This article looks at a serious disease that affects a large number of women after, and in a large part due to the menopause. Osteoporosis, or thinning of the bones, occurs at a rapid rate in some women when their ovaries cease to produce oestrogen. It has been called ‘the silent killer’ because it remains symptom-free until it has reached an advanced stage. Hip fractures and the complications resulting therefrom constitute the 12th leading cause of death in America. More women die from the repercussions of osteoporosis than from cancer of the cervix, uterus and breast combined. The incidence of osteoporosis is alarmingly high; in fact 45% of all women over 60 in the States have osteoporosis and it is responsible for 1.3 million fractures a year. 40% of osteoporosis sufferers have lost all their teeth by the age of 60 which often gives rise to malnutrition. 6.2 billion dollars are spent in the US per year on health insurance costs related to osteoporosis. In Australia the incidence of osteoporosis is said to be 30% of post-menopausal women, and two thirds of these women will have a fracture due to osteoporosis before the age of 70. These women occupy 300,000 bed days in hospitals annually and cost the community $600 million dollars a year. They suffer pain, loss of independence and make increasing demands on medical and community services.

Clearly there is a place for sound and effective preventive medicine in a population which will have an increasing percentage of people over 60. To this end, we will discuss the role of acupuncture, herbs, diet and mineral supplementation and lifestyle.

What is osteoporosis exactly?
Osteoporosis is defined as bone density lower than the normal lower limit in a young person e.g. in the forearm this is below 370 mg/ml. There is a slow loss of calcium (Ca), due to an imbalance in remodelling, from the age of 30 onwards in men and women (3% and 8% per decade respectively) which sharply accelerates at menopause, when oestrogen levels fall, to 1-2% per year. By 70 years a woman may have lost 30% of her bone mass but be symptomless. Half of this bone loss will have happened before menopause. The range of bone density at maturity is a major determinant of bone density (and therefore of osteoporosis risk) of any given individual for many years after menopause. Hence the great importance of building up bone mass before menopause.

What are the symptoms and signs of osteoporosis?
1. Crush or wedge fractures of the spine typically around T8 to L3. These occur during routine activity and may or may not be accompanied by pain.
2. Fractures of the arm, especially the wrist.
3. Fractures of the neck of the femur which, in 20% of cases, leads to death within a year from complications.
4. Kyphosis of the spine and loss of height with its associated abdominal and digestive disturbances.

Tests for osteoporosis
1. Forearm bone density may be measured by single photon and dual photon absorptometry to determine bone density and how much bone loss has occurred. If a reading is below the lower normal limit it can be predicted that this woman has a 50% chance of developing osteoporosis in 10 years. Which 50% she falls into may be determined by whether or not she will lose calcium excessively - and this will be influenced by genetic constitution, lifestyle and diet and possibly by treatment with Chinese medicine. This test has recently become available on an individual basis in Sydney, Australia. The cost, however, can be prohibitive for many.
2. Thinning of the skin due to loss of collagen is associated with osteoporosis and therefore a simple skin pinch test for elasticity may have qualitative predictive value.
3. At a recent symposium, research on osteoporosis and blood composition was described by workers from the Mayo clinic (USA) and Copenhagen University. By measuring certain serum proteins they could show the rate at which an individual is losing bone mass. This could have important implications in the future for predicting at-risk women.

In summary, in the future predictive tests may be useful in picking the one or two women out of four who is going to develop osteoporosis. And in the meantime assessing women for known risk factors is of some predictive value.

Risk factors
1. Family history - this has been shown to be a major risk factor by twin studies carried out at St Vincents Hospit-

More women die from the repercussions of osteoporosis than from cancer of the cervix, uterus and breast combined.
tal, NSW, Australia. Female relatives (mother, aunts, sisters, grandmothers) should be considered to determine family tendency to osteoporosis.

2. Having no children seems to increase the likelihood of osteoporosis developing, and to a lesser extent having several children in quick succession.

3. Lack of physical activity. All weight bearing exercises appear to increase bone mass and thus counteract to some extent the loss experienced as a normal part of ageing and menopause. Swimming was shown to be helpful in increasing bone mass in pre-menopausal women but not post-menopausal women. Thus women should be advised to partake in regular exercise both before and after menopause.

4. Poor Diet. Low Calcium may contribute to osteoporosis (see below). Vitamin D deficiency means that calcium is not properly incorporated into newly synthesized bone. This is unlikely to occur in countries where exposure to sunlight guarantees the body’s own manufacture of Vitamin D. Excess animal protein encourages the renal excretion of calcium thus depriving bone of plentiful supplies. If animal protein is being consumed two to three times a day then it is likely that calcium is being lost. Excess salt also predisposes to excess calcium excretion by the kidneys. Caffeine reduces absorption of calcium and also increases its excretion.

5. Smoking and heavy alcohol consumption interfere with bone maintenance.

6. Change in Oestrogen balance. (See next article in the series on Hormone Replacement Therapy.)

7. Slim build with fine bones. This probably indicates lower bone mass at maturity.

8. Being of Caucasian descent.

9. History of endometriosis (possibly due to increased peritoneal fluid levels of Interleukin 1 which influences bone modelling).

What is the role of Calcium?

