7. TREATMENT OF SIDE-EFFECTS OF CHEMOTHERAPY

The purpose of treating cancer cells with chemotherapy is to prevent them from dividing, invading and metastasizing. Most chemotherapeutic agents exert their effect on cell multiplication: obviously, since multiplication is a characteristic of many normal cells, chemotherapeutic agents will inevitably affect also normal cells and especially those with a rapid rate of multiplication and turnover such as those of the hair, intestinal mucosa, blood and bone marrow. This explains the common toxic effect of chemotherapy on the hair (hair loss), the intestines (vomiting and diarrhoea), the blood (affecting blood counts) and bone marrow (affecting the immune system).

Inhibition of cell multiplication can take place at several levels within the cell:

- Macromolecular synthesis and function
- Cytoplasmic organization
- Cell membrane synthesis function
- Environment of cancer cell growth

Most agents have their primary effect on either macromolecular synthesis or function. They interfere with the synthesis of DNA, RNA or proteins or with the appropriate functioning of the molecule. When interference with macromolecular synthesis or function of the neoplastic cells is sufficiently great, a proportion of the cells die. Because only a proportion of the cells die as a result of a given treatment, repeated doses of chemotherapy must be used to continue to reduce their number.

Neoplastic cell death may not take place at the time of exposure to the chemotherapeutic agent. Often the cell must undergo several divisions before the lethal event that took place earlier results in death of the cell. This means that the effect of chemotherapy may last for several weeks after the end of the treatment: likewise with its toxic effects on normal cells. This has important implication for our protocols with *Chemo-Support* as it means that we need to continue tonifying Qi and Blood for some time after the end of the treatment (see below).

TOXICITY

The toxicity of chemotherapeutic agents (and also of other drugs) is not a fixed entity but it varies according to several factors:

- Toxicity of specific agent
- Dose
- Schedule of administration
- Route of administration
- Predisposing factors of the patient which may be known or unknown before the start of the treatment
- Sex (women tend to develop toxicity at a lower dose than men)

COMMON TOXICITIES

Some toxicities are relatively common among chemotherapeutic agents. Common acute toxicities include:

- Myelo-suppression with leukopenia, thrombocytopenia and anaemia
- Nausea and vomiting
- Mucous membrane ulceration
- Alopecia

Apart from nausea and vomiting, these toxicities occur because of the cytotoxic effect of chemotherapy on rapidly-dividing normal cells in the bone marrow, mucous membranes and hair.

The side-effects of chemotherapy vary greatly according to the agent used. Agents may be broadly classified into four groups:

Alkylating agents damage the programs that control growth in the chromosomes of the tumour cells. Example: busulfan, carboplatin, carmustine, chlorambucil, cisplatin, cyclophosphamide, dacarbazine, doxorubicin, estramustine, ifosfamide, lomustine, mechlorethamine, melphalan, semustine, thiotepa.

Antimetabolites interfere with the manufacture of nucleotides, the substances that make up the DNA. Example: azacitidine, capecitabin, cladribine, floxuridine, fludarabine, 5-fluorouracil, gemcitabine, mercaptopurine, methotrexate, pentostatin, raltitrexed, thioguanine, trimetrexate.

Natural products interfere with cell structure and cell division. Example: asparaginase, bleomycin, dactinomycin, daunorubicin, docetaxel, doxorubicin, epirubicin, etoposide, idarubicin, irinotecan, plicamycin, mitomycin, mitoxantrone, taxol, teniposide, topotecan, vincristine, vinblastine.

Hormones block the effect of oestrogen by acting on the oestrogen-receptors. Example: aminoglutethimide, anastrozole, bicalutamide, dexamethasone, diethylstilbestrol, fluoxymesterone, flutamide, goserelin, leuprolide, letrezole, nilutamide, raloxifen, tamoxifen, torenufen.

Miscellaneous agents: altretamine, amifostine, amsacrine, dexrazoxane, hydroxyurea, mitotane, pamidronate, porfimer, procarbazine.

Biologic agents
Monoclonal antibodies: rituximab, trastuzumab.
Interferons: interferon-á2a and interferon-á2b.
Interleukins: aldesleukin, oprelvekin.
Myeloid- and erythroid-stimulating factors: erythropoietin, filgrastim, sargramostim.

SHORT-TERM SIDE-EFFECTS OF CYTOTOXIC DRUGS

Short-term side-effects of cytotoxic drugs include:

Loss of appetite
Nausea
Vomiting
Stomatitis
Malaise
Flu-like feeling, fever
Cystitis
Haematuria
Constipation
Diarrhoea

LONG-TERM SIDE-EFFECTS OF CYTOTOXIC DRUGS

Long-term side-effects of cytotoxic drugs include:

Cardiac toxicity (usually from high doses of doxorubicin or daunorubicin). Doxorubicin is widely used for breast carcinoma. If radiation is administered to the chest, the cardiac toxicity (in the form of congestive cardiac failure) may occur at lower doses. This particular long-term side-effect may occur even several years after the administration of chemotherapy.

Pulmonary toxicity (pulmonary fibrosis) is associated with high doses of bleomycin but also with alkylating agents and methotrexate.

Haematologic impairment. Alkylating agents may cause cytopenia.

Immunologic impairment and myelo-suppression. Fludarabine, cladribine and pentostatin cause profound suppression of CD4 and CD8 lymphocytes and render patients treated susceptible to opportunistic infections. There may be a fall in white blood cells and platelets counts.

Skin reactions (rash, inflammation, pigmentation, photosensitivity)

Liver toxicity.

