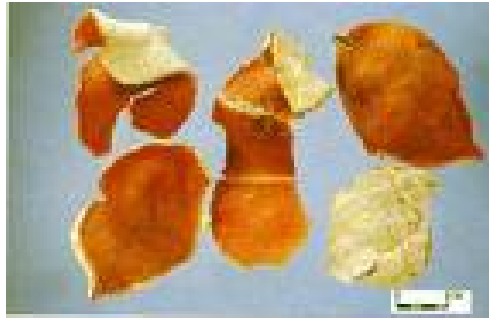


Published in:

Butler, L., (2008). Chen Pi. *Register Of Chinese Herbal Medicine Journal*.
May, 5 (5):16-19



Chen Pi 陈皮

Lee Butler*

Pharmaceutical name: *Pericarpium Citri Reticulatae*

English translation: Tangerine Peel, citrus peel, orange peel

Botanical name: *Pericarpium Citri Reticulatae Blanco*.

Properties: acrid, bitter, warm.

Channels entered: Lung, Spleen and Stomach channels

Alternate names: Ju Pi, Guang Chen Pi, Xin Hui Pi

Dosage: 3-9gm

Overview

I've been cooking with Chen Pi for years, so it's not new to me. When cooking with herbs, my selection is usually based both on their energetic affect, and also on their taste. I know that a textbook tells me the 'taste' of a herb, but when combining herbs, this taste is usually not that important – most TCM formulae taste unpleasant, and are still consumed as part of treatment. In contrast, foul tasting food is not usually consumed after the first mouthful! The challenge for me then has been to select herbs to cook with that complement each other energetically and from a taste perspective. Experimenting in this way has given some strange surprises. Shan Yao (rhizome of *Dioscoreacea opposita*) in a casserole actually tastes bitter rather than slightly sweet. Of the herbs I do use, Chen Pi is one of my favorites. Firstly, it is widely available – so one does not need to go to the trouble of ordering it from a herb supplier. In fact, when I first started using Chen pi, I did just that, believing that the actual strain/type of peel was very important. However, my research taught me that although Chen pi is generally considered to be dried mandarin peel, it is usually the assorted dried peel from mandarins as well as a number of similar citrus fruits (Bensky & Barolet 2004). This possibly explains the alternate name used 'Ju Pi', meaning 'orange peel' (Chen & Chen 2001). Many people have mandarins, oranges, satsumas etc in the house. Drying out the peel is a cheap, reliable way of obtaining good chen pi – especially if organic fruit has been used.

Secondly, Chen pi's action of regulating qi in the middle jiao makes it a perfect ingredient in a meal to aid the digestive process

Research related to Chen Pi

Having recently embarked on an MSc course in Chinese herbs my respect for my favourite herb has been greatly increased. In addition to the commonly recognized TCM attributes, Chen Pi has anti-microbial properties. Johann (2007) demonstrated the anti-microbial properties of citrus peel extracts on the human pathogens *Trichophyton mentagrophytes* and *Microsporum Canis*, and Jayaprakasha *et al* (2000) recommended in the conclusion to their research, that the natural compounds found in citrus peel extracts were so effective that citrus peel extracts could be used as bio-preservatives in food.

Both Abe *et al* (2007) & Fan *et al* (2007) found that orange peel inhibited tumorigenesis in mice (whilst this was the peel from oranges, as stated earlier, the chemical composition is very similar to that of Chen Pi), and some of the constituents found in Chen Pi may also have a tumour inhibiting action, though in the case of tangretin, some of the evidence is contradictory.

Toxicity

Although TCM text books state that there is no toxicity associated with Chen Pi, Ebo *et al* (2007) cite a case of anaphylaxis associated with *Citrus reticulata*. This is of particular interest, as hesperetin (a metabolite of Hesperidin, one of the

components of Chen Pi), has been found to have an anti-allergic effect (Lee *et al*, 2004).

Biochemical constituents and pharmacokinetics

Textbooks give extensive lists of the biochemical constituents of Chen Pi. One of the most interesting groups of components are the electro-actively bioactive ingredients tangeretin, hesperidin, nobiletin, and synephrine.

