

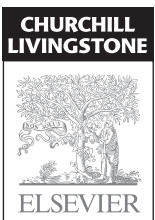
Herbs & Natural Supplements

An evidence-based guide 3RD EDITION



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Lesley Braun
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Herbs & Natural Supplements

An evidence-based guide 3RD EDITION


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Herbs & Natural Supplements

An evidence-based guide 3RD EDITION

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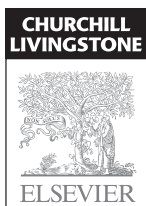
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indicates a herb or supplement action with particular significance for pregnant women.



indicates a warning or cautionary note regarding the action of a herb or supplement.



indicates FAQs about the herb or supplement.



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ORGANISATION OF THIS BOOK

This third edition of *Herbs & natural supplements – an evidence-based guide* is organised into four sections. The first section provides a basic introduction to complementary medicine in general and then, more specifically, to herbal medicine, clinical nutrition, aromatherapy, and food as medicine. It is hoped that many of your general questions will be answered here.

The second section focuses on issues relating to clinical practice and explores the relatively new fields of integrative medicine and wellness, as it relates to health. These areas are gaining popularity around the globe and complementary medicine philosophy and treatments are often an integral part of the approach. This section also contains chapters with a focus on safety because the wise clinical use of all interventions must be based on a benefit versus risk assessment. There are general chapters discussing the safety of herbs and natural supplements and drug interactions, and then specific chapters focusing on safety in pregnancy, before surgery and for people undertaking treatment for cancer. These topics are discussed in both a theoretical and a practical way to clarify the key concerns and produce some general guidelines that can be used to inform practice.

The third and largest section comprises 130 evidence-based reviews of some of the most popular herbs and natural supplements available over the counter. Exhaustive reviews of the peer-reviewed literature have been undertaken by the author team to update, modify and expand information from the previous edition, and 10 new monographs are included. Common names, chemical components, main actions, clinical uses, dosage range and safety issues are included for each herbal medicine. For nutritional supplements, background information and pharmacokinetics, food sources, deficiency signs and symptoms and the new Australian and New Zealand recommended daily intakes (RDIs) are also included where appropriate.

Although technical language is frequently used, there is also a summary in non-technical language (Practice Points and Patient Counselling) and answers to key questions patients may have about the product (Patients' FAQs). A 'Historical note' is included where appropriate and occasionally there are also 'Clinical note' boxes that provide further information.

The fourth section consists of ready-reference appendices, the largest of which is a table that outlines the interactions possible between the 130 complementary medicines reviewed and pharmaceutical drugs (Appendix 2). Although investigation into this area is still in its infancy, we have provided a brief explanation for each possible interaction and a general recommendation based on what is currently known or suspected. It is intended as a guide only, to be used to inform practice when clinicians take a medical and medication history: obviously it should be interpreted within the individual patient's context. It is anticipated that this section will continue to change in future editions as more clinical studies are published and theoretical predictions are tested. Appendix 5 is a guide to the safe use of complementary medicines in the preoperative period. Appendix 7 is a table organised by pharmacological action giving the herbs and nutrients that produce that action and the type of evidence available to support this. For example, to find which herbs and nutrients exert an anti-inflammatory action, check under 'Anti-inflammatory'. We have also included a glossary of medical, research, integrative and complementary medicine terms and abbreviations (Appendix 1), a list of Australian and New Zealand poisons information centres and their phone numbers (Appendix 3), and the contact details for teaching institutions, complementary and integrative medicine associations and product manufacturers in Australia and New Zealand (Appendix 4). These lists are not exhaustive but aim to provide a general guide for the reader.

ACKNOWLEDGMENTS

This third edition of *Herbs and Natural Supplements* is bigger than the second edition, which in turn was much bigger than the first. This is partly because 10 new monographs and two new chapters have been added, but also because the amount of published research in complementary medicine is still growing exponentially and there are now over 40,000 articles cited on Medline alone in this area.

The task of amassing, critiquing and reporting on the plethora of complementary medicine studies available is a daunting one that requires dedication, tenacity, patience and resourcefulness. This edition draws on the expertise of an expanded team of 12 contributors. I believe they are among the brightest and most talented CM writers in Australia. Without their valuable involvement, this book might never have been completed.

On a personal note, I'd like to thank my husband Gary for making it possible for me to step aside from our busy lives for many months to sit, think and write, while he took on the main family responsibilities. This work requires a lot of mental energy and introspection, which means retreating from the details of daily routine so it can all happen. His understanding, motivation and patience are invaluable and always greatly appreciated.

I'd also like to thank all my parents Shana and Fred Green, Judy Braun and Magenesta and Zonti Kustin for their emotional and hands-on support; my late father-in-law Emil Braun and grandfather Leon Kustin, who continue to serve as reminders to have courage and persevere; and the rest of my wonderful

extended family and friends who accept that I'm off the radar every now and again, working on another book.

I'd like to thank contributing writers Liza Oates, Rachel Arthur, Jane Daley and Trisha Dunning, who have stayed on the ride for this edition and continue to share their valuable expertise. Thank you also to Marc Cohen, who remains a visionary, and to new team members Ondine Spitzer, Gina Fox, Evelin Tiralongo, Louise Zylan, Leah Hechtman, Emily Bradley, Clare Francis and Surinder Baines for their commitment and professionalism.

I'd also like to thank Professor Franklin Rosenfeldt, who inspires me every day at the Alfred Hospital, colleagues at the National Herbalists Association of Australia (NHAA), colleagues in the Alfred Hospital pharmacy department, Steven Chong at the Journal of Complementary Medicine, Matthew Eton at the Australian Journal of Pharmacy, fellow practitioners, academics and researchers (in all the health fields) and, of course, patients. At Elsevier, I'd like to thank everyone involved in this project for making it as seamless as possible.

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Lesley Braun
Melbourne, Australia
2009

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Dr Braun is also Vice President of the National Herbalists Association of Australia, a member of the Therapeutic Goods Administration's (TGA) Complementary Medicine Evaluation Committee (CMEC), an advisory board member to the Australasian Integrative Medicine Association (AIMA), on the editorial board of the *Journal of Complementary Medicine* (JCM), a member of several advisory committees for the National Institute of Complementary Medicine (NICM), on the academic board of the Endeavour College of Natural Health and a member of several complementary medicine working groups for the Clinical Oncology Society of Australia (COSA).

Since 1996 she has authored numerous chapters for books and more than 100 articles, and since 2000 has written regular columns for the *Australian Journal of Pharmacy* and the *Journal of Complementary Medicine*. She lectures to medical students at Monash University and

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Her role as the main author of *Herbs and Natural Supplements — An Evidence-based Guide* represents a continuation of a life-long goal to integrate evidence-based complementary medicine into standard practice and improve patient outcomes safely and effectively.

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Professor Cohen is a registered medical practitioner with degrees in Western medicine, physiology and psychological medicine, as well as PhDs in both Chinese medicine and biomedical engineering. He sits on the

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including more than 50 international and 50 national conferences. As one of Australia's foremost pioneers of complementary medicine, he has made significant impacts on education, research, clinical practice and policy, and his achievements have been recognised with three consecutive RMIT Media Star Awards and the inaugural award for leadership and collaboration from the National Institute of Complementary Medicine.

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CHAPTER 12

INTRODUCTION TO WELLNESS

WHAT IS 'WELLNESS'?