This has been a very controversial topic in the medical world in recent years and hardly a month or two goes by without an article about menopause and calcium appearing in the medical press. The drug and vitamin companies are furiously marketing their calcium supplements and the Australian Dairy Corporation advertises its products in seductive soft focus in medical journals. The Dairy Corporation has gone so far as to take on the role of educating general practitioners and their patients about the relationship between menopause, osteoporosis, and its prevention, and calcium intake by sending out “comprehensive kits containing medical information on osteoporosis and its prevention and up-to-date facts on calcium”. They include posters for the waiting room advertising dairy products.

However as yet there remains no proof that increasing calcium intake after menopause with supplements or diet prevents fractures. In fact several studies indicate that it doesn’t really appear to lower the incidence of fractures at all. In Science August 1987 it was stated that “the link between calcium and osteoporosis was made on insufficient grounds” and that the advertisers were way out ahead of the scientific evidence. Calcium has become the laetrile of osteoporosis they said.

Despite the lack of hard evidence, post-menopausal women continue to be advised to take large doses of calcium; larger than is easy to obtain in the general diet, so that women usually have to rely on supplements which are generally thought to be inefficiently absorbed. The National Health and Medical Research Council (NHMRC) in 1987 questioned the value and safety of calcium supplements but then revised its recommended daily intakes from 1g to 1.5g for women post-menopause. Such contradictions in the medical world have no answer at present and the position experts take is necessarily vague. In a recent issue of the Medical Journal of Australia (June ’88) two articles by such ‘experts’ admitted the confusion but then made such meaningless statements as “the calcium deficiency model is the most powerful one that is available for the explanation and understanding of osteoporosis.” And so it seems that until something better comes along they’re going to stick by it.

This advice is given because we do know that taking sufficient calcium can turn the negative calcium balance usually found in menopausal women to a positive one, i.e. less is excreted than ingested, which indicates that it is being assimilated somewhere, presumably bone. Generally it is admitted that calcium is prescribed more according to Hippocratic principles (the medication has not been seen to be harmful) than to therapeutic principles. Let us go beyond such Hippocratic principles and take a hard-headed look at where calcium fits into a treatment regime for osteoporosis or its prevention?

One thing we know for sure is that a diet rich in calcium in early childhood and the pre-menopausal years does build stronger bones, thus lowering the risk of having critically thin bones after menopause, when bone mass loss is to some extent inevitable. Peak bone mass is achieved before the 4th decade of life and usually maximal between 18 - 30 years. So while it is not yet sure that calcium supplementation is useful after menopause there is no doubt that there is a place for advising/guaranteeing a good dietary intake before menopause. And until the conclusive studies are done (very difficult given the nature of field studies with their inherent substantial error in measured values, and considering the complexity of the calcium system) most general practitioners will continue to prescribe calcium to post-menopausal women which may either end up in the bathroom plumbing, or may to some extent help the bone maintain its strength. If we take a closer look at the bone where all this drama is being played out, some interesting facts come to light. Everyone knows that bones are made of calcium and other minerals but not many people have a true picture of what a dynamic tissue bone is. It is not inert but very metabolically active, with a rich blood supply … which means we have potential ways of influencing it by changing the internal milieu. Bone is composed of 25% water, 10% fat, 20% protein (collagen), and 45% mineral. This mineral is called hydroxyapatite. There is a constant flux of Calcium and Phosphate ions between the tissues and the blood on one hand, and the bone reservoir of hydroxyapatite on the other.

There are two types of bone

1. Compact cortical bone which forms the external envelopes of the skeleton e.g. the shafts of the tibia, femur, humerus and radius. Slow bone loss occurs in both sexes with this type of bone and there is evidence that calcium supplementation may help retard this.3
2. **Trabecular or medullary spongy bone** which forms plates that traverse the internal cavities of the skeleton e.g. ribs, vertebrae, calcaneum, iliac crest and the heads of the humerus and radius and the carpal bones. The sort of bone loss that affects post-menopausal women particularly, comes from this type of bone and yet the above authors discovered that calcium supplementation made no difference to this type of bone.

This then may provide the answer to the contradictions and the controversy. Yes, calcium supplementation does turn a negative calcium balance into a positive one i.e. it is being incorporated somewhere in the bone. However the fact that it does not seem to markedly reduce fracture incidence in osteoporotic women is due to the fact that it is not being incorporated in areas that sustain the large majority of fractures in women with osteoporosis, viz. the spongy bone of the vertebrae, hip and wrist.

So where does this leave us as practitioners when asked for advice about calcium? Since there is no doubt that denser bones augur well for bone health after menopause, be sure to encourage adequate calcium in the diets of all your female patients; the earlier the better. In my experience this sort of advice is only likely to be sought or taken by women who already have osteoporosis on their mind, i.e. late thirties, when a lot of the bone laying down is already done. It is nevertheless useful to sow the seeds of bone health awareness even in adolescent girls. A researcher at the Garvan Institute in Sydney, Australia put it very succinctly "a daily glass of milk and a walk would save $100,000 a year".

In post-menopausal women we have seen that calcium supplementation can convert a negative calcium balance into a positive one and it prevents some bone loss (probably mostly cortical) in menopausal women. Since it does not however appear to increase bone mass or reduce fracture incidence, the taking of supplements in this group cannot be seen as an adequate treatment or prevention for osteoporosis.