Tangeretin

Kang *et al* (2005) found that tangeretin had tumour-inhibiting effects, and concluded that extract from tangerine peel may induce apoptosis on colon cancer cells. In contrast to these findings Delaney *et al* (2001) noted a mild suppression of natural killer cell activity with long term high dose exposure of the Polymethoxylated flavones (PMF's) found in citrus extracts, whilst Duke (2002) found in his research that tangeretin may interfere with tamoxifen - a drug frequently prescribed for breast cancer. Brack *et al* (2002) explained that tangeretin cancelled out the tumour growth suppressing effect of tamoxifen, though did conclude that oral administration could be a useful strategy in cases where immuno-suppression was needed.

Hesperidin

Chen Pi is the main material used for extraction of hesperidin for the medicinal industry in China (Sun & Sheng, 1998), and the Chinese Health Department

appear to place great importance on the hesperidin content of Chen Pi, stipulating that all Chen Pi have at least 3.5% of this flavanoid glucoside (Chen *et al*, 2002).

Research suggests that hesperidin has many beneficial effects. It has been found to substantially inhibit LDL oxidation (Liu *et al*, 2007) and to be a potent anti-oxidant with neuro-protective effects (Cho, 2006). Fernandez *et al* (2005) suggest that hesperidin acts synergistically with benzodiazepines, potentiating the effect of tranquillizers and sedatives such as valium and mogadon.

Kawaguchi *et al* (2006), found hesperidin to be able to suppress collagen-induced arthritis when administered orally to humans. This suggests that oral administration of hesperidin could be effective for treating those presenting with rheumatoid arthritis.

Nobiletin

Nobiletin appears to have many positive effects on the body. Much of the research has been done on animals, however authors speculate that the same effects should be reproducible in humans. Whitman *et al* (2005) concluded that nobiletin from tangerine peel could not only reduce plasma cholesterol concentrations, but also may prevent atherosclerosis at the level of the vascular wall by inhibiting macrophage foam-cell formation. Nobiletin may also play a role in helping restore memory function Alzheimer's disease based on recent

research (Nakajima *et al* (2007), and also act as an anti-inflammatory (Choi *et al*, 2007).

From a TCM perspective, research by Yoshimizu *et al* (2004) and Minagawa *et al* (2001) is of interest. As previously discussed, Chen Pi has a beneficial affect on the Spleen and Stomach and digestion. The aforementioned authors found that nobiletin not only has a beneficial affect on the stomach, but it also appears to have a cytotoxic affect on gastric cancer cells, suggesting both a protective and a harmonizing role.

Synephrine

Synephrine is also a sympathomimetic agent given as the tartrate for the treatment of hypotensive states (Martindale, 1996). James (2002) recognizes synephrine as a decongestant, and states that it is “probably synergistic with caffeine as a thermogenic” (p. 721). This suggests that a herbal formula containing Chen Pi, and intended to tonify and warm the Spleen, may have its action enhanced if taken with tea or coffee.

This thermogenic effect has apparently been noticed by the ‘diet and slimming industry’ with synephrine being used in some weight-loss products as a ‘safe replacement’ for ephedrine (Ma Huang [stem of *Ephedra herba*]). However, Bouchard *et al* (2005) found it not to be as safe as assumed in their discussion of a case of ischemic stroke possibly induced by an ephedra-free dietary supplement containing synephrine. Research by Bui *et al* (2006) also sounds a

word of caution. In their research, they found that, after a single dose of bitter orange (900 mg dietary supplement extract standardized to 6% synephrine), systolic blood pressure, diastolic blood pressure and heart rate were all increased for a five-hour period.

Citrus peel Oil content

Although synephrine is the chemical that has attracted the attention of the 'diet industry', there is evidence to suggest that the oils found in Chen Pi (octanal, limonene terpinene and nerol) also have a lipolytic effect (Choi, 2006)

The actual amount of each of the oils in mandarin peel varies from species to species (Fanciullino *et al*, 2005). Limonene is however, the major component (89–97%) of the peel oil of mandarins belonging to the species *Citrus reticulata* Blanco and which James (2002) believes has much promise in anti-cancer activity. Wagner (2006) found that administration of 10 doses of limonene produced a dramatic 65% reduction in metastatic tumour nodules, reduced levels of two biomarkers associated with poorer cancer prognosis. Hakim *et al* (2000) found that consumption of citrus peel may have a potential protective effect in relation to skin squamous cell carcinoma (SCC). Crowell (1997) has discussed the beneficial role played by limonene as a chemo-preventive agent against rodent mammary cancer during the initiation phase as well as the promotion/progression phase of breast cancer.