'Wellness' is a concept that has gained popularity in recent years but still has no rigorously developed definition, theory or philosophy. At a very simple level, wellness can be equated with health which, according to the World Health Organization, is 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (WHO 1948). Wellness, however, can also be seen as distinct from health in that it is holistic and multidimensional. The notion of wellness includes not only physical, mental and social dimensions, but also emotional, cultural, spiritual, educational, sexual, occupational, financial, environmental, ethical and existential dimensions, with the assumption being that if any one of these dimensions is deficient, complete wellness cannot be achieved.

Wellness describes a quality of systems rather than isolated entities and, as such, it is dependent on relationships and must take into account both content and context. Because it describes systems, the notion of wellness can be applied to individuals as well as to communities, businesses and large-scale economies. The notion of wellness requires an ecological perspective that can be expanded to include the concepts of human security, corporate social responsibility, social justice, environmental impact and sustainability, together with subjective fulfilment and wellbeing.

In 1961, wellness pioneer Halbert Dunn defined wellness, in his book *High-level wellness*, as 'an integrated method of functioning which is oriented toward maximizing the potential of which the individual is capable' (Dunn 1961, p 4). He acknowledges that wellness is dependent on the relationship between individuals and their environment, stating that wellness 'requires that the individual maintain

a continuum of balance and purposeful direction within the environment where he is functioning'. He also stated that 'wellness is a direction in progress toward an ever-higher potential of functioning' (Dunn 1961, p 6).

More recently the [US] President's Council on Physical Fitness and Sports proposed a uniform definition of wellness as 'a multidimensional state of being describing the existence of positive health in an individual as exemplified by quality of life and a sense of well-being' (Corbin & Pangrazi 2001). Yet another definition suggests that wellness is an 'active process of becoming aware of and making choices toward a more successful existence' (US National Wellness Institute 2009). Another proposed definition is:

Wellness is the multidimensional state of being 'well', where inner and outer worlds are in harmony: a heightened state of consciousness enabling you to be fully present in the moment and respond authentically to any situation from the 'deep inner well of your being'. Wellness is dynamic and results in a continuous awakening and evolution of consciousness and is the state where you look, feel, perform, and stay 'well' and, therefore, experience the greatest fulfilment and enjoyment from life and achieve the greatest longevity. (Cohen 2008a, p 8)

This definition implies that the state of wellness allows the greatest flexibility to respond to situations and therefore provides the greatest resilience to stress and disease. Wellness in this context can be seen as the best preventative medicine. In this definition wellness is also seen as a state of consciousness that guides the quality of our relationships with the world and therefore cannot be viewed separately from the environment in which it occurs. Thus, if 'health' is 'wholeness', then wellness is the experience of an ever-expanding realisation of what it means to be whole (Cohen 2008a).

Travis and Ryan suggest that wellness is never a static state but rather a way of life, and that wellness and illness exist along a continuum: just as there are degrees of illness, there are also degrees of wellness. Travis and Ryan further see wellness as a choice, a process, a balanced channelling of energy, the integration of body, mind and spirit, and the loving acceptance of self (Travis & Ryan 2004).

If health and disease are considered to be at opposite ends of a spectrum, then it is possible to classify health into three broad areas: ill health (illness), average health and enhanced health (wellness) (Fig 12.1). The divide between ill health and average health is generally defined in Western medical terms, which classify diseases based on symptom patterns or other diagnostic parameters. Western medicine uses a bottom-up approach that aims to define and understand illness, and develop interventions such as drugs and surgery to treat or prevent the disease and control factors that reduce wellbeing ('stressors').

The divide between average health and enhanced health is less distinct. Enhanced health is more than just being disease-free: it assumes high levels of physical strength, stamina and mental clarity, as well as physical beauty and maximal enjoyment and fulfilment from life. This requires the holistic integration of multiple factors that determine physical, psychological, emotional, social, economic, environmental and spiritual health. In many Eastern philosophies, the idea of enhanced health can be extended to the concept of

'perfect health' or 'enlightenment', whereby a person is 'at one with the universe' and hence in a state of perfect bliss or 'nirvana' (Cohen 2003).

Moving up the spectrum from illness to wellness allows for greater flexibility of response and hence greater resilience; the best form of prevention is therefore to be as high on the spectrum as possible. Thus, while 'stressors' tend to reduce the ability to respond and create downward movement, upward movement can be facilitated by 'blissors', which create greater wellbeing. Throughout the spectrum, however, there is also a central axis that represents the core of our being. This central core, which may be termed the 'soul' or the 'essence', is an eternal and immortal aspect of the self that is naturally at one with the universe and blissful.

Bliss, or 'ananda' in Sanskrit, is considered by Vedic scholars to be the innermost level of the individual self, as well as the nature of the whole universe. It is the goal of the path to enlightenment and is found in the deepest experience of meditation and the innermost level of our being (Maharishi 1957-64). Bliss is also the ultimate aim of Eastern healing and spiritual practices, which adopt a top-down approach by attempting to elicit bliss through meditation and other practices that enhance wellbeing ('blissors') (Cohen 2008a).

The state of bliss can also be considered as the ultimate in achieving human potential. As the late anthropologist Joseph Campbell states:

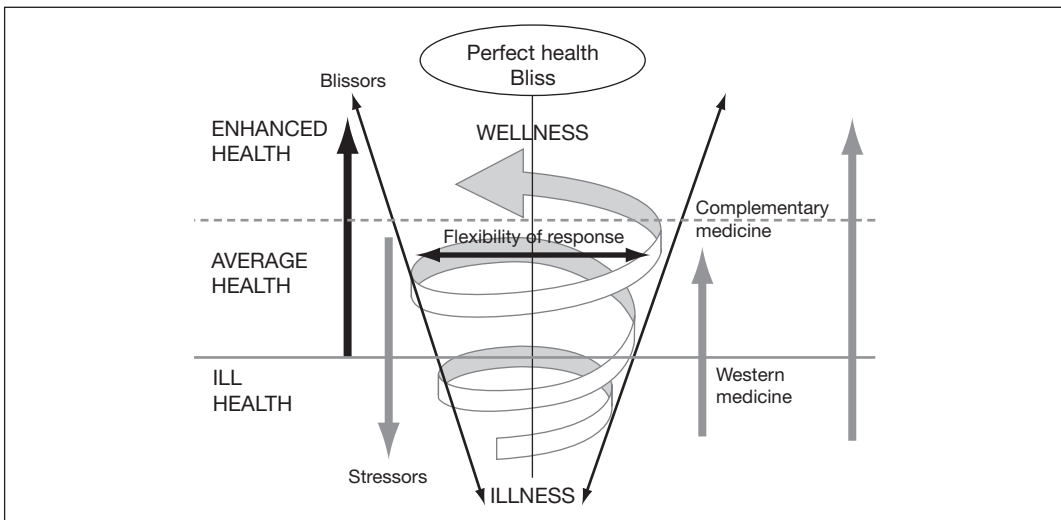


FIGURE 12.1 The illness-wellness spectrum (Cohen 2008a)

I think that most people are looking for an experience that connects them to the ecstasy of what it could feel like to be totally alive. To know the unburdened state of total aliveness is the pinnacle of the human potential. (Campbell 1988)

This ‘state of total aliveness’ is what many people may consider to be ‘wellness’.