### Calcium in the diet

Can one get enough calcium from diet without taking supplements? The recommended daily intake is 800-1000mg/day pre-menopause, and 1500mg/day post-menopause. Studies of average diets in Australia, the US and UK show that we probably consume about 700mg/day (i.e. half the recommended amount for post-menopause). In the US, two thirds of women under 30, and three quarters of women over 35 consume less than the recommended daily intake. In the US, 75% of dietary calcium comes from dairy, whilst in Australia, where milk consumption per capita has decreased 33% in the last 10 years, about 60% comes from dairy sources. Most milk is consumed in tea which may prevent calcium absorption anyway. Cheese is a more important source of calcium in Australian diets now.

A glass of milk (200ml), a carton of yoghurt (200ml), or a slice of hard cheese (35g) all have about the same amount of calcium viz. 250-300mg. For people happy to be on a high dairy diet, calcium intake may well be quite adequate. However many people are concerned about the high fat content of dairy foods, and for these people the dairy corporation has developed their low fat milk (called Shape in NSW). 320mls of Shape provides 500mg of calcium and less than 1g of fat. To get the same amount of calcium from whole milk or cheese would require the consumption of 450mls or 60g respectively which provide 15-20g of fat. Hence 3-4 glasses of Shape per day would be a satisfactory way to get adequate calcium if that quantity of milk can be faced.

For those on dairy free diets it is more difficult to get adequate calcium. The second highest source of calcium in the average western diet is tinned fish e.g. salmon or sardines eaten with their bones. Half a cup of such fish will supply as much calcium as a cup of milk, although daily consumption of large quantities of tinned fish is even less likely than large quantities of dairy. Other cultures, which do not use dairy products often have alternative sources of calcium e.g. Middle Eastern peoples use tahini (sesame) a lot in their cooking, Indians grind corn in limestone which imparts a good amount of calcium to the grain, Eskimos consume a great deal of fish and chew the bones. For the calcium content of common foods see table.

### Calcium in Different Foods

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### Calcium in Different Foods

100g of the following foods contain the following amounts of Calcium (mg):


The richest plant source is spinach, or greens such as collards, kale or turnip greens. 1 cup of these contains nearly as much calcium as a glass of milk although absorption may be hindered by the large amount of oxalates in these foods. Broccoli is another reasonably good vegetable source having about half the amount of calcium as the above mentioned greens. Beans (and bean products like tofu) have a similar calcium content to milk (weight for weight), but the phytates may prevent efficient absorption. Sea weed has a high calcium content (8-14 times that of a similar weight of milk) and if it makes up a significant proportion of the diet will go a long way to providing enough calcium for bone health. Similarly sesame seeds (6 times the amount in milk) if consumed in large quantities make significant contributions. Cereals are generally low in calcium and this combined with high phytate content means they contribute little. However it is evidently clear that diets which avoid dairy, such as the macrobiotic diet, can provide plenty of calcium.

But the general practitioner’s standby of calcium tablets is probably the easiest for women unable or unwilling to change dietary habits and especially older women who tend to eat rather little. There are a very large number of calcium supplements on the market now which vary in price and type. The cheapest form is calcium carbonate (CaCO₃) but this is difficult to absorb. It relies on adequate stomach acid and is therefore best taken with food. Older women frequently have inadequate stomach acid. Other sources are the various forms of chelate and orotate (more expensive but easier to digest). Oyster shell which contains calcium carbonate, calcium phosphate (CaPO₄) magnesium (Mg), aluminium (Al), and ferric oxide (Fe₂O₃) is commonly used as a supply of calcium in tablets but as any Chinese herbalist knows this shen-calming agent easily injures Stomach-
Qi, leading to indigestion and loss of appetite. It is usually advised to be taken with substances that nourish and strengthen the Stomach and Spleen. Calcium containing shen-calming agents are used for only short periods of time in Chinese medicine, unlike the extended usage of calcium supplements by post-menopausal women. Perhaps we should suggest that these supplements are taken with white rice porridge which strengthens and protects the Stomach and Spleen. An interesting product to recently appear is “Micocrystalline hydroxyapatite concentrate”, the protein calcium matrix found in bone. Its makers claim that it is exceptionally well absorbed into osteoporotic bone. A boon to all actual and potential osteoporosis sufferers if correct. Calcium supplements are generally advised to be taken at night time because this is the time of greatest bone loss. They should not be taken at the same time as iron or fluoride which interfere with their absorption. Similarly, intake of high roughage foods (especially cereals) should be at a different time. Women with hyperthyroidism or idiopathic hypercalcuria or with a history of kidney stones should not take supplements.

The absorption of calcium is influenced by intake (form and amount), vitamin D, age, pregnancy, and growth. Young women may compensate for low calcium intake by adaptive absorption (especially in pregnancy and lactation) but this is limited in older women. In addition to increasing the amount and absorption of calcium it makes sense to try to hang on to what you’ve taken in.

At menopause there is a demonstrated increase in urine levels of calcium7 and possibly decreased absorption. This raises the interesting possibility that a negative calcium balance may be contributed to by increased calcium loss rather than just considering inadequate intake. Maybe then the answer is to prevent loss or excretion rather than to just keep adding more.