Nephrotoxicity. This is typically caused by cisplatin, oxaliplatin, methotrexate and nitrosoureas). This toxicity may be acute or chronic and in severe cases it may require haemodialysis.

Neurotoxicity (peripheral neuropathy) is typically caused by vinca alkaloids, cisplatin, oxaliplatin, epipodophyllotoxins and paclitaxel.

CNS toxicity (lethargy, fatigue, depression, headaches, poor memory and concentration)

Premature menopause may occur in women who have received certain chemotherapeutic agents such as alkylating agents or procarbazine.

SIDE-EFFECTS OF INDIVIDUAL CYTOTOXIC DRUGS

Adriamycin
Heart muscle damage, haematuria, hair loss, nausea, vomiting, mouth ulcers.

Anthracyclines
Cardiomyopathy.

Asparaginase
Anaphylaxis (allergic reaction), fever, malaise.

Bleomycin (or Blenoxane)
Alopecia, stomatitis, fever, skin reactions, nail ridging, pulmonary toxicity.

Carboplatin (or Paraplatin)
Nausea, vomiting, bone-marrow suppression, nephrotoxicity, liver function abnormalities, diarrhoea.

Chlorambucil
Myelo-suppression, amenorrhoea, azoospermia, CNS effects at high doses.

Cisplatin
Nausea, vomiting, diarrhoea, bone-marrow suppression, renal toxicity, neurotoxicity, ototoxicity, severe electrolyte abnormalities (hyponatremia, hypomagnesemia, hypocalcemia, hypokalemia), peripheral neuropathy.

Cladribine
May cause profound suppression of CD4 and CD8 lymphocytes, nausea, skin rash, fever, headache, myalgia, arthralgia.

Cyclophosphamide
Bone-marrow suppression, hair loss, nausea, vomiting, cystitis, haematuria.

Dacarbazine
Severe nausea and vomiting, flu-like feeling, malaise, diarrhoea, bone-marrow suppression.

Daunorubicin
Myelo-suppression, cardiac toxicity, nausea, vomiting, alopecia.

Doxorubicin
Nausea, vomiting, stomatitis, hair loss, bone-marrow suppression.

Epipodophyllotoxins
Neuro-toxicity (peripheral neuropathy).

Etoposide
Nausea, vomiting, hair loss, bone-marrow suppression.

Fludarabine
May cause profound suppression of CD4 and CD8 lymphocytes, nausea, vomiting.

5-Fluorouracil
Diarrhoea, mild nausea, stomatitis, bone-marrow suppression, painful, erythematous desquamation and fissures of palms and soles.

Ifosfamide
Bone-marrow suppression, nausea, vomiting, cystitis, renal toxicity.

Melphalan
Renal toxicity, nausea, vomiting, diarrhoea, hair loss, stomatitis, bone-marrow suppression, depression.

Methotrexate
Bone-marrow suppression, nausea, stomatitis, skin reactions.

Methotrexate (high dose)
Mouth ulcers, stomach ulcers, nausea, vomiting, bone-marrow suppression, renal toxicity.

Mitomycin-C
Nephrotoxicity, bone-marrow suppression.

Mitoxantrone
Mild nausea and vomiting, loss of appetite, mild hair loss, bone-marrow suppression.

Paclitaxel
Neuro-toxicity (peripheral neuropathy), myelo-suppression, nausea, vomiting, alopecia.

Pentostatin
May cause profound suppression of CD4 and CD8 lymphocytes.

Procarbazine
Food and drug interactions (it has a MAOI activity and patient should avoid beer, wine, fermented cheese, chocolate, fava beans and yeast extracts), myelo-suppression, nausea, vomiting, rash, hives, photosensitivity.

Taxol
Bone-marrow suppression, allergic reaction, neurological damage, nausea, vomiting, diarrhoea.

Thiotepa
Fatigue, nausea, vomiting, cystitis, dizziness.

Vincristine
Constipation, numbness, tingling, paraesthesia of hands and feet.

CHEMOTHERAPY SIDE-EFFECTS FROM THE POINT OF VIEW OF CHINESE MEDICINE

If we analyse the above side-effects, there are important differences between various cytotoxic drugs and one could conceivably formulate an individual Chinese herbal formula for each. However, one can identify common characteristics among the above side-effects. We can attempt to group the side-effects according to the Chinese pathological pattern induced by the various cytotoxic drugs. Looking at the side-effects of each drug, four patterns in particular stand out:

1. DEFICIENCY OF QI, BLOOD AND YIN

Hair loss, diarrhoea, nail ridging, bone-marrow suppression, malaise, fatigue, depression, loss of appetite, neurological damage, dizziness, constipation, numbness, tingling, paraesthesia of hands and feet.

2. ST-QI REBELLING UPWARDS
Nausea, vomiting.

3. STOMACH HEAT
Mouth ulcers, stomatitis, stomach ulcers.

4. BLOOD HEAT
Haematuria, fever, skin reactions, cystitis.

Thus, we can deduce from the analysis of the above patterns that cytotoxic drugs cause the following:

1. Qi, Blood and Yin deficiency (of Stomach, Lungs, Liver and Kidneys)
2. Stomach-Qi rebelling upwards
3. Stomach Heat
4. Blood Heat

The treatment principles to adopt are therefore (the herbs used are indicated in brackets):

Tonify Qi, Blood and Yin (Huang Qi *Radix Astragali*, Ren Shen *Radix Ginseng*, Ling Zhi *Ganoderma*, Mai Men Dong *Radix Ophiopogonis*, Dang Gui *Radix Angelicae sinensis*, Nu Zhen Zi *Fructus Ligustri lucidi*, Huang Jing *Rhizoma Polygonati*)

Subdue rebellious Stomach-Qi (Lu Gen *Rhizoma Phragmitis*, Ban Xia *Rhizoma Pinelliae preparatum,* Sha Ren *Fructus Amomi*)

Clear Stomach Heat (Lu Gen *Rhizoma Phragmitis*, Zhi Mu *Radix Anemarrhenae*)

Cool Blood (Mu Dan Pi *Cortex Moutan*)

ANALYSIS OF INDIVIDUAL HERBS IN *CHEMO-SUPPORT*

Huang Qi *Radix Astragali*: tonify Qi and raise immune response.

