Government to recommence the initiative in the 2011/12 budget. It is estimated that continuation of the program could save more than 1500 lives per year and drastically reduce the strain of bowel cancer on the health system.

"We estimate a full program would cost around $140 million per annum to run," Cancer Council Australia Chief Executive Officer, Professor Ian Olver said. "That's about 23c a week for each taxpayer – or fewer than 1c a week for each of the 30 lives that could be saved.

"Reductions in public hospital expenditure, PBS and Medicare costs would substantially reduce the program's overall cost, making it cost-effective as well as life saving."

The plea for full funding and implementation of the program, which would test people over 50 every two years, will be the sole focus of Cancer Council's pre-budget submission to treasury.

"We have never before focused on just one initiative in a pre-budget submission, but Australia has never before been at the crossroads of such a vital cancer program," Professor Olver said.

To view the submission and the campaign visit www.getbehindbowelscreening.com.au

## Senate recommends gene patent reforms, as joint bill referred to Parliament

Gene patent reform took a step forward in late 2010, with the Senate recommending a range of policy changes at the same time as a multi-partisan draft bill to amend the Patents Act was referred to a Senate legislative committee.

Professor Olver said the Senate's recommended reforms would help clarify ambiguities in the Patent Act which, if left unchanged, could restrict competitive research and equitable access to healthcare, particularly as genetic technology rapidly evolved.

Published on 26 November 2010, two years after the inquiry into gene patents began, the Senate report recommended:

- improving transparency
- adding a broader research exemption and anti-avoidance provisions
- clarifying the definition of invention, and
- establishing a patent audit committee

The Patent Act Amendment Bill is expected to be tabled in Parliament for debate later this year.

## Nicotine replacement therapy on the PBS

In December, the Australian Government announced that nicotine replacement therapy was to be listed on the Pharmaceutical Benefits Scheme. The move has been applauded by Cancer Council Australia, Quit Victoria and the Heart Foundation of Australia, who expect the nation's cancer and cardiovascular disease burdens to be reduced as a result.

"People on low incomes smoke at much higher rates than those who are financially secure, meaning they bear a disproportionate share of cancers caused by smoking – which are among the most deadly and difficult to treat," Professor Olver said.

"It is an unfair cycle of poverty, illness and early death and, unless we start to see smoking rates reducing among socially disadvantaged people as they have among the educated and affluent, the gap in health outcomes will widen significantly."



# BOOK REVIEWS

## Cancer Principles & Practice of Oncology Review

Second Edition
Ramaswamy Govindan
Lippincott Williams & Wilkins (2010)
RRP: US$85.00
ISBN-13: 9781605470580

I studied for my English Literature 'O' Level examination using *Brody's Notes,* which provided a review of the texts we were studying. However, I did not read the texts and subsequently only received a "D" Grade and failed my exam.

This book provides a valuable tool for those studying the discipline of cancer, but must be recognised as a tool to test the knowledge already acquired rather than as the source of knowledge itself. The book's editor, Ramaswamy Govindan, acknowledges this as the role of the book in the preface. This book is a companion to Devita, Lawrence and Rosenberg's authoritative textbook, *Cancer - Principles and Practice of Oncology,* and as such is useful in directing attention to the key points of each subject.

This book is divided into chapters based on those in the Devita text book, which allows for the reader to focus on particular areas of specialisation. Each chapter comprehensively covers the assigned subject matter providing the reader with a thorough interrogation of knowledge held.

The book contains hundreds of multiple-choice and case-based questions covering the principles of surgical oncology, radiation oncology, medical oncology and malignant haematology. Topics covered include the biology, diagnosis, staging and treatment of cancers, as well as the management of cancer and treatment complications at each anatomic site. The questions vary between simple one-lined inquiries to more involved case studies. In either case, the answers provided are comprehensive explanations of the issue raised and include surrounding points of interest.