An important factor when considering diet and calcium utilisation is the amount of protein. Diets high in animal protein, especially red meat with its high phosphorous content, encourage calcium excretion. This may explain why the diets of parts of Asia where dairy foods are not eaten still provide adequate calcium for bone maintenance. The incidence of osteoporosis in Japanese women increases greatly when they move to Hawaii and adopt American eating patterns. Similarly an excess of salt in the diet encourages calcium excretion, as does excess coffee. Drinking alcohol with a meal reduces the absorption of calcium as does the consumption of high quantities of fibre at the same time as the calcium source. Cocoa also inhibits absorption, so milky hot chocolate cannot be relied on as a calcium source.

Those who rely on cereals for the bulk of their calorie intake (e.g. macrobiotic or Asian diets) should consider having their seaweed or sesame at a different time to prevent interference with calcium absorption by phytates. Roughage foods (especially cereals) should be at a different time.

Other lifestyle factors to be discussed with patients concerned about osteoporosis include cigarette smoking which increases bone loss, and stress which has been shown to not only increase loss of calcium from bone but decrease its absorption. People who take large amounts of vitamin A need to be wary because it stimulates bone loss, and people taking certain drugs (including steroids, aluminium-containing antacids, heparin, anticonvulsants) are at similar risk.

### Treatment of Osteoporosis with Western Medicine (WM)

It is the favoured course of action amongst the large majority of specialists and general practitioners now to put all menopausal women on hormone replacement therapy (HRT) for up to 30 years. This is done not only to treat any symptoms that occur at the transition of menopause but to guard against the development of osteoporosis. While keeping a high level of oestrogen undoubtedly slows the loss of calcium, there are many other factors to consider before launching onto a hormone regime that may continue for the rest of a woman’s life. One of the few specialists in the field to question the universal administration of HRT to menopausal women feels that calcium may in the end prove to be as effective as hormones in preventing fractures, if dose, timing of supplementation and compliance are better determined.8 HRT is covered in detail in the next article in the series. Preliminary reports from Danish researchers8 show a possible new direction for the WM treatment of osteoporosis. Trials with a drug used to treat Paget’s disease greatly reduced the number of spinal fractures and reduced bone loss in osteoporosis patients over a three year period. Drug companies are submitting applications to the FDA to market the drug.

### Osteoporosis and TCM

Where the Western medical treatment for osteoporosis is Calcium, the TCM treatment must be based on herbs which tonify the Kidneys, the organs responsible for bone health in TCM. Herbs which tonify the Kidneys rarely contain calcium, i.e. they must operate in a different way. The treatment of anaemia in WM and TCM presents another example of such a difference in approach. WM gives the building blocks and hopes the body will do the appropriate things with them. TCM on the other hand concentrates on the process:

\[
\begin{align*}
\text{(Iron)} & \quad \rightarrow \text{Haemoglobin/blood} \\
\text{(Ca)} & \quad \rightarrow \text{Bone}
\end{align*}
\]

Presumably a combination of both approaches is ideal, i.e. ensuring that not only are plenty of building blocks present but that the ‘energy’ of the body is such that the metabolic process can happen. TCM recommends supplying the building blocks in food rather than supplements. In fact herbalists will tell you that Ca salts of the type often used in Ca supplements can damage Stomach-Qi with long term use. When substances containing Ca are used as part of a Chinese herbal formula they are there to calm the shen not to strengthen the Kidneys or the bones.

The first task was to look for ways to approach the problem of treating something like osteoporosis which has no symptoms of its own. A similar problem was encountered with another gynaecological condition which presents in a modern day clinic - cervical neoplasia (CIN). This condition also has no symptoms for its own in the early years but relies on WM diagnostic techniques for its discovery. A diagnosis in TCM terms...
can be made by using definitions and by looking at the context of the disorder, e.g. by definition tumours represent stagnation of Qi or blood, or phlegm obstruction, and the context of CIN is often one of Liver-Qi stagnation.

By definition bone weakness implies Kidney weakness (“the Kidneys harbour the force of life of the bones and marrow”) ... and also by definition menopause is a time of declining Kidney function (“at 49 years of age the Kidneys decline and the Chong and the Ren channels no longer function”). If the Kidney function has been weak earlier in life also (before the 30’s), from inherited constitutional weakness, excess childbirths, pregnancies, abortions, miscarriages, sex, heavy lifting, excess standing, illness etc., then bone health and bone mass will likely be compromised. This is especially so if it occurred at a time when bone is still being formed i.e. before the early 20’s. (A diet very poor in calcium at this time has also been seen to increase risk of osteoporosis). Someone with inherited kidney weakness will often have a short stature and fine bones and poorly developed secondary sexual characteristics. Having older parents, or being born very soon after an older sibling, may also lead to poor inherited Kidney-Qi.

So the risk factors we would be looking for in our middle aged patients would be those which indicate Kidney weakness first and foremost. Of course other factors will also influence how the Kidneys can look after bone health e.g. the Spleen-Qi must also be adequate to ensure that the necessary building blocks are extracted from the diet. In physiological terms this means good stomach acid.

In summary
RISK FACTORS: old parents, previous serious illness, deprived childhood (malnutrition), excess births etc.
WARNING SIGNS: poor teeth, previous history of fractures, curved spine, loss of height, dark circles under the eyes, poor head hair, being fearful, timid, withdrawn, various Kidney symptoms (lower back pain, soles of feet sore, dysuria, tinnitus etc.).