Interestingly, polyphenol content, essential phenolics, total radical-trapping antioxidative potential (TRAP), and ascorbic acid have been found to be higher in orange peel than in the fruit itself (Gorinstein, 2001).

From the above, one can see that Chen Pi may have a far wider role than commonly considered once its chemical constituents have been taken into account. Whilst western science has taken the approach of trying to identify beneficial properties of each chemical constituent, and then has proceeded to isolate them, one can see that Chen Pi as a whole perhaps may be more beneficial. This is well illustrated by the contradictory studies into tangeretin and its role in those with cancer. In isolation tangeretin may display contradictory effects, however its anti-cancer role may well be magnified when present with the other anti-cancer components of Chen Pi.

Nevertheless, these results extend the knowledge of Chen Pi's actions identified in our pharmacopeias. Chen Pi regulates the middle jiao. As part of this action it has an ability to protect the gut from tumour cells and contribute to cancer cell apoptosis. Chen Pi's ability to resolve phlegm and damp may be relevant in its role in relation to tumour. This damp resolving quality may also explain how constituents of Chen Pi can be beneficial in the treatment of arthritis, reduction of plasma cholesterol, and prevention of atherosclerosis.

Everday use of Chen Pi

Taking the above into account, incorporating Chen Pi into the diet can be very beneficial to health. Making a tea with Chen Pi, or adding it to green tea is an easy way to do this. Making your own marmalade is another great way and will give that nice combination of sweet and sour. Adding Chen Pi to a chicken stock (along with a few other herbs) is my favourite method. The recipe below should give a great tasting stock. Please forgive my measuring system – it's a cooking thing!

Chicken Stock

Add the carcass of a chicken to a large stock pot/saucepan.

Add the following:

8 peppercorns

1 onion

4 cloves of garlic

2 carrots

Half a dozen red dates Da Zao (fruit of *Zizphus jujuba*)

4 long strips of Huang Qi (root of *Astragalus membranaceus*)

One good pinch of Chen Pi (a three fingered pinch)

Small handful of Shan Yao

One small handful of Gou Qi Zi (fruit of *Lycium barbarum*)

1 small handful of Hei Zhi Ma (seeds of *Sesami nigrum*)

Cover with water and simmer for 6-8 hours. Strain off liquid and place in fridge.

Once cold a solid layer of fat will form on top which you may wish to scoop off

and discard. Now ready to use. It's a great base for a risotto – as any Italian cook will tell you, the measure of a good risotto is in the stock (...and a risotto is not too different from a congee, but a lot more tasty!)

Enjoy!

Lee Butler

References

Abe, S., Fan, K., Ho, C.T., Ghai, G., Yang, K. (2007). Chemopreventive Effects Of Orange Peel Extract (OPE). II: OPE Inhibits Atypical Hyperplastic Lesions In Rodent Mammary Gland. *Journal Of Medicinal Food*. Mar; **10** (1):18-24..

Bensky and Barolet (2004). *Chinese Herbal Medicine, Formulas and Strategies*. Eastland Press

Bouchard, N.C., Howland, M.A., Greller, H.A., Hoffman, R.S., Nelson, L.S., (2005). Ischemic Stroke Associated With Use Of An Ephedra-Free Dietary Supplement Containing Synephrine. *Mayo Clinic Proceedings*. Apr; **80** (4):541-5.

Brack, M.E., Boterberg, T., Depypere, H.T., Stove, C., Leclercq, G., Mareel, M.M., (2002). The Citrus Methoxyflavone Tangeretin Affects Human Cell-Cell Interactions. *Advances In Experimental Medicine And Biology*. **505**:135-9.

Cardullo, A. C., Ruszkowski, A. M., & Deleo, V. A. (1989). Allergic Contact Dermatitis Resulting From Sensitivity To Citrus Peel, Geraniol, And Citral. *Journal of the American Academy of Dermatology*. **21**, 395-7.

Chen, G., Zhang, L., Zhao, J., Ye, J. (2002). Determination Of Hesperidin And Synephrine In Pericarpium Citri Reticulatae By Capillary Electrophoresis With Electrochemical Detection. *Analytical and Bioanalytical Chemistry*. June, **373** (3): 169-173

Cho, J. (2006). Antioxidant And Neuroprotective Effects Of Hesperidin And Its Aglycone Hesperetin. *Archives of pharmacal research*. Aug; **29** (8):699-706

Choi, H.S. (2006). Lipolytic Effects Of Citrus Peel Oils And Their Components. *Journal of Agricultural and Food Chemistry*. May, **54**, 3254-8.