Disappointingly, this book does not include chapters on psychosocial issues nor cancer rehabilitation, both of which are important topics in modern oncological practice.

As with the definitive text *Cancer - Principles and Practice of Oncology*, this review provides online access to ensure any updates to practice detailed in the book can be captured online, thus ensuring the questions and answers represent contemporary, cutting edge practice.

This book particularly targets medical and nursing staff studying for clinical exams and would provide a useful resource for those setting the examinations for such people. For this reason this book provides a valuable contribution to any medical or nursing library.

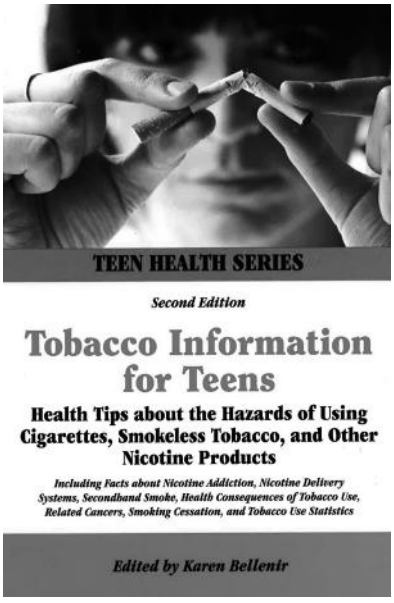
*Bill Jansens, Shoalhaven Cancer Care Centre, NSW.*

## Tobacco Information for Teens

Edited by Karen Bellenir
Second Edition (2010)
Omnigraphics Teen Health Reference series
454 Pages
RRP: US$62.00
ISBN: 978-0-7808-1153-9

When first asked to review this book, I was excited at the idea of a new tool that I might be able to employ in my work with young people. My excitement was short-lived.

This very North American-focused reference doesn't clearly state who the intended audience is and nothing about its appearance helps define this. However, many references are made throughout that imply it might be intended for teenagers themselves. Having worked with adolescents and young adults for some years now, I would have to question whether someone in this age group would ever pick up such an uninviting text, let alone wade through the dry, factual tome. It is far from user-friendly, if young people are indeed the intended audience. Moreover, it's far from user-friendly for older adults, should this have been intended for teachers, parents or health promotion professionals.




The book opens with 'How to Use' instructions. I know of few

young people who have the patience for written material that needs a 'how to' explanation. In the current online era, the vast majority would source up-to-date information from web-based sources that require little or no explanation of how to use them.

The 440 page book is divided into six parts: Facts About Tobacco and Nicotine; Nicotine Delivery Systems; Cancers Associated with Tobacco Use; Other Health Concerns Related to Tobacco Use; Tobacco Use Cessation; and If You Need More Help or Information. I can't imagine anyone making it to section six and feeling inclined to investigate further.

The dry information and even the way in which it is presented lacks anything that would make it attractive to readers. Twelve pages alone are dedicated just to listing the chemicals and ingredients in cigarettes. The extent of its creative appearance is limited to grey shaded text boxes of 'Quick Tips', 'It's A Fact' and 'What's It Means' bullet points. The language is dry, mature and statistical, and there are no diagrams, cartoons or illustrations to encourage a young (or older) reader.

Content reflects a poor understanding of issues of relevance to young people. Suggested strategies to help the teenager quit include methods of distraction that include "do a crossword puzzle…play cards" and eating "carrot or celery sticks". I'm sure the irrelevance of these to contemporary teenagers does not need further explanation. An example in the myth-busting section early in the book, where the authors challenge the myth that "smoking won't affect my health until I'm much older", uses two examples of questionably famous Americans who died at ages 38 and 46. Anyone who has teenage children will understand that to young people, 38 and 46 year-olds are old!

This book is the second edition of a series of texts known as the 'Teen Health Series'. One would presume that the series follows the same format and style which gives cause to question how they've come to need second editions. Notably, the advisory board for this publication lists academics and librarians and one medical practitioner. Nowhere in any of the acknowledgements or bibliographic notes is there mention of input from any individual with experience in working with youth or development of youth-appropriate materials.