Using the knowledge we have of Kidney disorders together with the risk factors determined by the research mentioned earlier we should be able to pretty well predict who are the women who fall into the 25% who are likely to develop osteoporosis. Having determined your high risk patients, the next stage is applying TCM concepts to treatment or prevention of thinning bones.

TREATMENT OF OSTEOPOROSIS WITH TCM
Treatment depends on age and the stage of the disease. Before the 30’s, treatment and lifestyle should aim to nurture and conserve Kidney-Qi. Remember that up to this age, bone mass can be increased by appropriate diet and lifestyle. Hence advising a diet high in calcium, plenty of exercise, avoiding excess sex, heavy lifting etc. will be appropriate for younger women.

In older women we have seen that high calcium doesn’t necessarily do any good ... perhaps because the Kidney energy is declining. Advising plentiful calcium in the diet cannot do any harm however and may well help protect some types of bone. At this age it is important to minimise bone loss too. We know that taking oestrogen as part of HRT will help do this. Perhaps there are ways of using Chinese herbs to do it too.

Following this line of reasoning I first went looking for Chinese herbs with oestrogenic activity that were also said to strengthen bone. This approach proved fruitless. But then maybe it is not appropriate to tonify or stimulate the hormonal (Tian Gui) aspect of Kidney function after their natural decline. By the age of 49 as we noted earlier, the Kidney-Qi starts to decline and therefore the Chong and the Ren channels no longer function. Adding oestrogen (or oestrogenic herbs) is just asking the Chong and the Ren channels to keep functioning after their natural lifetime. So we need to look at that other aspect of Kidney function - bone maintenance - in isolation from that of Chong/Ren control. I therefore discarded the idea of looking for oestrogen analogues and concentrated on herbs which are nutrient to bone.

In TCM herbal texts many herbs are said to strengthen bones and ligaments, or to strengthen sinews and bones, or are said to be nutrient to sinews, bones and cartilage. Very few of these contain calcium but interestingly the large proportion of them fall into the category of Kidney yang tonics.

HERBS WHICH STRENGTHEN BONE

YANG TONICS:
Ba Ji Tian (Radix Morindae Officinalis), Xian Mao (Rhizoma Curculiginis Orchidiosid), Du Zhong (Cortex Eucommiae Ulmoidis), Gou Ji (Rhizoma Cibotii Barometz), Xu Duan (Radix Dipsaci), Gu Sui Bu (Rhizoma Gusuibu), Tu Si Zi (Semen Cuscutae), Sha Yuan Ji Li (Semen Astragali), Yi Zhi Ren (Fructus Alpiniae Oxypyl- lae), Rou Cong Rong (Herba Cistanches), Lu Rong (Cornu Cervi Parvum).

YIN TONICS:
Gui Ban (Plastrum Testudinis) contains Ca, benefits the Kidneys. Hu Ma Ren (Semen Sesami Indici) contains Ca, benefits the Kidneys. Sang Ji Sheng (Ramus Loranthi seu Visci) tonifies Liver and Kidneys, nourishes blood.

WIND AND DAMP EXPELLING HERBS:
Hu Gu (Os Tigris) contains Ca. Qian Nian Jian (Rhizoma Homalomenae Occultae) tonifies Kidneys. Wu Jia Pi (Cortex Acanthopanacis Radicis) tonifies Kidneys.

BLOOD TONICS:
He Shou Wu (Radix Polygoni Multiflori) tonifies Kidneys.

BLOOD REGULATORS:
Niu Xi (Radix Achyranthis Bidentatae).

Examining the Calcium containing substances in the herbal pharmacopeia, we can see if any might be relevant to a prescription for osteoporosis. (Most calcium-containing substances appear in the “Calm the Shen” category and some in the “Astringent” category).

HERBS THAT CONTAIN CALCIUM

SHEN CALMING
Zi Shi Ying (Fluoritum) - used for uterine bleeding. Zhen Zhu (Margarita) - clears the Liver. Mu Li (Concha Ostreae) - pacifies Liver-Yang, used for uterine bleeding. Long Gu (Os Draconis) - pacifies Liver-Yang.

ASTRINGENTS
Hai Piao Xiao (Os Sepiae seu Sepiellae) - retains essence, stops bleeding. Qian Shi (Semen Euryleales Ferox) - tonifies Kidneys and Spleen.
Lian Zi Rou (Semen Nelumbinis Nuciferae) - tonifies Spleen and used for Heart/Kidney disharmony.

Most of these calcium containing substances, especially those in mineral form, would not be advisedly used long term and especially not in older women whose stomach acid tends to be low anyway. Remember mineral substances easily injure Stomach-Qi leading to indigestion and loss of appetite. Therefore these substances probably have little application in treating osteoporosis ... an interesting comment on the mechanistic and simplistic approach of WM. Qian Shi and Lian Zi may have some application in menopausal patterns (Spleen and Kidney deficiencies or Heart/Kidney imbalances) but do not offer large quantities of elemental calcium as do the minerals.