Choi, S.Y., Hwang, J.H., Ko, H.C., Park, J.G., Kim, S.J. (2007). Nobiletin From Citrus Fruit Peel Inhibits The DNA-Binding Activity Of NF-Kappab And ROS Production In LPS-Activated RAW 264.7 Cells. *Journal Of Ethnopharmacology*. Aug 15;113(1):149-55.

Choi, S.Y., Ko, H.C., Ko, S.Y., Hwang, J.H., Park, J.G., Kang, S.H., Han, S.H., Yun, S.H., Kim, S.J. (2007). Correlation Between Flavonoid Content And The NO

Production Inhibitory Activity Of Peel Extracts From Various Citrus Fruits.

Biological & Pharmaceutical Bulletin. Apr; **30** (4):772-8

Crowell, P.L.(1997). Monoterpenes In Breast Cancer Chemoprevention. *Breast Cancer Research And Treatment*. Nov-Dec; **46** (2-3):191-7

Delaney, B., Phillips, K., Buswell, D., Mowry, B., Nickels, D., Cox, D., Wang, H.B., Manthey, J. (2001). Immunotoxicity Of A Standardized Citrus Polymethoxylated Flavone Extract. *Food And Chemical Toxicology*. Nov; **9** (11):1087-94.

Duke, J. (2002). *Handbook of Medical Herbals*. (2nd Ed). London: CRC Press.

Ebo, D.G., Ahrazem, O., Lopez-Torrejon, G., Bridts, C.H., Salcedo, G., Stevens, W.J (2007). Anaphylaxis From Mandarin (Citrus Reticulata): Identification Of Potential Responsible Allergens. *International Archives Of Allergy And Immunology*. May; **44** (1):39-43.

Fan, K., Kurihara, N., Abe, S., Ho, C.T., Ghai, G., Yang, K. (2007). Chemopreventive Effects Of Orange Peel Extract (OPE). I: OPE Inhibits Intestinal Tumor Growth In Apcmin/+ Mice. *Journal Of Medicinal Food*. Mar; **10**(1):11-7.

- Fanciullino, A.L., Tomi, F., Luro, F., Desjobert, J.M., Casanova, J. (2005). Chemical Variability Of Peel And Leaf Oils Of Mandarins. *Flavour And Fragrance Journal*. **21**: 359–367
- Fernandez, S.P., Wasowski, C., Paladini, A.C., Marder, M. (2005). Synergistic Interaction Between Hesperidin, A Natural Flavonoid, And Diazepam. *European Journal of Pharmacology*. Apr **11**; 512 (2-3):189-98.
- Gorinstein, S., Martín-Belloso, O., Park, Y., Haruenkit, R., Lojek, A., Číž, M., Caspi, A., Libman, I., Trakhtenberg, S. (2001). Comparison of some biochemical characteristics of different citrus fruits. *Food Chemistry*. August, **74**, 3: 309-315
- Hakim, I.A., Harris, R.B., Ritenbaugh, C. (2000). "Citrus Peel Use Is Associated With Reduced Risk of Squamous Cell Carcinoma of the Skin Citrus Peel Use Is Associated With Reduced Risk of Squamous Cell Carcinoma of the Skin." *Nutrition & Cancer*. **37**(2): 161-168.
- Heinrich, M., Barnes, J., Gibbons, S., Williamson, E.M. (2004). *Fundamentals of Pharmacognosy and Phytotherapy*. Elsevier: London
- Jayaprakasha, G.K., Negi, P.S., Sikder, S., Rao, L.J., Sakariah, K.K. (2000). Antibacterial Activity Of Citrus Reticulata Peel Extracts. *Zeitschrift für Naturforschung. C, Journal of Biosciences*. Nov-Dec; **55**(11-12):1030-4

Johann, S., Oliveira, V.L., Pizzolatti, M.G., Schripsema, J., Braz-Filho, R., Branco, A., Smania, A., Jr. (2007). Antimicrobial Activity Of Wax And Hexane Extracts From Citrus Spp. Peels. *Memórias do Instituto Oswaldo Cruz*. Sep; **102** (6):681-5.