Needless to say, there has been no input or review by young people themselves, as one would expect of materials being developed for use by young people today. When I asked a couple of the young people with whom I work to take a cursory glance, it drew looks ranging from boredom to amusement. When questioned, it was clear that they thought I was joking that it might be something that would be of interest to them. One asked me why they would open a book when they have an iPad.

Needless to say, I would not recommend that professionals working with young people recommend this book to their clientele, if they wish to create or retain any rapport that they have thus far developed. It may have some limited use for holding by school libraries as a reference for school assignments, until its publication date becomes rapidly outdated by material available contemporaneously online.

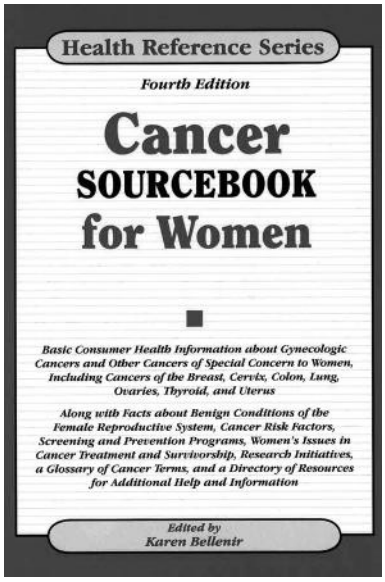
*Meg Plaster, Adolescent/Young Adult Cancer Nurse Coordinator, Cancer and Palliative Care Network, WA.*

## Cancer Sourcebook for Women

Edited by Karen Bellenir
Fourth Edition (2010)
Omnigraphics Health Reference series
718 Pages
RRP: US$95.00
ISBN: 978-0-7808-1139-3

The *Cancer Sourcebook for Women* is one in a series of reference books by Omnigraphics. The back cover explains that the Omnigraphics health reference series is for "helping the lay person understand, manage and avoid serious illness" They go on to explain that the *Cancer Sourcebook for Women* offers updated information about gynaecologic cancers and other cancers of special concern to women. It explains cancer risks, methods used to diagnose and treat cancer and cancer survivorship. The book concludes with a glossary of cancer related terms and a directory of resources. This series has published extensively on a variety of topics and this is the fourth edition of the *Cancer Sourcebook for Women*.

The book itself comprises of eight parts (divided into 57 chapters) dealing with women's health issues, cancer risks, specific cancer types, diagnosing and treating cancer and side-effects of cancer and their treatments, survivorship issues and additional help. It also provides a glossary of terms and directories for further information. The table of contents is easily navigated and flows in a logical manner. The manner in which the book is written is aimed at providing basic consumer information for the patient and the caregiver at home. The book is well written and easy to follow, with



chapters offering basic information on most topics related to cancer care and women. In addition to this, the book also covers basic information on non-malignant issues particular to women. It is written with the general public in mind and as such may be too basic as a resource for health professionals. However, it would provide a starting point for further research or a basic resource for the student.

It should be noted that the book itself is aimed at the US consumer and as such all the statistics mentioned are American. In addition, there are sections on clinical trials, costs and private insurance that are not wholly applicable in Australia (though the basic descriptions are the same in both countries). All of the references provided are American and the section at the back on support groups and directories for additional information relate to organisations found in North America. If I were to recommend this book to my patients, I would be inclined to provide some local resources and web sites.

This book provides a good basic reference for anyone who is interested in cancer and other women's health issues.