The next question to be addressed is how to put these herbs into formulations which will encourage bone density or growth. There are no treatments in traditional herbal texts for osteoporosis since it is a symptomless disease in its early stages. Dharmananda working in the US has formulated a mixture which he calls Jian Gu ("strengthen bone") and lists osteoporosis among its many uses. It is included in his constitutional remedies (2 for each element, xu or shi) being the tonic formula for the "water" type. The prescription contains a large number of herbs... a bit of everything! It is based on "Ge Jie Da Bu Wan". Looking at more classical formulae, those that fit our requirements i.e. strengthen bone and treat the Kidneys, fall into the Bi Syndrome and Yang tonic categories. They remove wind and damp and tonify Liver and Kidneys. Examples of patent medicines in these categories are: Jian Bu Hu Qian Wan, Feng Shi Xiao Tong Wan, Du Zhong Feng Shi Wan, Du Huo Ji Sheng Wan, Te Xiao Yao Tong Ling, Da Huo Luo Dan, all of which tonify Kidneys and Liver, dispel wind-damp and nourish bone. Three formulæ in the Yang tonic category which strengthen bone are: Kang Gu Zeng Sheng Pian, Yao Tong Pian, Zhuang Yao Jian Shen Pian.

Looking at the components of these formulæ to determine their appropriateness for use in menopausal women we find that some of them, despite their bone strengthening capacities would be inadvisedly used in the very long term. Others used by women with any sort of Bi Syndrome could be very helpful in enhancing bone strength. Appendix 1 lists the ingredients of the above named patent medicines, the bone strengthening herbs being marked by an *. I have considered only patent medicines here, bearing in mind that we are looking for remedies which can be applied repeatedly over a period of many years and the likely non-compliance of patients asked to boil up their herbs over this length of time.

At this point it is relevant to remind you that many of the formulæ described in the last article for treating imbalances frequently occurring during and after menopause also contain herbs which benefit bone: Zuo Gui Wan contains Gui Ban (Plastrum Testudinis), Tu Si Zi (Semen Cuscutae), Niu Xi (Radix Achyranthis Bidentatae), Lu Jiao Jiao (Colla Cornu Cervi). Er Xian Tang contains Ba Ji Tian (Radix Morindae Officinalis), Xian Mao (Rhizoma Curculiginis Orchidoidis). You Gui Wan contains Tu Si Zi (Semen Cuscutae), Du Zhong (Cortex Eucommiae Ulmoidis), Lu Jiao Jiao (Colla Cornu Cervi). Zhi Bai Ba Wei Wan contains Long Gu (Os Draconis), Mu Li (Concha Ostreae).

Tonic herbal formulæ are commonly used in China from middle age to encourage longevity. Because most herbs have a distinct hot or cold bias however, they cannot be used indiscriminately over the long term. Similarly substances like Long Gu and Mu Li which contain mineral calcium cannot be taken for too long.

Considering the original formulæ described for menopausal patterns, those for Bi Syndrome and Yang tonification, and those described for bone disorders, it should be possible to find an appropriate formula for any patient who is at risk of osteoporosis.

This formulæ could then be taken at regular intervals. The Chinese traditionally take their kidney strengthening herbs at a specific period of time in the middle of winter. Other formulæ which treat particular symptoms (Bi syndrome, menopausal symptoms etc.) would be used as and when those imbalances occurred and continued or modified as symptoms demanded.

A safe way to take herbs on a more continuous basis is to choose herbs that are more like food or can be used as food (see below) or to make wines of certain tonic herbs and to drink them in small quantities daily. Appendix 2 includes a couple of examples of such wines which could be drunk by middle aged or elderly people in the winter.9

**Treatment with Diet and Exercise**

A combination of TCM and WM ideas can fruitfully be applied here. Building up bone mass before menopause has been seen to be achieved by a diet rich in calcium and plenty of exercise. Presumably healthy Spleen and Stomach function is necessary to absorb the necessary calcium and other minerals. And of course adequate inherited kidney energy is essential to grow strong bones in the first place. Post-menopause, a diet rich in calcium may still be important (in fact recommended daily intake is higher than pre-menopause) but it doesn't seem to be enough. The catalyst (Kidney function) must also be nurtured to ensure the bone is maintained. From this point of view foods which promote calcium, benefit the Kidney and strengthen Stomach and Spleen would seem to fit the bill.

According to TCM texts on nutrition there are many foods described as nutrient to kidneys or spleen or stomach... this obviously being a large enough topic for another article. However it is also stated that only bone will *directly* nourish bone. Hence soups or casseroles which incorporate bones are very beneficial for any women at risk of bone loss. Ox tail is the most frequently used bone to strengthen the spine (a favourite dish which is very therapeutic in this regard is oxtail soup). Pork spine (sold as soup bones) or hock are often used. Pork ribs are tastier but not quite so effective at strengthening bone. Tendons are also used by the Chinese to strengthen their bones (see appendix 3 for recipes). While the first two recipes in Appendix 2 can happily be consumed by people of any age or constitution, with moderation, there are some recipes that are very specifically designed for older people and only for consumption in the winter. 'Winter Time Bone Soup (Appendix 2) uses Kidney yang tonic herbs to firstly activate the Qi (always the first step with older people whose Qi is failing) and then uses other ingredients to nourish the...
blood, Yin and Jing. Pork bones are most desirable in this recipe because they nourish the yin more, however oxtail, hock, ribs or soup bones can all be used. Root vegetables are added in preference to green vegetables because of their more astringent and downward movement, since the action of this soup must be deep and internal. Mushrooms, black fungus, lotus seed and Da Zao are used to nourish the blood. It is important for soups of this nature that clay pots rather than metal are used. This type of soup is then taken in small quantities along side other foods at each meal time. The large clay pot will often be kept cooking for days with additions when necessary.