Ren Shen *Radix Ginseng*: tonify Qi.

Ling Zhi *Ganoderma*: tonify Qi and Blood and raise the immune response.

Huang Jing *Rhizoma Polygonati*: tonify Qi, nourish Yin and Jing.

Mu Dan Pi *Cortex Moutan*: cool Blood.

Zhi Mu *Radix Anemarrhenae*: clear Heat.

Fu Ling *Poria*: resolve Dampness.

Chen Pi *Pericarpium Citri reticulatae*: resolve Dampness, stop nausea.

Mai Men Dong *Radix Ophiopogonis* : nourish Yin.

Dang Gui *Radix Angelicae sinensis*: nourish Blood

Ban Xia *Rhizoma Pinelliae preparatum*: resolve Phlegm, subdue rebellious Stomach-Qi, stop nausea and vomiting.

Lu Gen *Rhizoma Phragmitis*: clear Stomach-Heat, stop vomiting.

Nu Zhen Zi *Fructus Ligustri lucidi*

Sha Ren *Fructus Amomi*: move Qi, resolve Dampness, stop nausea.

Gan Cao *Radix Glycyrrhizae uralensis*: harmonize.

PHARMACOLOGY OF *CHEMO-SUPPORT* INGREDIENTS

I shall report only the pharmacology of the above plants that is relevant to chemotherapy, immune function, inflammation, digestion or carcinoma. Thus, for each plant, there are many other pharmacological actions not reported below. These data are not available for all of *Chemo-Support*'s ingredients.

It should also be noted that such data are reported for reference only as they reflect a reductionist view of the action of herbs that is at variance with the Chinese medicine view. Some of the research studies reported present a doubly-reductionist view: firstly, they use single herbs and secondly, many of them use single constituents of a herb. By contrast, Chinese medicine uses only formulae composed of several herbs. It is a well-know fact that first of all, the action of a herb is more than the sum-total of the actions of its individual constituents and secondly, the synergistic action of the herbs within a formula is more than the sum-total of its individual herbs.

Furthermore, many of the studies reported are based on animal experiments which could be criticized on ethical grounds.

HUANG QI *Radix Astragali*

Constituents

2'4'-dihydroxy-5,6-dimethoxyisoflavone, kumatakenin, choline, betaine, polysaccharides, glucoronic acid, folic acid.

Pharmacology

1.Enhancement of immune function

The decoction given to mice increased the phagocytic activity of the reticuloendothelial system. Oral administration or nasal spray of Huang Qi offered protection against the common cold. Intraperitoneal administration of the polysaccharides from the root of *Astragalus membranaceus* antagonized the atrophy of immune tissues such as spleen, thymus and intestinal lymph nodes as well as leukopenia caused by immunosuppressant prednisolone in mice. Intraperitoneal administration of the homogeneous fraction of the polysaccharides astragalan I and II increased the weight and cell number of mouse spleen. Two months of oral treatment with the herb in subjects susceptible to common cold greatly increased the levels of SIgA and IgG in the nasal secretion.

2. Antibacterial effect
In vitro, Huang Qi was effective against *Shigella shigae, Bacillum anthracis, Streptococcus hemolyticus, Corynebacterium diphtheriae, Diplococcus pneumoniae, Staphyloccus aureus.*

3. Prevention of renal toxicity in chemotherapy
A double-blind trial of 49 patients undergoing chemotherapy showed that the decoction of Huang Qi *Radix Astragali* and Fu Ling *Poriae* markedly reduced the incidence of renal toxicity. Rats with experimentally-induced glomerulonephritis, when treated with Huang Qi had significantly less proteinuria than control groups as well as milder pathological tissue changes.

4.Effect on endurance
Decoction of Huang Qi given to mice significantly increased their endurance in swimming tests.

5. Endocrine effect in patients undergoing radiotherapy
In a randomized clinical trial, the plasma hydrocortisone level in stage II carcinoma of the cervix was observed. The average level in 18 patients before and after irradiation were 8.0 and 6.1 Fg/100ml, whereas the before and after levels were 9.5 and 9.1 Fg/100ml in patients who received a decoction of Huang Qi *Radix Astragali* and Nu Zhen Zi *Fructus Ligustri lucidi* for two months.

6. Anti-inflammatory effect
Intravenous dose of 5 mg/Kg or oral dose of 50 mg/Kg of astramembranin I inhibited the increase in vascular permeability induced by serotonin or histamine in rats.

7. Hepatoprotective effect
Intravenous administration of 10 mg/Kg of astramembranin I induced accumulation of cAMP in rabbit plasma.

REN SHEN *Radix Ginseng*

Constituents

Triterpene saponins, aglycone protopanaxadiol, aglycone protopanaxytriol, aglycone oleanolic acid, water-soluble polysaccharides, polyynes.

Pharmacology

Endocrine effect

Animal tests proved that ginseng stimulates the pituitary gland to increase the secretion of ACTH, which in turn stimulates the adrenal gland.