*Jennifer Duggan, Department of Gynaecology Oncology, Royal Hospital for Women, NSW.*

## Two Years to 'Normal'

Karen Leibovitch
Longueville media (2010)
ISBN: 978-1-920681-56-2
RRP: $32.95

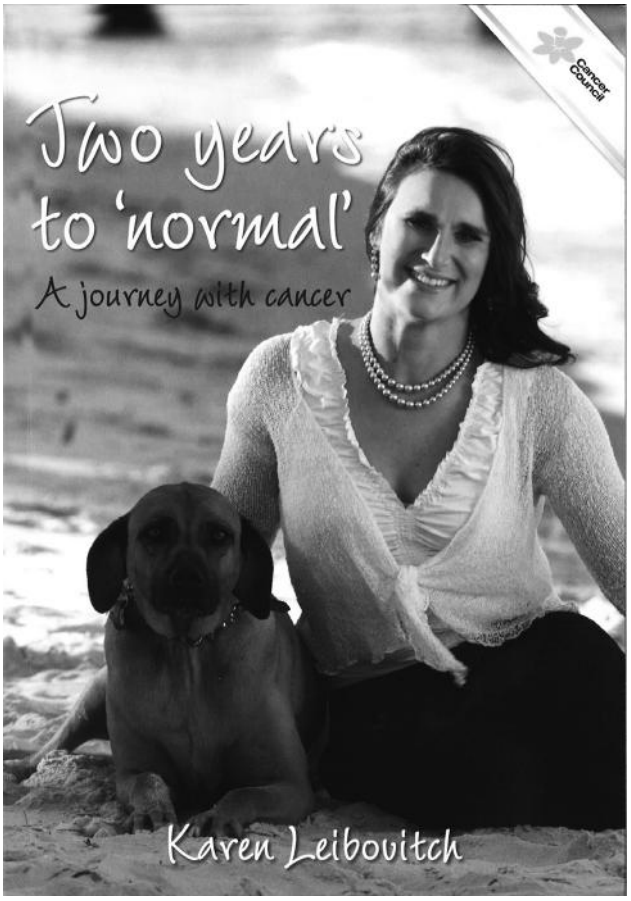
Karen Leibovitch has written an account of her journey that serves to inform the reader that cancer has a far reaching impact on the individual and their family that extends well past diagnosis and treatment. *Two Years to 'Normal'* gives a clear view of the immediate effect and ongoing consequences of diagnosis and surgical excision of tongue cancer on the author and her family.

The author has written in a conversational style, which enables the reader to feel like they are sharing a coffee and a story, in turn making the book an effortless read. There is great value in the author's description of the effects of her disease (both physically and psychosocially) on her immediate family and their relationships, and how these effects did not immediately resolve upon remission. As health professionals it is important to be reminded that a diagnosis of cancer affects not just the individual but their partner, children, siblings, parents, extended family and friends and that these effects continue long after treatment, whether successful or not.

Leibovitch, a counsellor, depicts her thoughts and emotions over the two year period from diagnosis through the book with both honesty and humility. An interesting component that the author has included is the development of therapeutic relationships between herself and the health care professionals involved in her care, particularly the relationship with both her surgeon and later her counsellor, which emphasises the need for both trust and veracity.

For those diagnosed with cancer, *Two Years to 'Normal'* may be a resource to allow increased understanding of the rollercoaster of emotions they and their families are embarking on. The sale of Leibovitch's book supports the Cancer Council's National Helpline.

*Lucy Patton, The Centre for Nursing Education, Sir Charles Gairdner Hospital, WA.*