Amongst all the other foods only two are described as having bone strengthening properties. These are the black bean, or Dou Chi, and Chinese garlic chives. The latter specifically tonifies Kidney Yang and strengthens loins, knees, bones and joints.

From the Nei Jing and the theory of 5 elements comes the advice to avoid excess bitter flavour if there is any disease of the Kidneys or bones. In western society the most likely source of excess bitter flavour would be coffee, which we have already seen encourages leaching of the calcium from the bone.

WM advises a high intake of dairy. Milk in TCM terms is neutral, sweet and ascending. It goes to the Lung, Stomach and Heart channels and pertains to earth. It is used as a tonic in cases of deficiency i.e. it tonifies Qi and blood, produces fluid, and lubricates the intestines. It is used therapeutically in the treatment of indigestion, diabetes and constipation. It is prescribed as a suitable food for a yin deficient type of menopausal woman with internal fire leading to loss of weight, constipation and dry skin. For the Spleen and Kidney yang deficiency type of menopausal woman, however, whose digestion is weak, milk may well lead to excess phlegm. Foods which tonify yin and generally moisten the body do not include any other food type high in calcium except for sardines.

In addition to diet, Chinese people take special care with exercise to promote health and longevity. Since this topic is also an article in its own right I will briefly mention only those Qigong exercises found beneficial in enhancing Kidney energy and bone health.11

The main Qigong patterns used are the ‘Blowing method to Strengthen Kidney’, ‘The Toe Raised Transport and Conversion Pattern’ and ‘The Kidney Massaging and Essence Benefiting Pattern’. The first is a walking technique combining twists from the waist with a breathing pattern, the second is a more complex series of movements done facing the four axes of the compass in sequence as the hands describe ‘opening and closing’ of the upper, middle and lower dantians. The final technique is done last thing before going to sleep at night. Shenshu BL-23 and Yongquan KID-1 are massaged in sequence with opening and closing patterns performed at the middle dantian. None of these Qigong exercises is difficult to master, nor are they very time consuming and it is easy to incorporate them into a daily routine.

**Acupuncture for osteoporosis?**

While it may well be the case that points like Dashu BL-11 or Xuanzhong GB-39 enhance the strength of the bone, until long term trials are carried out it is hard to know whether it is worth advising frequent trips to the acupuncturist to the patient concerned with osteoporosis. I have concentrated more on treatments involving lifestyle modifications interspersed with herbal treatments where appropriate, because the prevention or treatment of osteoporosis needs to continue for all the post-menopausal years ... maybe 30 years or more. A thought to make even the most avid acupuncture endorphin addict think twice.

**In Conclusion?**

Presented here are many of the facts about osteoporosis as we understand them from a (still limited) western scientific viewpoint. Juxtaposed are several ideas stemming from a viewpoint many thousands of years older and based on a very different concept of health and disease. What we do with these concepts now in our analysis and treatment of at risk menopausal women depends on our own synthesis of these two approaches.

**APPENDIX 1**

The examples of patent medicines which strengthen bone and treat the Kidneys are taken from Chinese Patent Herbal Formulas by J, Fratkin*. Other sources may list formulations with variations according to the factory of origin.

**PATENT FORMULAE TO STRENGTHEN KIDNEY AND BONE**

**JIAN GU (Eucommia and Achyranthes Eighteen Formula)**

This formula tonifies Kidney yang, yin and Qi, nurtures Jing, strengthens bones and ligaments, benefits the lower back. Used for weak and sore back and legs, urinary dysfunction, impotence, spermatorrhoea, recovery from broken bones, osteoporosis, diminished hearing and weakness from over work and stress.

Du Zhong (Cortex Eucommiae Ulmoidis)*, Niu Xi (Radix Achyranthis Bidentatae)*, Gou Qi Zi (Fructus Lycii Chinensis), Shu Di Huang (Radix Rehmanniae Glutinosae Conquita), Ba Ji Tian (Radix Morindae Officinalis)*, Shan Yao (Radix Dioscoreae Oppositae), Chuan Xiong (Radix Ligustici Wallichii), Bai Ji Tian (Radix Morindae Officinalis)*, Fu Ling (Sclerotium Poriae Cocos), Xu Duan (Radix Dipsaci)*, Rou Cong Rong (Herba Cistanches), Dan Gui (Radix Angelicae Sinensis), Ren Shen (Radix Ginseng), Bai Zhu (Rhizoma Atractylodis Macrocephalae), Hu Gu (Radix Achyranthis Bidentatae)*, Hu Gu (Os Tigris)*, Qin Jiao (Radix Gentianae Macrophyllae), Dang Gui (Radix

**WIND DAMP REMOVING PATENT MEDICINES WHICH STRENGTHEN BONE**

These formulae will be considered if the woman concerned with osteoporosis has any aches or pains.

**Jian Bu Hu Qian Wan (Walk Vigorously like Tiger Stealthy Pill)**

For chronic arthritis, lumbago and sciatica etc., Kidney weakness, and benefits tendons and bones.