Effect on endurance

Mice administered a single extract of ginseng recorded a 132% increase in duration of swimming compared with a 179% increase in mice given the extract for 7 days.

Immunologic effect

Ginseng increases the function of the reticuloendothelial system. Administration to guinea pigs promoted antibody production against leptospira and influenza virus. The percentage of tumour-bearing mice and weight of the tumour decreased in mice bearing sarcoma S 180 and ARS following dosages of ginseng. Ginseng may also increase the activity and and reduce the toxicity of other anti-tumour agents.

Haematologic effect

Ginseng extract demonstrated protective and stimulant actions on bone marrow, increasing red and white blood cell numbers, and also hemoglobin in normal and anemic animals.

Effects on the nervous system

An intraperitoneal injection of 50mg/kg of Ren Shen for 5 days has a stimulating effect as it increases the amounts of dopamine and norepinephrine in the brain stem. However, Ren Shen solution 40% taken orally reacts as a sedative. Therefore, due to its dual effective nature, Ren Shen provides an adaptogenic effect for the body suffering various stresses.

LING ZHI *Ganoderma*

Constituents

Ergosterol, lysozyme, acid protease, amino-acids, polypeptides, saccharides, sterols, lactones, alkaloids and polysaccharides.

Pharmacology

1. Cardiotonic action. The tincture had a significant cardiotonic action on the isolated frog heart.

2. Action on coronary circulation. Injection of an extract given to dogs rapidly increased the coronary flow by 44%.

3. Regulation of immune function and inhibition of allergic reaction. Ling Zhi accelerated the clearance of I-labelled protein in the blood of albino mice, indicating its ability to enhance the phagocytic action of the reticuloendothelial system. The polysaccharide fraction of Ling Zhi markedly increased the phagocytic ability of abdominal macrophages of mice against chicken erythrocytes. These facts suggest that the polysaccharides can increase non-specific immunologic function of the body.

MU DAN PI C*ortex Moutan*

Constituents

Paenol, paenoside, pasenolide, paeniflorin, volatile oil and phytoesterol.

Pharmacology

1. Antimicrobial action

The decoction of the root showed strong antibacterial action *in vitro* against, *Bacillus subtilis, Escherichia coli, Salmonella typhi, Salmonella paratyphi, Proteus vulgaris, Staphylococcus aureus, Streptococcus haemolyticus, Doplococcus pneumonia* and *Vibrio cholerae*.

2. Anti-inflammatory action

Paenol given intragastrically inhibited swelling of rat paws induced by dextran. Paenol inhibited the increase of intra-abdominal capillary permeability of mice and cutaneous capillary permeability of guinea pigs caused by acetic acid. The methanolic extract, the glycosidic fraction and paenol inhibited blood platelet aggregation.

MU DAN PI C*ortex Moutan*

3. Hypotensive effect
The blood pressure of dogs with essential or renal hypertension was significantly reduced after oral administration of 5 g/Kg of the decoction of the root bark for 5 days and 10 g/Kg for two more days.

4. CNS effects
Intraperitoneal or oral administration of paenol decreased the spontaneous activity of mice, antagonized caffeine-induced hyperactivity and prolonged cyclobarbital-induced sleep.

FU LING *Poria*

Constituents

Beta-pachyman, machymic acid, ergosterol, choline, histidine, potassium salts.

Pharmacology

1. Antineoplastic effect

Pachymaran produced an inhibition rate of 96.88% against sarcoma in rats. Topical application of the methanolic extract of the herb (2 mg/100 ìl) significantly reduced the percentage of tumour-bearing mice and the number of tumours per mouse induced by DMBA plus TPA.

2. Effect on immune function

Oral administration increased phytohemagglutinin-induced lymphocyte transformation rate and increased serum IgG.

3. Effect of digestive system

The herb inhibited gastric ulcer provoked by pylorus-ligation and decreased gastric secretion and free acidity in rats. The herbs also protected rats against CCl4-induced hepatotoxicity, reducing GPT activity and preventing necrosis of hepatocytes.

CHEN PI *Pericarpium Citri reticulatae*

Constituents

Dlimonene, citral, hesperidin, neohesperidin, tangeretin, nobiletin, citromitin, 5-O-desmethylcitromitin, inositol, vitamin B1.

Pharmacology

1. Actions on the gastro-intestinal smooth muscles

The herb decoction inhibited the motility of the isolated small intestines of mice and rabbits.

2. Action against gastric ulcers

Daily injections of methylhesperidin for 6 days markedly reduced the incidence of ulcers and inhibited gastric secretions.

3. Anti-inflammatory action

Both hesperidin and methylhesperidin had vitamin P-like actions. Hesperidin inhibited the inflammatory reaction of croton oil granulation in rats. Intraperitoneal dose of 10 mg/Kg of hesperidin inhibited increased permeability caused by histamine in mice.

MAI MEN DONG *Radix Ophiopogonis*

Constituents

Ophiopogonins A, B, C, and D (steroid saponins), beta-sitosterol, amino-acids.

Pharmacology

1. Antibacterial action

The herb inhibits *Staphylococcus albus, Bacilus subtilis, Escherichia coli* and *Salmonella typhi*.

2. Immunologic effect

Intraperitoneal administration of 12.5 g/Kg of the herb to mice significantly increased the weight of the spleen and phagocytosis of the macrophages; it also counteracted the reduction in white cells due to cyclophosphamide.

3. Effects on blood glucose

Intramuscular administration of 1 ml/Kg of the 50% decoction of the herb increased blood glucose level in rabbits.