# CALENDAR OF MEETINGS

## AUSTRALIA AND NEW ZEALAND

| Date | Name of Meeting | Place | Secretariat |
|---|---|---|---|
| ***March*** | | | |
| 25-27 | Abdominal Radiology Group Australia & New Zealand 2011 Meeting | Sydney, New South Wales | Abdominal Radiology Group Australia & New Zealand<br>Website: www.arganz2011.com<br>Email: arganz2011@arinex.com.au<br>Phone: + 61 2 9265 0700 |
| 25-27 | Breast 2011 | Sydney, New South Wales | Kay Collette<br>Website: www.breast2011.com.au<br>Email: breast2011@bigpond.com<br>Phone: +61 2 9419 4252 |
| ***April*** | | | |
| 28-30 | 20th Annual Scientific Meeting of the Australasian Brachy therapy Group | Perth, Western Australia | Australasian Brachytherapy Group<br>Website: www.abg.org.au<br>Email: events@conferencesolutions.com.au<br>Phone: +61 3 9870 2611 |
| ***May*** | | | |
| 3-6 | Royal Australasian College of Surgeons Annual Scientific Congress 2011 | Adelaide, South Australia | Royal Australasian College of Surgeons<br>Website: www.surgeons.org/<br>Email: conferences.events@surgeons.org<br>Phone: +61 3 9249 1273 |
| 19 | Australian Indigenous Cancer Survivors forum | Sydney, New South Wales | Malathi Kanagasabapathy,<br>Website: http://www.healthinfonet.ecu.edu.au/health-resources/conferences?cid=703<br>Email: malathi@m247consulting.com<br>Phone: + 61 410 630 316 |
| ***July*** | | | |
| 3-7 | Tripartite Colorectal Meeting | Cairns, Queensland | Australian Association of Stomal Therapy Nurses<br>Website: www.tripartite2011.org<br>Email: Stomaltherapy@cabrini.com.au<br>Phone: +61 (0) 3 5983 2400 |
| 21-23 | Cancer Nurses Society of Australia, 14th Winter Congress | Sydney, New South Wales | Cancer Nurses Society of Australia<br>Website: http://www.dcconferences.com.au/cnsa2011<br>Email: cnsa2011@dcconferences.com.au<br>Phone: +61 2 9954 4400 |
| ***August*** | | | |
| 4-7 | Skin Cancer Conference | Hamilton Island, Queensland | The University of Queensland<br>Website: skincancerconference.com.au/2011/<br>Phone: 1300 856695 |
| 10-12 | Medical Oncology Group of Australia Annual Scientific Meeting & Best of ASCO Australia | Adelaide, South Australia | Medical Oncology Group of Australia<br>Website: www.moga.org.au<br>Email: moga@moga.org.au<br>Phone: +61 2 9256 9652 |

# CALENDAR OF MEETINGS

| Date | Name of Meeting | Place | Secretariat |
|---|---|---|---|
| ***October*** | | | |
| 28-30 | BreastScreen Australia Conference | Melbourne, Victoria | BreastScreen Australia<br>http://www.bsaconference.com.au/<br>bsa@thinkbusinessevents.com.au<br>+61 3 9417 1350 |
| 17-20 | Oceania Tobacco Control Conference | Brisbane, Queensland | Cancer Council Queensland<br>Website: www.oceaniatc2011.org/<br>Email: JoannaLam@cancerqld.org.au<br>Phone: +61 7 3634 5361 |
| ***November*** | | | |
| 14-17 | Clinical Oncological Society of Australia Annual Scientific Meeting | Perth, Western Australia | Clinical Oncological Society of Australia (COSA)<br>Website: www.cosa.org.au<br>Email: cosa@cancer.org.au<br>Phone: +61 2 8063 4100 |