Kang, S.A., Park, H.J., Kim, M.J., Lee, S.Y., Han S.W., Leem, K.H. (2005). Citri Reticulatae Viride Pericarpium Extract Induced Apoptosis In SNU-C4, Human Colon Cancer Cells. *Journal of Ethnopharmacology*. **97** (2): 231-235

Kawaguchi, K., Maruyama, H., Kometani, T., Kumazawa, Y. (2006). Suppression Of Collagen-Induced Arthritis By Oral Administration Of The Citrus Flavonoid Hesperidin. *Planta Medica*. Apr; **72** (5):477-9

Lee, N.K., Choi, S.H., Park, S.H., Park, E.K., Kim, D.H. (2004). Antiallergic Activity Of Hesperidin Is Activated By Intestinal Microflora. *Pharmacology*. Aug; **71** (4):174-80.

Li, X., (2002). *Chinese Materia Medica Combinations and Applications*. St Albans: Donica Publishing Ltd.

Liu, R., Meng, F., Liu, Y., Bai, H., Liu, B.W. (2007). Inhibitory Effect Of Isorhamnetin And Hesperidin On LDL Oxidation Induced By Cu²⁺. *Zhong Yao Cai. Jun*; **30** (6):677-81

Martindale, W., (1996). *The Extra Pharmacopoeia*, (31st ed). London: The Royal Pharmaceutical Society, Council of the Royal Pharmaceutical Society of Great Britain.

Minagawa, A., Otani, Y., Kubota, T., Wada, N., Furukawa, T., Kumai, K., Kameyama, K., Okada, Y., Fujii, M., Yano, M., Sato, T., Ito, A. & Kitajima, M. (2001) The Citrus Flavonoid, Nobiletin, Inhibits Peritoneal Dissemination Of Human Gastric Carcinoma In SCID Mice. *Japanese Journal of Cancer Research*, **92**, 1322-8.

Nakajima, A., Yamakuni, T., Haraguchi, M., Omae, N., Song, S.Y., Kato, C., Nakagawasai, O., Tadano., T., Yokosuka, A., Mimaki, Y., Sashida, Y., Ohizumi, Y. (2007). Nobiletin, A Citrus Flavonoid That Improves Memory Impairment, Rescues Bulbectomy-Induced Cholinergic Neurodegeneration In Mice. *Journal Of Pharmacological Sciences*. Sep; 105 (1):122-6

Pitchford, P., (1993). *Healing with Wholefoods*. Berkeley: North Atlantic Books.

Sun, W.J., and Sheng, J.F., (1998). *Handbook Of Natural Active Constituents*. Chinese Medicinal Science and Technology Press, Beijing.

Wagner, E., (2006). "Limonene, Perillic Acid Counter Spread of Cancer
Limonene, Perillic Acid Counter Spread of Cancer." *Life Extension*. **12** (9): 16-16.

Wang, W., Xueqin, X.u., Bin, Q., Ling, J., Chen, G., (2006). A New Method For
Fabrication Of An Integrated Indium Tin Oxide Electrode On Electrophoresis
Microchips With Amperometric Detection And Its Application For Determination
Of Synephrine And Hesperidin In Pericarpium Citri Reticulatae. *Electrophoresis*,
27, 4174–4181

Whitman, S.C., Kurowska, E.M., Manthey, J.A., Daugherty, A., (2005). Nobiletin,
A Citrus Flavonoid Isolated From Tangerines, Selectively Inhibits Class A
Scavenger Receptor-Mediated Metabolism Of Acetylated LDL By Mouse
Macrophages. *Atherosclerosis*. Jan;**178**(1):25-32.

Wood, R., (1999) *The New Whole Foods Encyclopedia: A Comprehensive
Resource For Healthy Eating*. New York: Penguin Putnam Inc.

Yoshimizu, N., Otani, Y., Saikawa, Y., Kubota, T., Yoshida, M., Furukawa, T.,
Kumai, K., Kameyama, K., Fujii, M., Yano, M., Sato, T., Ito, A. & Kitajima, M.
(2004) Anti-tumour effects of nobiletin, a citrus flavonoid, on gastric cancer
include: antiproliferative effects, induction of apoptosis and cell cycle
deregulation. *Alimentary Pharmacology & Therapeutics*, **20** (1): 95-10

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