DANG GUI *Radix Angelicae sinensis*

Constituents

Ligustilide, n-butylidene phthalide, palmitic acid, beta-sitosterol, beta-sitosteryl palmitate, sucrose, vitamin B12, nicotinic acid, folic acid, folinic acid, biotin, vitamin A and E.

Pharmacology

1. Effect on coronary flow

Perfusion of the 2% fluid extract into the isolated heart of guinea pigs significantly dilated the coronary vessels and increased coronary flow.

2. Effect on platelet aggregation

The aqueous extract of the root and its ingredient ferulic acid inhibited rat platelet aggregation and serotonin release.

3. Effect on immune system.

The herb enhanced the phagocytic function of abdominal macrophages of animals.

4. Anti-inflammatory effect

The aqueous extract of the root decreased vascular permeability. The inhibitory activity in mice by oral administration was comparable to that of aspirin; like aspirin, it also inhibited the release of 5-HT and other inflammatory substances.

BAN XIA *Rhizoma Pinelliae preparatum*

Constituents

Methionine, glycine, beta- and gamma-aminobutyric acids, alkaloids l-ephedrine and trigonelline, phytosterol, glucoronic acid.

Pharmacology

1. Anti-emetic action

The stir-fried tuber had an anti-emetic action in emesis induced by morphine or digitalis. The decoction of the herb prevented early vomiting caused by deslanoside as well as emesis caused by orally-administered copper sulfate.

2. Anti-neoplastic action

The aqueous extract had a marked inhibitory action on animal tumours such as sarcoma, liver carcinoma and cervical carcinoma.

3. Anti-inflammatory action

The tuber has a PAF-antagonism effect due to the lignans.

SHA REN *Fructus Amomi*

Constituents

Essential oils, saponins, zinc, copper, iron

Pharmacology

Gastrointestinal effect

A low-level decoction of Sha Ren has been proved to stimulate the intestines of rats and rabbits. Sha Ren helps to relieve bloating, spasms and pains, and diarrhea

2. Effect on nausea

11 patients suffering from nausea were given 2 grams of powdered Sha Ren orally 3 times a day with good results.

Patients appetites have also been improved with Sha Ren

LU GEN *Rhizoma Phragmitis*

Constituents

Coixol, tricin, asparamide, D-xylose, L-arabinose, D-glucose, D-galactose, vitamins B1, B2 and C.

Pharmacology

1. Antibiotic effect

Decoctions of Lu Gen have shown an *in vitro* antimicrobial effect against beta-hemolytic *Streptococcus*.

ZHI MU *Radix Anemarrhenae*

Constituents

Timosaponin, mangiferin, sarsasapogenin, markogenin, neogitogenin, anemarns

Pharmacology

Antipyretic effect

Subcutaneous injection of the aqueous extract of the rhizone (4g/kg) decreased the body temperature of rabbits inoculated with *Escherichia coli*.

NU ZHEN ZI *Fructus Ligustri lucidi*

Constituents

Oleanolic acid, acetyloleanolic acid, betulin, lupeol, salidroside, mannitol, oleic acid, linoleic acid, palmitic acid.

Pharmacology

1. Incremental effect on white blood cells

The fruit increased white blood cells in leukopoenia due to chemotherapy or radiotherapy in mice.

2. Effect on immune function

The fruit promoted lymphoblast transformation and increased the number of cells with haemolytic plaques. The *in vitro* restorative effect of the aqueous extract of the herb was studied in cancer patients and in normal healthy donors. Using the local graft versus host (GvH) reaction as a test assay for T-cell function, the extract affected an immune restoration in 9 of 13 cancer patients with an increase in local GvH reaction from 32.3 / 36.1 mm3 to 118/ 104.9 mm3; these results suggest the herb contains powerful immune stimulants.

NU ZHEN ZI *Fructus Ligustri lucidi*

3. Antineoplastic action

The extract given by intragastric administration to mice gave a 49% inhibition rate against cervical cancer. The extract of the herb has been found to reverse tumour-associated macrophage suppression; these data suggest that the herb has cancer chemopreventive properties.

4. Effect on leukopenia

The injection of an extract of the fruit given once or twice daily could be used in cancer patients to prevent and treat leukopenia caused by chemotherapy.

5. Anti-inflammatory effect

Paw oedema in rats was inhibited by oral administration of 12.5 or 25 g/Kg of the decoction of the herb for 5 days.

HUANG JING *Rhizoma Polygonati*

Constituents

Flavonoid glycosides, cardiac glycosides, alkaloids, amino-acids, resin.

Pharmacology

1. Antibacterial effect

The decoction inhibited *Staphylococcus aureus* in vitro.

2. Effect on blood glucose

Oral administration of the extract of the herb to rabbits gradually increased blood glucose level but decreased it afterwards.

GAN CAO *Radix Glycyrrhizae uralensis*

Constituents

Triterpenes glycyrrhizin, flavonoids berniarin, umbelliferone, ferulic acid, sinapic acid, amino-acids, biotin, beta-sitosterol.

Pharmacology

1. Glucocorticoid-like action

Injection of glycyrrhizin in healthy subjects increased free cortisol levels in the blood. Intraperitoneal administration of a low dose of glycyrrhizin to rats caused atrophy of the thymus gland and increased weight of the adrenal gland suggesting a cortico-tropin-like action; in patients with mild Addison=s disease requiring daily intramuscular injection of 12.5 mg of cortisone, concurrent daily intramuscular dose of glycyrrhizin increased urinary free 17-hydroxycorticosterone and decreased the conjugated 17-hydroxycorticosterone.