# INTERNATIONAL

| Date | Name of Meeting | Place | Secretariat |
|---|---|---|---|
| ***March*** | | | |
| 11-12 | Integrative Care for the Future: The future of cancer care | Arnhem, The Netherlands | Integrative Care for the Future and Supplement BV<br>Website: http://www.sup.nl/<br>Email: mischa@sup.nl |
| 15-19 | 12th International Conference Primary Therapy of Early Breast Cancer | St Gallen, Switzerland | St. Gallen Oncology Conferences<br>Website: www.oncoconferences.ch<br>Email: info@oncoconferences.ch<br>Phone: +41 71 243 0032 |
| 24-26 | EORTC EANO conference 2011: Trends in Central Nervous System Malignancies | Brussels, Belgium | European Cancer Organisation<br>Website: http://www.ecco-org.eu<br>Email: info@ecco-org.eu<br>Phone: +32 2 775 0201 |
| ***April*** | | | |
| 1-3 | Women's Health 2011: The 19th Annual Congress | Washington DC, United States of America | VCU Institute for Women's Health Website: www.bioconferences.com/conferences/WomensHealth/index.aspx<br>Email: womenshealth2011@liebertpub.com |
| 7-9 | 2nd Interdisciplinary Conference - Prostate Cancer: Predictive Models for Decision Making | New York, United States of America | European School of Oncology ; Memorial Sloan-Kettering Cancer Center<br>Website: www.eso.net/events-2.html Email: prostate@eso.net<br>Phone: +39 02 85464527 |
| 8-10 | Asian Oncology Summit | Hong Kong, China | Elsevier & The Lancet Oncology<br>Website: www.asianoncologysummit.com/<br>Email: aos@elsevier.com<br>Phone: +65 6349 0283 |
| 14-16 | Kyoto Breast Cancer Consensus Conference | Kyoto, Japan | Kyoto University Breast Surgery Department<br>Website: www.kyoto-breast-cancer.org/<br>Email: info@kyoto-breast-cancer.org<br>Phone: +81-75-761-5751 |
| 19-23 | 9th International Gastric Cancer Congress | Seoul, South Korea | Local Organizing Committee of 9 IGCC<br>Website: www.9igcc.com<br>Email: office@9igcc.com<br>Phone: +82 2 837 0815 |

# CALENDAR OF MEETINGS

| Date | Name of Meeting | Place | Secretariat |
|---|---|---|---|
| ***May*** | | | |
| 3-5 | 1st International Conference on UV and Skin Cancer Prevention | Copenhagen, Denmark | The Danish Cancer Society ; TrygFonden; Cancer Council Victoria and Victorian Health Promotion Foundation<br>Website: www.cph-skincancer.com/<br>Email: info@cph-skincancer.com<br>Phone: +45 35257500 |
| ***August*** | | | |
| 14-19 | 2011 Pan Pacific Lymphoma Conference | Kaloa Kauai, Hawii, United States of America | University of Nebraska Medical Center<br>Website: www.unmc.edu/cce<br>Email: bram@unmc.edu<br>Phone: +1 402 559 9250 |
| ***September*** | | | |
| 22-27 | ECCO 16 - 36th ESMO Multidisciplinary Congress | Brussels, Belgium | European Cancer Organisation<br>info@ecco-org.eu<br>www.ecco-org.eu<br>Ph: +32 2 775 0201 |
| ***October*** | | | |
| 06-07 | IV InterAmerican Oncology Conference: 'Current Status and Future of Anti-Cancer Targeted Therapies' | Buenos Aires, Argentina | InterAmerican Oncology Conferences<br>Website: www.oncologyconferences.com.ar<br>Email: secretariat@oncologyconferences.com.ar |
| 16-20 | IPOS 13th World Congress of Psycho-Oncology | Antalya, Turkey | International Psycho-Oncology Society and Turkish Psychosocial Oncology Association<br>Website: //www.ipos-society.org/ipos2011/<br>Email: aholcomb@ipos-society.org<br>Phone: +1.434.996.5739 |
| ***November*** | | | |
| 09-12 | 16th Annual Reach to Recovery International Breast Cancer Support Conference | Taipei, Taiwan | Taiwan Breast Cancer Alliance; Formosa Cancer Foundation<br>Website: www.reachtorecovery2011.org<br>Email: hanna@tbca-npo.org.tw<br>Phone: +886 2 2557 8050 |
| 27-2 | 97th RSNA Scientific Assembly and Annual Meeting | Chicago, Illinois, United States of America | Radiological Society of North America<br>Website: www.rsna.org/rsnsa<br>Email: reginfo@rsna.org<br>Phone: +1 630 571 7879 |
| ***December*** | | | |
| 8-12 | IV InterAmerican Oncology Conference: 'Current Status and Future of Anti-Cancer Targeted Therapies' | 34th Annual San Antonio Breast Cancer Symposium | CTRC Research Foundation<br>Website: www.sabcs.org<br>Email: rmarkow@crec.net<br>Phone: +1 210 450 5912 |

## CANCER COUNCIL AUSTRALIA

Cancer Council Australia is the nation's peak cancer control organisation.