THE WORLD IN CRISIS

It seems that all people at some time have tried to tackle the question of how to live well in the world. This single question has driven many different areas of human endeavour and has led to innovations that have created new technologies and ways of living that have allowed human populations to expand exponentially (Meadows et al 1976).

The world is currently facing a series of crises that are challenging the financial system, the climate and the environment. Increased global terrorism, pandemics, environmental pollution, general toxicity and natural disasters are breaching national boundaries and threatening human security. We also currently live in a world where one-third of the world’s population is dying from diseases linked to malnutrition and starvation; another third is dying from obesity and diseases related to overconsumption; toxic chemicals are continuously being created and released into our environment and food supply, and people are becoming increasingly disconnected from their natural environment and one another.

Modern healthcare systems are also struggling to provide quality care to all in need, as the burden of illness-care reaches barely manageable proportions. It is becoming clear that the current illness-based medical model is not sustainable and is ill-equipped to meet the needs of the global population or deal with the consequences of an ageing population, increasing healthcare costs and an epidemic of lifestyle-related diseases such as obesity, diabetes, heart disease and cancer.

The disproportionate focus on illness has allowed unhealthy lifestyle practices to remain largely unchecked, thereby allowing them to expand across the globe to the point where they now represent the greatest threat to human health and survival. A 2005 report by the World Health Organization entitled *Preventing chronic disease: A vital investment* estimates that of the 58 million deaths in the world in 2005, 35 million (60%) were caused by chronic diseases

such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes. The report goes on to suggest that 80% of premature heart disease, stroke and type 2 diabetes and 40% of all cancers are preventable, concluding that the main modifiable risk factors for these diseases are lifestyle-related and include unhealthy diets, physical inactivity and tobacco use (WHO 2005).

It has been predicted that, as a result of unhealthy lifestyles, for the first time in history the lifespan of the next generation in the United States could be shorter than that of their parents (Olshansky et al 2005). In a PriceWaterhouseCoopers (PWC) report on the future of healthcare entitled *HealthCast 2020: Creating a sustainable future* (PWC 2005), it is suggested that ‘There is growing evidence that the current health systems of nations around the world will be unsustainable if unchanged over the next 15 years’ (PWC 2005, p 2), while ‘preventive care and disease management programs have untapped potential to enhance health status and reduce costs’ (PWC 2005, p 4).

IN SEARCH OF WELLNESS

It is becoming increasingly evident that the fate of all people is ultimately linked and that as a global species we must find sustainable ways to live well in the world together. It could be viewed that humanity has reached a ‘tipping point’, bringing the possibility of either substantial hardship or a breakthrough into new ways of living and a new phase in human evolution. This new phase represents a culmination of thousands of years of human history, during which different philosophies, traditions and technologies have attempted to address the questions of life, ageing, illness and death.

The search for wellness is a common goal for all people. It can be understood as a conscious extension of the basic animal instinct to avoid pain that has its origins at the dawn of humanity when consciousness first became self-reflective (Cohen 2000). This search has influenced the evolution of medicine, which has seen the elaboration of two distinct yet complementary approaches: Eastern medicine, which is based on holistic thinking that maintains a cosmological and systems perspective outlining a philosophy of life; and Western medicine, which is based on a reductionist approach, emphasising controlled scientific experimentation and mathematical analysis (Cohen 2002).

The different health paradigms that aim to improve health and wellness have attempted to address the same issues in different ways. The principle of consilience suggests that there is an underlying unity of knowledge whereby a small number of natural laws may underpin seemingly different conceptual frameworks (Wilson 1999). Indeed there are general concepts and principles that seem to recur as themes across different healthcare paradigms.

THE THERMODYNAMICS OF WELLNESS

Perhaps the most ubiquitous principle in medical thought is the idea that life is dependent on energy. The science of energy is well described in the field of thermodynamics, which proposes universal laws that give rise to precise mathematical equations that form the foundation for modern science and technology. However, while the field of thermodynamics purports to describe all energetic processes, it is seldom applied directly to the fields of health and medicine, despite 'energy' being a basic principle in virtually every healing tradition.

The concept of energy is described in different traditions as 'life energy', 'vital force', 'prana', 'chi' (or 'Qi'), and is said to flow along defined pathways and support the functioning of living systems. Traditional Chinese medicine has developed a sophisticated framework for conceptualising this energy: it is seen to encompass the concept of 'flow' and to move according to the dynamic interplay of the opposite yet complementary forces of 'yin' and 'yang', which guide the process of transformation whereby non-living things become animate. In this view, pain and disease are said to result when the energetic flow is disrupted, and healing is aimed at restoring the natural balance and flow (Cohen 2002).

As science does not recognise a form of energy specific to living systems, many concepts underlying Eastern medicine have been criticised as unscientific. There are parallels, however, between Eastern and Western concepts, which can be seen to be linked through the concept of information. Information can be measured in terms of energy or 'joules/degree Kelvin' (Tribus & McIrvine 1971), and there is a congruence between the concepts of 'Qi' in Eastern medicine and 'information' in thermodynamics.

Thus the Eastern concept of disease arising from a blockage of 'Qi' can be seen to parallel the second law of thermodynamics,

which describes a tendency towards disorder or entropy in an isolated system. Disease and the adverse effects of ageing, which include progressive degeneration of tissues together with loss of function, can therefore be related to an increase in entropy as a consequence of blockages or isolation of different systems. In contrast, the ability of living systems to grow, evolve and learn appears to defy the second law and can be related to an open exchange between organisms and the environment. This can be extended to the concept of 'nirvana', or perfect bliss, whereby a person is 'at one with the universe' and there is no distinction between self and non-self, thus creating an open system that is no longer prone to the increase in entropy that occurs in isolated systems (Cohen 2002).

WELLNESS AND FLOW

While it may be true that life depends on energy, living systems must remain 'open', as it is the flow of energy through them that maintains their integrity. The concept of 'flow' is a powerful one that provides a bridge between Eastern and Western thought. The concept of flow applies to both thermodynamic processes and systems theory, as well as to the cyclic thinking of Eastern medicine. The concept of flow has also been applied to subjective psychological states that involve the integrated functioning of mind and body. This concept has been developed by Mihalyi Csikszentmihalyi who describes flow as 'a joyous, self-forgetful involvement through concentration, which in turn is made possible by a discipline of the body' (Csikszentmihalyi 1992).

The state of flow occurs when perceived challenges exactly match the skills and capacity to respond. Such a state is therefore a 'whole of consciousness' phenomenon that requires the integrated action of both physiological and psychological processes, and hence the involvement of the entire being. In requiring 'wholeness', the 'flow state' is aligned with health and wellness, and engenders positive feelings that include:

- being completely involved in what we are doing — focused, concentrated
- a sense of ecstasy — of being outside and beyond everyday reality
- great inner clarity — knowing what needs to be done and how well we are doing it (introspective, realistic feedback)
- knowing the activity is able to be done — that our skills are adequate to the task

- a sense of serenity — having no undue concerns or worries about oneself, and a feeling of growing beyond the boundaries of the ego
- timelessness — being thoroughly focused on the present so that hours seem to pass by in minutes
- intrinsic motivation — whatever produces flow becomes its own reward (Csikszentmihalyi 2004).