2. Mineralocorticoid-like action

The extract reduced the urinary volume and sodium excretion and increased potassium excretion in various animal species.

3. Anti-inflammatory action
The anti-inflammatory effect of the herb resembles that of butazone or hydrocortisone; cotton pledget-induced granulation, formaldehyde-induced paw swelling and subcutaneous granulomatous inflammation in rats were all inhibited by glycyrrhetic acid.

4. Effect on the immune system
Glycyrrhizin inhibited egg-white-induced allergic reaction in guinea pigs. Glycyrrhizin inhibited the degranulation of mast cells elicited by the histamine liberation agent, Compound 48/80, so that it suppressed the release of the allergy mediators.

5. Anti-ulcer action
Injection of the herb extract produced significant inhibition of ulcers in albino rats, together with marked reduction in gastric juice and free acid. In many clinical studies on the use of Gan Cao for ulcers, the effectiveness was usually around 90%.

6. Anti-neoplastic action
Glycyrrhetinic acid inhibited the transplanted Oberling-Guerin myeloma in rats.

7. Effect on lipid metabolism
In rats with atherosclerosis, Gan Cao lowered cholesterol levels and stopped the progression of the lesions.

8. Antihepatotoxic effect
Oral administration of the extract of the herb showed hepatoprotective effects against carbon tetrachloride-induced cytotoxicity in rats; it markedly abated hepatic degeneration and necrosis, promoted the recovery of hepatocellular glycogen and ribonucleic acid and also lowered serum glutamic pyruvic transaminase. Glycyrrhizin and glycyrrhetic acid are able to prevent the development of cirrhosis.

The dosage during treatment indicated above should be adjusted according to the severity of the side-effects and the above dosage could be reduced or increased.

If the patient is receiving both chemo- and radio-therapy and is taking both *Chemo-Support* and *Radio-Support*, the dosage of each should be reduced. Adjustments can be made according to the patient's side-effects and timing of therapies in this situation by using a higher ratio of *Chemo-Support* during the days surrounding chemotherapy or when its side-effects are heightened. Similarly, the dosage of *Radio-Support* can be increased if the side-effects experienced from radiotherapy are more severe, or during the days surrounding the administration of radiotherapy.

Chemo-Support should be discontinued approximately four weeks after the end of the treatment when the condition should be reassessed and a different formula given. By contrast, *Radio-Support* should be continued for at least 6 weeks after the end of radiotherapy.

ACUPUNCTURE TREATMENT OF CHEMOTHERAPY SIDE EFFECTS

Fatigue

Ren-12 Zhongwan, ST-36 Zusanli, SP-6 Sanyinjiao, BL-20 Pishu, BL-21 Weishu.

Nausea, vomiting

Ren-13 Shangwan, P-6 Neiguan, ST-34 Liangqiu, ST-36 Zusanli.

In addition to acupuncture, the following massage technique is very effective to combat nausea and vomiting: apply a massage oil to the lower legs, make a loose fist with your hands, starting from ST-36, massage downwards along the Stomach channel using the knuckles of the index fingers all the way down to the ankle and then massage upwards along the Spleen channel using your thumbs.

This technique harmonizes the ascending and descending of Stomach- and Spleen-Qi, stimulating Stomach-Qi to descend and Spleen-Qi to ascend.

Alopecia
BL-17 Geshu (with direct moxa cones), ST-36 Zusanli, SP-6 Sanyinjiao, LIV-8 Ququan, BL-20 Pishu, BL-23 Shenshu. Add Shou Wu Pian or *Glorious Sea* to *Chemo-Support*.

Myelo-suppression
BL-17 Geshu (with direct moxa cones), BL-11 Dashu (with direct moxa cones), BL-20 Pishu, BL-23 Shenshu.

Stomatitis, mouth ulcers
ST-44 Neiting, L.I.-4 Hegu, L.I.-11 Quchi.

Cystitis
Ren-3 Zhongji, BL-63 Jinmen, BL-28 Pangguangshu, BL-32 Ciliao, SP-9 Yinlingquan.

Fever
L.I.-11 Quchi, KI-2 Rangu, Du-14 Dazhui.

Skin rash
L.I.-11 Quchi, SP-10 Xuehai.
Diarrhoea
ST-25 Tianshu, ST-37 Shangjuxu.

BIBLIOGRAPHY (of chemotherapy)

Perry M, Anderson C, Dorr V, Wilkes J, *The Chemotherapy Sourcebook*, Williams & Wilkins, Baltimore, Maryland, 1999.

Skeel R, *Handbook of Cancer Chemotherapy*, Williams & Wilkins, Baltimore, Maryland, 1999.

Zhu YP, *Chinese Materia Medica*, Harwood Academic Publishers, Amsterdam, 1998.

Bensky D and Gamble A, *Chinese Herbal Medicine Materia Medica*, Eastland Press, Seattle, 1993.

Chang H.M. and But P.P.Hay, *Pharmacology and Applications of Chinese Materia Medica*, World Scientific, Hong Kong, Vol. I, 1986.

Chen J K, Chen T T, *Chinese Medical Herbology,* Art of Medicine Press, City of Industry, CA, USA 2004.

CHEMO-SUPPORT: PROTOCOL AND DOSAGE

Chemo-Support works better if it is started some time before the beginning of chemotherapy and continued for about 4 weeks after the end. It is important to note that "during the treatment" means during the course of treatment, i.e. also in the days of break from the treatment. The dosage is as follows:

- Two weeks before the start of treatment: 3 tablets a day
- Four days before the start of treatment: 2 tablets twice a day
- During the treatment: 3 tablets three times a day (or more)
- After the end of treatment for 4-6 weeks: 2 tablets twice a day

It is best to take the tablets away from meals, i.e. about 1 hour before or after a meal, swallowed with hot water. The tablets should also be taken separately from other medication, at least 1 hour away.