Its members are the leading state and territory Cancer Councils, working together to undertake and fund cancer research, prevent and control cancer and provide information and support for people affected by cancer.

### *MEMBERS*

Cancer Council ACT
Cancer Council New South Wales
Cancer Council Northern Territory
Cancer Council Queensland
Cancer Council South Australia
Cancer Council Tasmania
Cancer Council Victoria
Cancer Council Western Australia

### *AFFILIATED ORGANISATIONS*

Clinical Oncological Society of Australia Inc.

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Professor I Olver AM MBBS, MD, PhD, CertMin, FRACP, FAChPM, AFRACMA

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## CLINICAL ONCOLOGICAL SOCIETY OF AUSTRALIA INC

The Clinical Oncological Society of Australia (COSA) is a multidisciplinary society for health professionals working in cancer research or the treatment, rehabilitation or palliation of cancer patients.

It conducts an annual scientific meeting, seminars and educational activities related to current cancer issues. COSA is affiliated with Cancer Council Australia.

### *EXECUTIVE COMMITTEE*

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Ms H Dhillon
Professor I Olver
Proffesor J Zalcberg

### *MEMBERSHIP*

Further information about COSA and membership applications are available from:
www.cosa.org.au or cosa@cancer.org.au

Membership fees for 2010

Ordinary Members: $160
Associate Members: $100 (includes GST)

### *PROFESSIONAL GROUPS*

ANZ Children's Haematology and Oncology
Breast
Cancer Nurses Society of Australia
Cancer Pharmacists
Cancer Biology
Clinical Research Professionals
Epidemiology
Familial Cancer
Gastrointestinal
Gynaecology
Lung
Medical Oncology
Melanoma and Skin
Neurooncology
Nutrition
Palliative Care
Psycho-oncology
Radiation Oncology
Regional and Rural
Social Work
Surgical Oncology
Urologic Oncology

# Information for contributors

*Cancer Forum* provides an avenue for communication between all those involved in the fight against cancer and especially seeks to promote contact across disciplinary barriers.

To this end articles need to be comprehensible to as wide a section of the readership as possible. Authors should provide sufficient introductory material to place their articles in context for those outside their field of specialisation.

## Format

*Cancer Forum* welcomes original articles about medical, scientific, political, social, educational and administrative aspects of cancer control. All manuscripts should be submitted by email to info@cancerforum.org.au as MS Word documents.

Length: 2000-2500 words.

Font: Arial - 20pt for title, 12pt for headings and 10pt for text.

Following the title, include your full name, organisation and email address.

Include an introductory heading and sub-headings that describe the content.

Number pages in the footer.

## Abstract

All manuscripts must include an abstract of approximately 200 words, providing a summary of the key findings or statements.

## Illustrations

Photographs and line drawings can be submitted via email or on disk, preferably in tiff or jpeg format, or as transparencies or high quality prints.

If images are not owned by the author, written permission to reproduce the images should be provided with the submission.

## Referencing

Reference numbers within the text should be superscripted and placed after punctuation.

The list of references at the end of the paper should be numbered consecutively in the order in which they are first mentioned and be consistent with the National Library of Medicine's International Committee of Medical Journal Editors' *Uniform Requirements for Manuscripts Submitted to Biomedical Journals.*

eg. Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25;347(4):284-7.

A full guide is available at www.nlm.nih.gov/bsd/uniform_requirements.html

**The Editorial Board will make the final decision on publication of articles and may request clarifications or additional information.**

## Manuscripts should be emailed to:

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info@cancerforum.org.au


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Website: www.cancer.org.au