The idea that positive psychological states and wellbeing require ‘open systems’ is recognised in everyday common language in the phrases ‘having an open heart’ or ‘open mind’. The concept of flow sustaining life is also a basic tenet of Chinese and other traditional medicine philosophies. A thermodynamic model that includes the concept of energy and flow can also be seen to include many parallels between Eastern and Western concepts and thus provide links between different conceptual systems (Fig 12.2).

For example, the process of flow leading to transformation and the maintenance of living systems parallels the concept of the five elements or phases of transformation that is common to Chinese medicine, Ayurvedic medicine and ancient Greek medicine (which considered quintessence as a fifth element in addition to air, water, fire and earth). The result of this transformation is represented by the concept of ‘yin’ and ‘yang’, which refers

to interdependent yet mutually exclusive opposites and can be compared to the concept of ‘complementarity’ in quantum physics or the concept of homeostatic balance in physiology. The result of this balance leads to an increase or decrease in order as described by entropy or evolution, while the infinite nature of direct experience can be compared to the concept of ‘Tao’ or the mathematical concept of ‘absolute infinity’, both of which are defined as being inherently incomprehensible (Cohen 2002).

WELLNESS METRICS

Wellness is holistic and multidimensional, and involves content and context. As such it is both subjective and objective, and is difficult to quantify. As yet there are no agreed upon metrics by which wellness can be reliably measured, despite the existence of many potential indicators and proxy measures that may be applied to populations as well as individuals. Thus it is now possible to measure subjective states such as ‘quality of life’, ‘happiness’ and ‘wellbeing’ through instruments such as the Australian Quality of Life Index (Cummins et al 2008), as well as to use more objective and physiological measures such as anthropometric and biometric data. Objective indicators of wellness can also be obtained from tissue

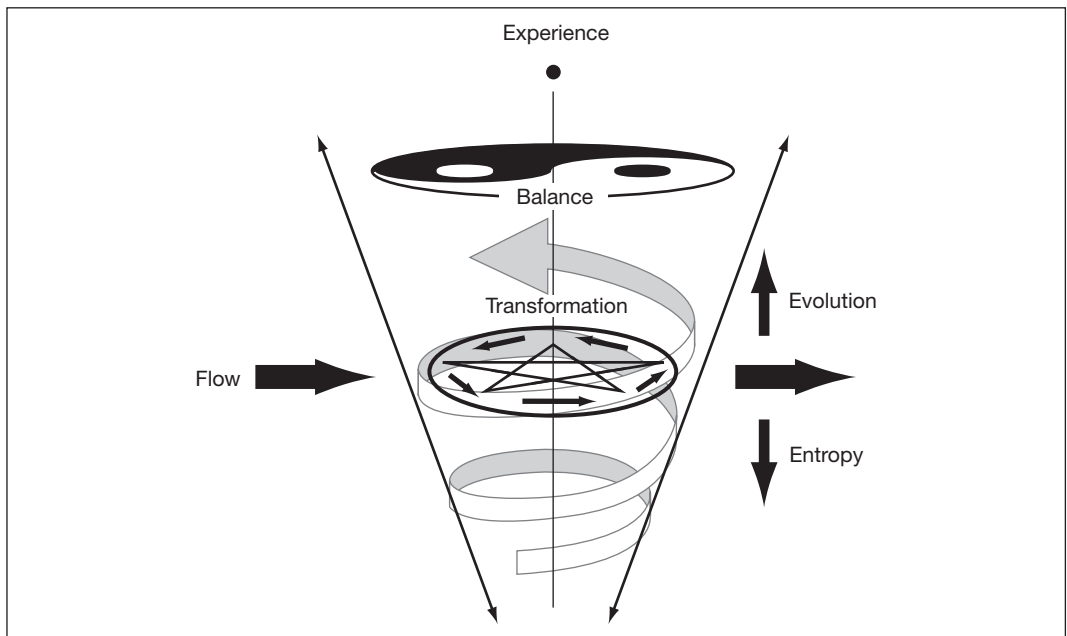


FIGURE 12.2 Pictorial conceptualisation of wellness concepts from traditional Chinese medicine (Cohen 2008a)

sampling and measuring biochemical, hormonal, genetic, haematological and toxicological data, as well as by testing functional capacity and performance. Further indicators for wellness can be obtained from demographic, socioeconomic and epidemiological data, which can be used to appraise access to food, shelter, education, employment, healthcare and consumer goods, as well as to rate health risks, ecological footprint, morbidity, mortality and life expectancy (Cohen 2008a).

The multidimensional nature of wellness makes any single measure inadequate, and so attempts have been made to combine measures from the different domains. For example, the BankWest Quality of Life Index tracks Australian living standards across municipalities based on key indicators of the labour market, the housing market, the environment, education and health (BankWest 2008).

In attempting to measure 'full spectrum wellness', Travis and Ryan adopt the concept of a 'wellness energy system', which implies a thermodynamic model and measures wellness in terms of inputs and outputs. They acknowledge that 'we are all energy transformers, connected with the whole universe', and that 'all our life processes, including illness, depend on how we manage energy' (Travis & Ryan 2004). These authors further describe 12 aspects of wellness, which include inputs provided by breathing, eating, and sensing, and outputs described as self-responsibility and love, transcending, finding meaning, intimacy, communicating, playing and working, thinking, feeling and moving. These 12 aspects of wellness are the basis for the wellness inventory: evolved from health-risk appraisal techniques to become the first computerised wellness assessment tool, this inventory aims to provide a measure of wellness across the 12 dimensions through a self-reported questionnaire.

Perhaps the most comprehensive attempt to create a metric for wellbeing is the 'Happy Planet Index', which uses both subjective and objective data in an attempt to measure the ecological efficiency with which countries achieve long and happy lives for their citizens. The Happy Planet Index is a composite measure that is calculated by multiplying life satisfaction by life expectancy and then dividing by ecological footprint. It therefore takes a thermodynamic approach to the wellness of populations by dividing outputs (the length and happiness of human life) by inputs (natural resources) (Marks et al 2009). The finding that the average scores

across nations are low, that all nations could do better and that no country does well on all three indicators or achieves an overall high score on the index has led the Happy Planet Index to be considered currently as the (Un)Happy Planet Index (Marks et al 2009).

THE WELLNESS REVOLUTION

Since the emergence of self-reflective consciousness, every culture at every point in history has maintained various practices that aim at achieving and maintaining the wellbeing of individuals and the wider community. These practices invariably include the use of the local environment, food, water and plants, as well as various indigenous healing practices, such as massage and traditional cultural practices that are performed to focus the mind and anchor the experience of being well in ritual, routine and direct sensual experience.

While every culture throughout history has had its own wellness practices and philosophies, a culture that is global or sustainable has never existed before (Cohen 2008a). In the current millennium, however, there is a need for global solutions that provide an integrated response to the many world crises and an orientation towards wellness promises to provide such solutions. Thus it is suggested that along with the current crises, the world is also experiencing the start of a 'wellness revolution' and the accompanying growth of a 'wellness industry'.

THE WELLNESS INDUSTRY

In his 2002 book *The wellness revolution*, economist Paul Zane Pilzer estimated that the value of existing items in the US wellness industry had reached approximately US\$200 billion. This included US\$70 billion for vitamins and US\$25 billion for spas and fitness centres — about half the amount spent on automobiles in the USA (Pilzer 2002). Pilzer suggests that the US\$200 billion is only the tip of the iceberg, and that wellness products and services represent the beginning of a new trillion-dollar sector of the US economy. In an updated edition of his book, Pilzer estimates that in 2007 the US wellness industry had expanded to over US\$500 billion and that the untapped market for wellness had increased in size thanks to millions of new wellness consumers (Pilzer 2007).