If the patient feels very nauseous and finds it difficult to swallow the tablets, these could be crushed and powdered, immersed in a small amount of hot water with three slices of fresh ginger and the water sipped slowly.

The dosage during treatment indicated above should be adjusted according to the severity of the side-effects and the above dosage could be reduced or increased.

If the patient is receiving both chemo- and radio-therapy and is taking both *Chemo-Support* and *Radio-Support*, the dosage of each should be reduced. Adjustments can be made according to the patient's side-effects and timing of therapies in this situation by using a higher ratio of *Chemo-Support* during the days surrounding chemotherapy or when its side-effects are heightened. Similarly, the dosage of *Radio-Support* can be increased if the side-effects experienced from radiotherapy are more severe, or during the days surrounding the administration of radiotherapy.

Chemo-Support should be discontinued approximately 4-6 weeks after the end of the treatment when the condition should be reassessed and a different formula given. By contrast, *Radio-Support* should be continued for at least 6 months after the end of radiotherapy.

TESTIMONIALS

Patient testimonial

"In the past 2-1/2 years, I have been diagnosed with rectal cancer and liver cancer metastases. I am a 52-year old man. Throughout my treatment, which has been, to say the least, extremely challenging, I have received acupuncture treatments regularly to relieve the side effects of my chemotherapy and to help me heal from my surgeries.

However, although I have weathered my treatments pretty well, I was continuing to get more and more fatigued with foggy thinking and was beginning to have severe digestive issues.

My acupuncturist prescribed *Chemo-Support* to help me with these side effects. When I began to take it (in the weeks between my semi-monthly chemotherapy) I noticed almost immediately that I was able to think clearer and to feel stronger. In fact, with each subsequent chemo treatment I seem to be more resilient, having less severe reactions to those treatments with more restful sleep, no more digestive issues. My quality of life has improved tremendously overall, between the acupuncture and now, because of the Chemo-Support."
C.S.

Patient testimonial

67 year old WM retired physician

Onset of symptoms Spring 2001 [rectal bleeding + stool narrowing]

9/4/01 Diagnosis of large low lying Rectal Carcinoma.

Fall 2001 Radiation to pelvis and chemotherapy [Xeloda] [*Radio Support* + *Chemo Support* [3 bid] = no side effects, went to primary surgery strong.

12/5/01 primary surgery at Mayo Clinic, temp ileostomy, resting colo-anal anastomosis.

Spring 2002 post surgery chemo with 5FU-Leucovorin + *Chemo Support* = no side effects

6/2002 reduction of ileostomy, no complications.

Fall 2002 colo-anal anastomosis begins to fail; then 4 small [largest 1.1 cm] metastasis noted in lungs on routine follow up chest film.

Chemo with Oxaliplatin begun anastomosis fails, chemo stopped.

No chemo until fall 2003. Urgent rescue APR 6/1/2003 at UNC. Long difficult recovery and then retired from practice of medicine.

Additional and growing metastases noted in lungs [all lobes] and a rapidly growing met in R pole of Liver.

Xeloda begun = some stabilization of metastases [*Chemo Support* did prevent nausea, diarrhea].

Spring 2004 CyberKnife of enlarging R pole liver metastasis. For one year seemed to have worked, unfortunately the outermost rim survived and later regrew.

8/2004 began Avastin, Oxaliplatin, Xeloda as lung mets burgeoned to up to 2+ cm.[*Chemo Support* [3-4 bid] prevented nausea and diarrhea, nonetheless peripheral neuropathy, hand foot syndrome and cold intolerance were progressive, disease only stabilized and when neuropathy became intolerable switched off Oxaliplatin to Camptosar; retained Xeloda and Avastin.

June 2005 had antibody dermatological reaction to Avastin, DC'd, hand foot syndrome intolerable all chemo DC'd =chemo holiday [stopped *Chemo Support*]

8/2005 significant progression of disease [no Symptoms = increased tumor sizes and increasing CEA]

Began Camptosar, Erbitux, Celebrex [to replace Avastin] + *Chemo Support* 3-4 bid. = remarkable 90% debulking of tumors over 9 months.

June 2006 severe fatigue and malaise + evidence liver met was regrowing as thickening hollow ball led to "chemo vacation" and first of 2 RFA procedures on Liver met.

9/2006 PET scan [first] showed very active disease in lungs with regrowth back to previous bulk, chemo restarted.

Chemo now Erbitux, Camptosar, Xeloda in moderate doses plus Celebrex 400mg bid and initial Curcumin 2gm bid. *Chemo Support* 5 bid.

Some early regression, rapid onset of increasing fatigue malaise but no nausea nor diarrhea.

Recent increase of all Rx to maximal doses Xeloda 5/day, Curcumin 4 gm bid, IV drugs to max/meter squared. CEA dropped initially now creeping back up. Lung metastases regressed 40% on scan. Possible 3d RFA for remaining medial face of ball not yet killed off and growing. Fatigue and malaise deepening twice as fast as prior regimen, still no diarrhea nor nausea [weight stable over one year].

Patient

Positive notes: my oncologist believes my doubling of longevity to date [besides a strong constitution and indomitable will] is due to very long tolerance of chemo. Most other similar patients have unendurable diarrhea that limits use of the above drugs.