Mu Gua (Fructus Chaenomelis Lagenariae), Niu Xi (Radix Achyranthis Bidentatae)*, Hu Gu (Os Tigris)*, Qin Jiao (Radix Gentianae Macrophyllae), Dang Gui (Radix

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*Note: The asterisk (*) indicates specialty herbs or ingredients commonly used in Chinese medicine.

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**JOURNAL OF CHINESE MEDICINE NUMBER 34 SEPTEMBER 1990**
**Du Zhong Feng Shi Wan (Eucommia Bark Wind Damp Pills)**

Strengthens bone and tendon fortifies Kidneys and Liver, tonifies and invigorates Qi, tonifies blood.

**Du Huo Ji Sheng Wan (Angelica Du Huo and Loranthus pill)**

For Wind Damp and chronic arthritis, tonifies Liver and Kidneys, Qi and blood, strengthens tendons and bones. This formula primarily expels wind damp and moves stagnation It has no tonic action and is not appropriate for long term use.

**Te Xiao Yao Tong Ling (Special Efficacy Lower Back Pain Pills)**

To strengthen the waist and Kidneys, tonifies Jing, strengthens bone and tendon fortifies Kidneys and Liver, clears damp. Used to treat joint pain (large or small) due to deficient Liver and Kidneys. The patient must be over 40 and have signs of deficiency to use this formula.

**Kang Gu Zeng Sheng Pian (Combat Bone Hyperplasia Pill)**

Tonifies Liver and Kidneys, fortifies marrow, tendon and bone, clears damp. Used to treat joint pain (large or small) due to deficient Liver and Kidneys. The patient must be over 40 and have signs of deficiency to use this formula. This formula which regulates blood contains a large number of bone strengthening herbs. Used if there is Blood Stagnation causing pain.

This formula which contains two bone strengthening herbs and a calcium source can only be used where stagnation of the Qi in the channels exists. It also contains tonics for yin, blood and Qi.
This formula has an almost equal number of tonic and wind damp clearing herbs. It has been used with success in a number of spinal disorders and may be appropriate in some osteoporotic disorders.

**Zhuang Yao Jia Shen Pian (Strengthen Lower Back, Make Strong Kidney Tablet)**

Tonifies Kidney Yang and Qi, benefits tendon and bone, treats bladder symptoms.

Gou Ji (Rhizoma Cibotii Barometz)*, Du Zhong (Cortex Eucommiae Ulmoidis)*, Sang Ji Sheng (Ramus Loranthi seu Viscis)*, Jin Ying Zi (Fructus Rosae Laevigatae), Dong Chong Xia Cao (Cordyceps Sinensis), Fu Ling (Scle-erotum Poriae Cocos), Fu Pen Zi (Fructus Rubi), Ji Xue Teng (Radix et Caulis Jixueteng).

This tonic is frequently used long term in Qi deficient and debilitated patients.

**GENERAL PATENT TONICS WHICH STRENGTHEN BONE**

**Gejie Da Bu Wan (Gecko Great Tonifying Pills)**

This is a general tonic which supports the Kidneys especially after illness, childbirth or surgery.

Gejie (Gecko), Du Zhong (Cortex Eucommiae Ulmoidis)*, Gou Qi Zi (Fructus Lycii Chinensis), Shu Di Huang (Radix Rehmanniae Glutinosae Conquitae), Ba Ji Tian (Radix Morindae Officinalis)*, Shan Yao (Radix Dioscoreae Oppositae), Chuan Xiong (Radix Ligustici Wal-lichii), Fu Ling (Sclerotium Poriae cocos), Xu Duan (Radix Dipsaci), Dang Gui (Radix Angelicae Sinensis), Bai Zhu (Rhizoma Atractylodis Macrocephalae), Huang Qi (Radix Astragali), Yu Zhu (Rhizoma Polygonati Odorati), Gou Ji (Rhizoma Cibotii Barometz)*, Mu Gua (Fructus Chaenomelis Lagenariae), Sang Ji Sheng (Ramus Loranthi Visci)*, Jin Ying Zi (Fructus Rosae Laevigatae), Dong Chong Xia Cao (Cordyceps Sinensis), Fu Pen Zi (Fructus Rubi), Ji Xue Teng (Radix et Caulis Jixueteng).

Although there are 5 bone strengthening herbs in this formula it is almost an equal number of tonic and wind damp clearing herbs. It has been used with success in some osteoporotic disorders including carrots and yams, mushrooms, black fungus, Lotus seed and Da Zao. Bring bones to the boil and skim off the scum. Add herbs, vegetables and fungus etc. Simmer with lid on for 5 hours to 2 days.

**References:**

5. Current Therapeutics (July 87).

**APPENDIX 2**

**Gou Qi Zi Wine:** 300gms Gou Qi Zi, 2 quarts Brandy. Age for 2 months then take 1-2 oz before or after meals. This wine tonifies the Qi and helps the muscles and the bones.

**Du Zhong Wine:** 300gms Du Zhong, 2 quarts Brandy. Age for 1 month then take 10-60mls three times a day. This wine tonifies the Kidneys and helps relieve back pain.

**APPENDIX 3**

**Oxtail Soup:** 240 gms of oxtail, 80 gms soaked black mushrooms, 20 gms boxthorn fruit. Put all ingredients in a pot, add water and stew for 4-5 hours.