The growth of the wellness industry is evidenced by the dramatic growth of the global spa industry (now considered by many to be the 'spa and wellness' industry), which has recently

emerged as a global phenomenon through a convergence of industries, traditions and therapeutic practices. While spa therapies have been around since ancient times in many different forms that reflect the cultural, social and political milieu in which they are embedded, these practices are now being rediscovered, integrated and branded to create a new global industry that draws from a range of aligned industries, including beauty, massage, hospitality, tourism, architecture, property development, landscape design, fashion, food and beverage, fitness and leisure, personal development, as well as complementary, conventional and traditional medicine (Cohen 2008a).

Fuelled by the merging of the travel dollar with the health dollar, spas are now springing up all over the world and have become a standard feature of luxury hotels and resorts. Spas are reported to be the fastest-growing leisure industry, and it is estimated that by 2001 revenues from spas had already overtaken revenues from amusement parks, box office receipts, vacation ownership and ski resorts (ISPA 2002). A more recent report on the global spa economy suggests that global revenue from spas in 2007 was worth more than US\$255 billion globally and that the wider wellness industry was worth an additional US\$1.1 trillion (SRI International 2008).

In offering to deliver on wellness, the spa industry is moving beyond luxury and pampering into the area of providing healthcare and, even further, raising consciousness. As such, the global spa industry is a melting pot for a whole host of products and services that encourage enhanced health and wellbeing and are drawn from a wide variety of traditions that include conventional, complementary and traditional medicine. Thus spas are adopting an integrative approach; they are taking holistic medical concepts out of clinics and combining them with the world of hospitality and leisure to place them in sustainable, enjoyable and nurturing environments.

Hotels certainly have a much greater appeal than hospitals. By combining hospitality with an integrative medicine model that emphasises lifestyle change and personal empowerment, the spa and wellness industry has the potential to transcend conventional medicine and create a globally sustainable health system. While most spas do not, as yet, create formal medical records, instigate diagnostic tests or perform medical procedures, these are all taking place in some medi-spas and destination

spas, while some spas are beginning to integrate conventional and complementary medicine services with hospitality services such as accommodation, food and beverage to create hybrid hospital-spa-hotels ('hos-spa-tels'). As these are integrated into international hospitality chains, they create the potential for the delivery of a global integrated health service based on wellness principles (Cohen 2008a).

CONSCIOUS CONSUMPTION

The rise of the wellness industry is aligned with a move towards 'lifestyles of health and sustainability' (LOHAS). LOHAS is a demographic defining a particular market segment related to sustainable living and 'green' ecological initiatives, and is generally composed of a relatively upscale and well-educated population segment. In 2006 the LOHAS market segment was estimated at approximately US\$209 billion for goods and services focused on health, the environment, personal development and sustainable living. The focus of LOHAS is conscious consumption and covers diverse market segments such as personal health, natural lifestyles, green building, alternative energy and transportation, and ecotourism (for more information about LOHAS, see www.lohas.com).

A strong component of the LOHAS movement is the trend for consumers to choose more holistic, prevention-based models of healthcare, and this is evidenced by the increasing use of complementary and alternative medicine (Tindle et al 2005). This trend may reflect a growing disenchantment with the medical profession's seemingly one-sided emphasis on science and technology, as well as a growing demand for autonomy in healthcare decisions. Certainly, the general population is now better informed than ever and has better access to health information. The public are subsequently demanding more from healthcare providers and are not interested only in treating illness. Instead they want to maximise their health, prevent or slow down the ageing process and achieve higher levels of functioning (Cohen 2001).

The LOHAS movement has arisen out of a growing awareness that rampant consumerism seems to be taking over and destroying the planet. Certainly, unchecked and unconscious consumption can be seen to be at the root of many of the world's problems. Thus while we as consumers currently have access to a seemingly unlimited choice of goods in every size

and colour, we remain disconnected from the products and services we purchase and often do not know where they come from, how they are produced, who produced them, what is in them, how they are disposed of or who benefits from their purchase.

In response to this, there is a growth in conscious consumer trends that include LOHAS, as well as a variety of trends badged with different labels such as; 'green', 'natural', 'organic', 'fair-trade', 'corporate social responsibility', 'eco', 'ethical investment', 'sustainable', 'bare-foot luxury'. These have given rise to 'locovor' restaurants (those that source food within 160 kilometres/100 miles), carbon offset programs, green buildings, 'carbon neutral businesses', 'ecotourism', 'ethnotourism', 'voluntourism', 'downsizing', 'compacting', 'tree-change', 'social capital' and 'triple and quadruple bottom-line reporting'.

It is suggested that this range of conscious consumer trends can be integrated under the banner of 'conshumanism', which is a term that defines 'conscious and humane consumption' or 'consumption with maximal awareness, efficiency and enjoyment and minimal pain, energy, waste and pollution' (Cohen 2008a). Conshumanism embraces an overarching concept that can integrate multiple consumer trends towards greater transparency, equity, accountability, social responsibility, environmental sustainability and ethics. The common feature of these trends is increasing information and consciousness about consumption as well as incorporating an awareness of wellness into everyday lifestyle decisions.

TOWARDS A WELLNESS POLICY AGENDA

While treating illness has traditionally been the domain of the medical system, there is a growing realisation that wellness is holistic and multifaceted, and that implementing a wellness agenda requires wellness to become part of the fabric of our society so that it infiltrates the education system, workplaces and the consciousness of every individual. Thus action is required from all sectors, from individuals, government and non-government agencies to the corporate sector.

GOVERNMENT INITIATIVES

The year 2008 seems to have been a watershed year for Australian government wellness initiatives. The Australia 2020 Summit called for

the development of a 'whole-of-life wellness model' and a 'wellness footprint' to evaluate, measure and resource services across portfolios (Good & Roxon 2008), while the National Health and Hospitals Reform Commission, the National Preventative Health Task Force, the Primary Health Care Strategy Reference Group and the Indigenous Health Equity Council were established, all with a mandate for health reform (Moodie et al 2008).

Established in February 2008, the National Health and Hospitals Reform Commission (NHHRC) came out with a set of guiding principles that include 'strengthening prevention and wellness', and acknowledged that a comprehensive and holistic approach is needed to reorient the health system, so that there is greater emphasis on helping people stay healthy through stronger investment in wellness, prevention and early detection and appropriate intervention to maintain people in as optimal health as possible (NHHRC 2008). In October 2008 the NHHRC commissioned an options paper on 'A national agency for promoting health and preventing illness' (Moodie et al 2008), which proposes the establishment of a National Health Promotion and Prevention Agency in order to provide education, evidence and research to make prevention a top priority. This options paper was followed by the publication of an interim report, *A healthier future for all Australians*, a major theme of which was 'Taking responsibility', calling for greater personal responsibility for improving health supported by policies that make healthy choices easier; health literacy in a national curriculum for all schools; better information about creating healthy local communities — 'wellness footprints'; and workplace health promotion and wellness programs (Bennett 2008).

In line with these developments, the National Preventative Health Taskforce was established in April 2008 to provide evidence-based advice to governments and health providers on preventative health programs and strategies, focusing on the burden of chronic disease currently caused by unhealthy lifestyles. This taskforce produced a discussion paper entitled 'Australia, the healthiest country by 2020', which acknowledges the need for a coordinated approach to wellness, stating that:

Our health is not only determined by our physical and psychological make-up and health behaviours, but also by our education, income and employment; our access to services; the place in which we live in [sic] and

its culture; the advertising we are exposed to; and the laws and other regulations in place in our society (Preventative Health Task Force 2008).

WORKING TOWARDS WELLNESS

In addition to the above initiatives taken by the Australian government, 2008 saw a number of global initiatives with a call for a more proactive, wellness-oriented approach to be taken by the corporate sector. Illness places a huge burden not only on government health systems and communities, but also on industry, with the potential for catastrophic effects. While the costs to industry from illness due to absenteeism are clear, it is only recently that the costs of ‘presenteeism’ have been assessed. It has been estimated that presenteeism — when workers turn up for work but are unproductive because of an ongoing illness — involves a greater cost than absenteeism, and may represent up to 60% of an employee’s total lost productivity and medical costs (Goetzel et al 2004). Presenteeism may also pose serious threats to workplace safety, lead to dissemination of infectious diseases and have hidden long-term costs as well as compounding other lifestyle and social issues.

There is therefore a clear advantage in addressing wellness in the workplace, as this may have a positive impact on a company’s productivity, recruitment, retention and ultimate profitability. As many employees spend a significant portion of their life at work, workplace wellness programs are also well positioned to address the growing burden of chronic lifestyle-related disease.

At the World Economic Forum Annual Meeting in Davos, Switzerland, in January 2008, there was a call for action to raise the issue of employee health on the corporate agenda. At the meeting, the results of a collaboration between the World Economic Forum and the World Health Organization were released that suggested that workplace wellness programs are a real, but underexploited, opportunity to tackle the growing worldwide epidemic of chronic disease. This coincided with a PriceWaterhouseCoopers report entitled *Working towards wellness: accelerating the prevention of chronic disease*, which suggests that large multinational corporations are now looking for wellness strategies to implement in their workplaces and the communities in which they operate, and are rolling out comprehensive wellness programs in multiple countries, even though there are challenges in the

implementation, evaluation and monitoring of such programs (PriceWaterhouseCoopers 2007).

As yet there is still no robust accounting for wellness, despite the evolution of triple and quadruple bottom-line reporting; however, the corporate sector appears to be taking workplace wellness programs beyond health screening and occupational health and safety programs, and there are moves to engage employees and the wider community in wellness and lifestyle initiatives through corporate social responsibility, environmental sustainability and community development agendas.

LIFESTYLE MEDICINE

Wellness impacts on every aspect of our lives, and experiencing wellness requires the holistic integration of multiple factors that determine physical, psychological, emotional, social, economic, environmental and spiritual health. Wellness is therefore ultimately an issue of lifestyle. In order to embrace wellness or enhanced health, the key ‘life activities’ that determine our health must be addressed. These life activities are summarised by the SENSE approach (see Ch 1). We all need to manage stress, move, eat, interact with other people, interact with the world, and learn. If we improve the way we do these activities, we will naturally improve our wellbeing. Wellness therefore involves the following:

- **stress management** — managing stressors (e.g. effective time management strategies and priority setting), and including everyday activities that enhance our ability to cope with stressors (e.g. meditation, breathing exercises, hobbies, and infusing life with creativity, humour and fun)
- **exercise** — engaging in regular physical activity that improves our aerobic capacity (e.g. walking), physical strength (e.g. resistance training) and flexibility (e.g. yoga)
- **nutrition** — receiving adequate nutrition through the consumption of a wide variety of fresh, seasonal, whole foods that are stored and prepared appropriately; minimising our exposure to toxins by using organic produce; and avoiding tobacco smoke and environmental toxins
- **social and spiritual interaction** — devoting ourselves to quality time with others and fostering love and intimacy in all our personal relationships; developing an ethic of service to others and a sense of

social responsibility (e.g. volunteering and community work); giving to charities (e.g. time, effort, money); ethical investing and purchasing

- **education** — learning about ourselves and others, our environment and our place in it, and attempting to avoid obvious hazards while living sustainable, ecological lifestyles.

In recognition of the impact that lifestyle has on illness, developments in health funding in Australia have enabled allied health professionals to become part of a team that can address lifestyle issues. This has led to the emergence of 'lifestyle medicine', which is deemed to be a new discipline that attempts to bridge the gap between health promotion and conventional medicine by applying 'environmental, behavioural, medical and motivational principles to the management of lifestyle related health problems in a clinical setting' (Egger et al 2008).

Managing lifestyle issues changes the emphasis from conventional treatment to one where patients need to be more involved in their own care, and which therefore requires the clinician to have considerable motivational knowledge and skills. It involves the therapeutic use of lifestyle interventions in the management of disease (Egger et al 2009). Lifestyle medicine may also involve health coaching, which is a practice in which health professionals apply evidence-based psychological, counselling and coaching principles and techniques to assist their patients to achieve positive health and lifestyle outcomes through cognitive and behaviour change (Gale 2009).

A NEW ACADEMIC DISCIPLINE

It appears that the wellness revolution has created the opportunity for wellness to be framed as a new academic discipline. The multidimensional and holistic nature of wellness, however, demands extensive collaboration and communication across diverse discipline areas of expertise to work on wellness-oriented teaching, learning and research projects.

Wellness seems to have an emerging research agenda, with one of the four Australian Government National Research Priorities being 'Promoting and maintaining good health'. This priority area aims to support preventative healthcare and enable people to make healthy choices, and includes the following key research themes: a healthy start to life, ageing well, ageing productively and preventive healthcare (Department of

Education, Employment and Workplace Relations 2009). While this research priority area seems to target wellness-related research, wellness underpins many disparate research areas, ranging from theoretical and bench-top science to clinical research as well as social and policy research. A wellness agenda is therefore also inherent in other research priority areas, such as sustainability, frontier technologies and safeguarding Australia from terrorism, crime, invasive diseases and pests.

While a wellness research agenda is emerging, significant hurdles remain. Specific research into wellness and disease prevention is hindered by a lack of discrete outcome measures with which to measure wellness. Additional challenges include the design of programs that monitor and promote adherence, novel delivery models and the training, regulation and accreditation of suitable practitioners.

Although training and regulation pose challenges, wellness is a growing area in education and training and is increasingly becoming the focus of academic programs at undergraduate and postgraduate levels. International demand for a wellness-oriented academic program is located in three principal healthcare sectors: the conventional healthcare disciplines, which have an increasing emphasis on health promotion; the complementary and allied health sector including fitness, sports science, nutrition and psychology; and the rapidly growing hospitality, leisure and spa sector.

The need for wellness-related education is demonstrated by current health workforce shortages, the lack of experienced managers and therapists to work in spas, hospitality and leisure and the need for business professionals to embrace workplace wellness. A Productivity Commission report on Australia's health workforce suggested four broad approaches to overcome current health workforce shortages and distribution problems, and to address the future pressures facing the system. The first of these approaches involves strategies aimed at reducing the underlying demand for healthcare through 'wellness' and preventative strategies. This report also commented on the need for a health workforce with increased skills in health promotion (Productivity Commission 2006).

Creating a new academic discipline around wellness is a challenge, as there is a need to align the wellness industry with the professional and educational standards of the healthcare and business sectors. Such an alignment is evident in the continual increase in the

provision and standard of education programs in wellness-related areas such as naturopathy, massage, fitness, yoga and spa therapies. This has led to calls for wellness-education-related accreditation and standards. In answering this call, the US National Wellness Institute recently set up an Academic Accreditation Committee and developed a set of baccalaureate-degree-level standards and processes that will lead to accreditation of academic programs and graduate certification (US National Wellness Institute 2008).

In Australia, RMIT University has taken on a leadership role and established the world's first postgraduate Master of Wellness program (see www.rmit.edu.au/healthsciences/wellness). While no position descriptions currently require applicants to have a postgraduate wellness degree, this program provides core subjects and a suite of electives that include healthcare- and business-related courses so that students can choose their own path, build on their existing skills and become equipped to lead the wellness revolution in their respective disciplines. Thus the program is designed to provide graduate students from diverse backgrounds, including both health science and business graduates, with a holistic overview of wellness principles and practices. The program also aims to have a positive impact on students' personal health and wellbeing, and uses cutting-edge educational technology and the latest understanding about adult teaching and learning to deliver a fully online program with a global reach.

WELLNESS ONLINE

Wellness is a product of consciousness and it is said that 'the currency of wellness is connection' (Travis & Ryan 2004). With the advent of the internet as well as the development of information and communications technology (ICT), the world is certainly becoming more connected. Over the past two decades the development of the internet and ICT has progressed so rapidly that it is now possible for everyone on the globe to be linked via mobile communications technology that infiltrates almost every aspect of society.

It is clear that wellness-related technologies are converging in an online environment. Already ICT is used to support healthcare delivery, and electronic health-information systems promise to improve efficacy, safety and quality of care through the provision of alerts

and reminders, diagnostic support, therapy critiquing and planning, prescribing decision support, information retrieval, image recognition and interpretation, as well as through the discovery of new phenomena and the creation of medical knowledge (Coiera 2003).

The advent of personal computing and modern consumer electronics has made technologies that were once accessible only to technical specialists available to the general population via home-based and mobile platforms. For example, online calculators can provide the basis for lifestyle advice and motivation for implementing positive lifestyle changes, and online tools can provide assessments via subjective questionnaires as well as by the direct testing of cognitive and other functional status.

Biometric monitors allow remote wellness monitoring by uploading data on various physiological parameters such as activity and sleep. These devices are being integrated into other personal electronic devices such as phones and digital music players. For example, Apple and Nike offer a kit in which a shoe sensor communicates with a wireless iPod receiver to transmit workout information such as elapsed time, distance travelled, and calories burned (see www.apple.com/ipod/nike) (Cohen 2008b).

Online data collection allows personal information to be analysed and interpreted with the assistance of online experts, who in turn have access to sophisticated knowledge-management technologies, including bibliographic databases and decision support systems. Furthermore, online education offers unprecedented opportunities to deliver education across the planet, and develop knowledge and skills wherever they are required.

THE FUTURE OF WELLNESS

While the worldwide web is only around 5000 days old, when considered as a single machine it represents the largest and most reliable machine ever built with information-processing power approaching the same order as a human brain. The size and power of the web is doubling every two years, and it is expected that its future evolution will lead to services and opportunities that are yet to be imagined (Kelly 2007). Its global reach provides a unique platform for connecting people, ideas and practices, essential parts of the wellness equation. How best to harness its capabilities to improve individual and global wellness is still unclear. Will initiatives such as Google

Health be able to provide everyone on the planet with a free online health record and provide continuity of care as well as opportunities for epidemiological research and public health initiatives? Will online access provide everyone with access to education and the wealth of the world's knowledge? Will 'augmented reality' become the norm and 'virtual reality' become indistinguishable from 'reality'? Will video games become better than real life? Will social networking provide a forum for meaningful connection and provide an end to loneliness and social isolation? Will online environments facilitate therapeutic and health enhancing experiences? Will the harnessing of global connectivity be able to enhance how we experience our environment and avert the many crises we are facing?

It seems clear that over the next few decades changing global demographics, accompanied by major societal changes brought about by climate change, and technological innovations will have an impact on personal, community and global wellbeing and will for ever change how humans live. The development of wellness as a key focus for research, education, healthcare, government policy and industry can only improve the outlook for present and future generations.

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Goji

HISTORICAL NOTE For thousands of years in traditional Chinese medicine, the fruit of the lycium shrub has been used as both a food and an important medicinal substance. In fact, the earliest known Chinese medicinal monograph documented medicinal use of *L. barbarum* around 2300 years ago. According to this tradition, it is believed that the fruit has anti-ageing properties, nourishes the kidneys and liver by tonifying yin deficiency and brightens the eyes. It also has a long history of use as a traditional remedy for male infertility and is included in most fertility-promoting Chinese herbal remedies (Luo et al 2006). In China it is known by several names such as Gou Qi Zi or Gouqizi which probably led to the name it is known as here, goji.

COMMON NAME

Goji

OTHER NAMES

Gou Qi Zi, Gouqizi, Fructus Lycii, Kei Tze, Wolfberry

SCIENTIFIC NAME

Lycium barbarum (Solanaceae family)

PLANT PART USED

Fruit

Goji berry is a deep-red, dried fruit about the same size as a raisin, but with a different taste. The berries have a slight chewy consistency and taste like a mixture of cherries and cranberries without the sweetness of raisins.

CHEMICAL COMPONENTS

The reddish orange colour of the fruit is derived from a group of carotenoids, which make up only 0.03–0.5% of the dried fruit. The predominant carotenoid is zeaxanthin, which comprises about one-third to one-half of the total carotenoids present (Inbaraj et al 2008). The fruit also contains various small molecules, such as betaine, cerebroside, beta-sitosterol, p-coumaric acid, various vitamins (e.g. B1, B2, vitamin C), and minerals (e.g. iron, selenium, zinc). Among these chemical constituents, the most valuable and pharmacologically active components are a group of unique, water-soluble glycoconjugates — collectively termed *Lycium barbarum* polysaccharides (LBPs) — that are estimated to comprise 5–8% of the dried fruit (Amagase et al 2009).

MAIN ACTIONS

Antioxidant

LBPs have a high in vitro antioxidant score (Amagase et al 2009). Goji stimulates endogenous antioxidant mechanisms and has been shown to significantly increase superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px), and reduce lipid peroxidation (indicated by decreased levels of malondialdehyde, MDA) in humans (Amagase et al 2009). A study of streptozocin-induced diabetic animals found that LBP can restore abnormal oxidative indices to near normal levels (Li 2007).

The zeaxanthin component found in whole goji berries is bioavailable in humans (Cheng et al 2005) and is likely to contribute the fruit's in vivo antioxidant effects. Bioavailability of zeaxanthin from freeze-dried wolfberries can be greatly enhanced when consumed in hot skimmed milk compared to hot water or warm milk (Benzie et al 2006).

Antidiabetic

A study by Zhao et al demonstrated that diabetic animals treated with LBP for 3 weeks resulted in a significant decrease in the concentration of plasma triglyceride and weight in non insulin dependent diabetes mellitus (NIDDM) rats. Furthermore, LBP markedly decreased the plasma cholesterol levels, fasting plasma insulin levels and postprandial glucose levels at 30 min during oral glucose tolerance test and significantly increased the Insulin Sensitive Index in NIDDM rats (Zhao et al 2005b). The fruit extract of goji has also shown hypoglycaemic and lipid-lowering activities in diabetic animals whilst not affecting healthy animals (Luo et al 2004). It

appears that the polysaccharides and vitamin antioxidants are responsible for these particular effects.

Neuroprotective

Goji berry extract and LBP display neuroprotective activity in several different experimental models.

An aqueous extract isolated from *L. barbarum* exhibited significant protection on cultured neurons against harmful chemical toxins (A beta and dithiothreitol) by reducing the activity of both caspase-3 and -2, but not caspase-8 and -9 (Yu et al 2007). A new arabinogalactan-protein (LBP-III) was isolated from LBP, which appeared to have the strongest effect.

LBP demonstrates neuroprotective effects in the retina in several experimental models of glaucoma (Chan et al 2007, Chang & So 2008, Yu et al 2007). The polysaccharide-containing extract (LBP) from *L. barbarum* exhibited neuroprotective effects in the retina against ocular hypertension in a laser-induced glaucoma animal model (Yu et al 2007). Chang and So confirmed that LBP protects retinal ganglion cells in vivo (Chang & So 2008).

LBP protects neurons against beta-amyloid peptide toxicity in neuronal cell cultures (Chang & So 2008).

Reduces chemotherapy- and radiotherapy-induced toxicity

LBP elicited a typical cardioprotective effect on doxorubicin (DOX)-related oxidative stress in an experimental model (Xin et al 2007). Furthermore, in vitro cytotoxic study showed the antitumour activity of DOX was not compromised by LBP.

Interestingly, another animal study identified that LBP promotes the peripheral blood recovery of irradiation or chemotherapy-induced myelosuppressive mice (Gong et al 2005). Compared to controls, 50 mg/kg LBP significantly ameliorated the decrease of peripheral white blood cells and peripheral red cells in irradiated myelosuppressive mice. Higher doses significantly enhanced peripheral platelet counts.

Immune modulation

LBPs have been known to have a variety of immunomodulatory functions including activation of T cells, B cells and NK cells (Chen et al 2008, Zhu et al 2007).

A polysaccharide-protein complex isolated from *L. barbarum* (LBP) activated macrophages in vivo (Chen et al 2009). The mechanism may be through activation of transcription factors NF-kappaB and AP-1 to induce TNF-alpha production and up-regulation of major histocompatibility complex (MHC) class II costimulatory molecules. LBP also activates T cells.

Sexual behaviour and male reproductive function

Studies with experimental models suggest the polysaccharides in goji berries may improve sexual behaviour and reproductive function (Luo et al 2006). LBP improved the copulatory performance and reproductive function of hemicastrated male rats, such as shortened penis erection latency

and mount latency, regulated secretion of sexual hormones and increased hormone levels, raised accessory sexual organ weights, and improved sperm quantity and quality (Luo et al 2006).

Studies with LBP indicate a protective effect on testicular cells against a variety of insults. Luo et al (2006) demonstrated a dose-dependent protective effect for LBP against DNA oxidative damage of mouse testicular cells in vivo. LBP also inhibits time- and hyperthermia-induced structural damage in murine seminiferous epithelium, in vitro (Wang et al 2002). Moreover, LBP delays apoptosis in this system, both at normothermic and hyperthermic culture conditions. Considering the oxidative stress is suspected to be a major cause of structural degradation and apoptosis in hyperthermic testes, the protective effect of LBP may be mediated by an antioxidant mechanism of action.

OTHER ACTIONS

One of *L. barbarum* glycoconjugates promoted the survival of human fibroblasts cultured in suboptimal conditions and demonstrated important skin-protective properties (Zhao et al 2005a).

CLINICAL USE

Goji has become more popular for the last few years due to its public acceptance as a 'super food' with highly advantageous nutritive and antioxidant properties. It is touted as being able to improve wellbeing and protect against cancer and other serious diseases. Most investigation with goji has been conducted in China and there is little clinical research information available in English language journals.

Improved wellbeing

A randomised, double-blind, placebo-controlled clinical trial examined the general effects of orally consumed goji berry, *L. barbarum*, as a standardised juice (GoChi; FreeLife International LLC, Phoenix, AZ) to healthy adults for 14 days (Amagase & Nance 2008). The study was designed to measure multiple outcomes based on the traditionally understood properties of the product. Comparisons between day 1 and day 15 revealed that goji treatment significantly increased ratings for energy level, athletic performance, quality of sleep, ease of awakening, ability to focus on activities, mental acuity, calmness, and subjective feelings of general wellbeing. Furthermore, goji significantly reduced fatigue and stress, and improved regularity of gastrointestinal function. In contrast, the placebo group ($n = 18$) showed only two significant changes, heartburn and elevated mood.

Aphrodisiac and increased male fertility

Traditional evidence and animal studies provide some support for its use; however, well-controlled clinical studies are not available to determine the effectiveness of goji in this capacity.

OTHER USES

Goji is broadly marketed as a 'super food' with significant health-promoting qualities. The high concentration of antioxidants, vitamins and minerals in

the fruit makes it a nutritious substance; however, claims that it cures major diseases are not founded on sound clinical evidence.

The high concentration of zeaxanthin in the berries makes it a good dietary source of this carotenoid. As such, indications which respond to increased zeaxanthin intake may also respond to an equivalent dose from goji berries. (See Lutein/zeaxanthin monograph for further information.)

DOSAGE RANGE

Daily dose: 6–15 g daily.

ADVERSE REACTIONS

Not known.

SIGNIFICANT INTERACTIONS



Warfarin

Two case reports exist in the literature, suggesting an interaction between warfarin and goji is possible. One case was of an 80-year-old Chinese woman on a chronic stable dose of warfarin, who experienced two episodes of an elevated international normalised ratio (INR) after drinking herbal tea containing goji (Leung et al 2008). Another case describes a 61-year-old Chinese woman, previously stabilised on anticoagulation therapy (INR 2–3) who had an elevated INR of 4.1 as a result of drinking a concentrated Chinese herbal tea made from *L. barbarum* L. fruits (3–4 glasses daily). No changes in her other medications, lifestyle or dietary habits were revealed (Lam et al 2001). Until confirmation from controlled trials is available, caution is advised.

CONTRAINDICATIONS AND PRECAUTIONS

None known.



PREGNANCY USE/PATIENT COUNSELLING

The fruit is likely to be safe when taken in typical dietary doses; however, the safety of higher doses is unknown.



PATIENTS' FAQs

What will this herb do for me?

Goji fruits are a nutritious source of vitamins, minerals and antioxidants. Preliminary tests show that

PRACTICE POINTS/PATIENT COUNSELLING

- Goji berries are a nutritious source of antioxidants, vitamins and minerals.
- The LBP in the fruit that are considered to be the most important for pharmacological activity are attracting research interest.
- Preliminary studies in test tubes and with animal models indicate the berry and/or polysaccharides enhance immune function, exert neuroprotective effects, reduce lipid and blood glucose levels in diabetic models and improve male fertility; however, human tests are not available to determine whether these effects are significant in humans.
- Use with caution in people taking warfarin.

it has multiple health-promoting effects, but little human research is available to confirm activity.

When will it start to work?

As a concentrated source of nutrients, general benefits will start within several days.

Are there any safety issues?

Two case reports suggest a possible interaction between warfarin and goji berry, but this remains to be confirmed.

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