I believe *Chemo Support* directly prevents productive side effects [Yang? Sx] but does not help deficiency side effects [Yin? Sx].

Further note during the only two URI's I have had in 5 years while ill I was less ill [in terms of productive symptoms such as sneezing, coughing, runny nose, congestion] than my healthy relatives who had same viral illness. Also, I had a shorter course. Mostly felt fatigue malaise during URI. M.G., MD

Patient testimonial

In the past 2-1/2 years, I have been diagnosed with rectal cancer, liver cancer metastases, have had multiple surgeries including losing 75% of my liver -- and now inoperable lung metastases. I am a 52-year old man. Throughout my treatment, which has been, to say the least, extremely challenging -- I have received acupuncture treatments regularly to relieve the side effects of my chemotherapy and to help me heal from my surgeries.

However, although I have weathered my treatments pretty well, I was continuing to get more and more fatigued with foggy thinking and was beginning to have severe digestive issues.

Months and months ago my acupuncturist gave me a bottle of *Chemo-Support* to help me with these side effects -- and I have to say that for a very long time I did not take any. When I finally opened the bottle and began to take it (in the weeks between my semi-monthly chemotherapy) -- I noticed almost immediately that I was able to think clearer and to feel stronger. In fact, with each subsequent chemo treatment I seem to be more resilient, having less severe reactions to those treatments with more restful sleep, no more digestive issues. My quality of life has improved tremendously overall, between the acupuncture and now, because of the *Chemo-Support*. C.S.

Practitioner testimonials

"I have treated over twenty patients with *Chemo-Support* for an average of four to six months. I have observed and my patients have reported to find *Chemo-Support* beneficial for improving energy and in decreasing the side effects of nausea and vomiting."
L.P. Los Angeles, CA

"At [our] clinic we use both *Chemo-Support* and *Radio-Support* for many of our patients. I have definitely seen less fatigue in the women I have treated with *Chemo-Support*. They report that their energy and stamina are improved and there is less occurrence of anemia associated with chemotherapy. One of my patients was referred to me after she had undergone two rounds of chemotherapy. She was exhausted, very depressed, and felt very dry and depleted. She was on *Chemo Support* for the last round of therapy and she felt much less exhausted, her energy increased and she had fewer sensations of heat and night sweating."
R. G. San Francisco, CA

"I have been treating several women with breast cancer who have been undergoing chemotherapy. The patient who is taking *Chemo-Support* has had considerable improvement with her digestive function. Prior to taking *Chemo-Support*, she was suffering from burning, painful diarrhea which is no longer a problem. She is very pleased with her herbal treatment."
D. G. Wilmington, NC

"We find *Chemo-Support* to be beneficial in the initial treatment of Stage I and Stage II breast cancer, and especially in combination with other formulas (such as *Brocade Sinews* with *Chemo Support* for use with Taxol and *Glorious Sea* and *Chemo-Support* when using Navelbine). Along with acupuncture, *Chemo-Support* is helpful in supporting the Qi and helping the patient tolerate chemotherapy."
B. B. San Francisco, CA

Last October a female client of mine, age 65, told me that 6 months earlier she finished a chemotherapy treatment regarding a quite malignant tumor it had been diagnosed in her left breast.

Although chemotherapy was over when she came to me her blood tests still had been showing low level of red blood cells, around 3.000 units. I advised to take *Chemo Support*.

Just after a month she had been taking a dosage of 4 tablet daily, she had a new blood test, about 1.200 units higher than the previous one.

Besides that, her blood tests were in general much better, her internist was very satisfied. She was really happy and she asked me if she could continue with *Chemo Support*.

M. G.

RADIOTHERAPY AND *RADIO SUPPORT*

Introduction

Radiotherapy refers to the use of ionizing radiation to treat disease: this newsletter will focus specifically on the use of radiation to treat cancer. Ionizing radiation deposits energy that injures or destroys cells in the area being treated by damaging their genetic material and consequently preventing them from growing.

The success of radiation therapy depends on the delivery of an adequate dose to the entire tumour volume without causing severe damage to surrounding normal tissues; therefore, the radiation is aimed as accurately as possible at the tumour.

However, healthy cells will be inevitably affected causing the numerous side-effects of radiotherapy. The tolerance of healthy tissues to radiation is related to the volume irradiated, the nature and function of organs within that volume and the stage of cancer treated.

Sources and methods of radiotherapy

Over the last 20 years, the use of radium as a source of radiation has been replaced with artificial isotopes such as cobalt-60, caesium-137 and iridium-192.

Isotopes may be administered in the following ways:

- implanted directly into tissues (e.g. iridium needles in the treatment of carcinoma of the tongue).
- inserted into a cavity (e.g. caesium sources inserted into the uterus and vagina for the treatment of carcinoma of the cervix).
- systemically (e.g. iodine-131 in the treatment of thyroid cancer).

External beam radiation therapy: revolutionized in the 1950's, this method involves the use of linear accelerator machines to generate a stream of electrons which is accelerated to high speed by microwave energy before hitting a tungsten target. This interaction results in the emission of high-energy X-rays. It is thought that this method ensures the skin receives a lower dose of radiation than with other methods as the point of maximum dose is 1-2cms below the skin surface. It is used to treat localized cancers.

In external beam treatments, the maximum therapeutic effect is generally achieved by employing a practice called “fractionation”, where the total dose of radiotherapy is divided into small parts over several weeks.

Treatment planning and dosage
When planning a course of radiotherapy, the following three factors are taken into account:

• the size of the tumour: a larger number of fractions will normally be required to eliminate a larger tumour.

• tolerance of normal tissues: the total dose which can be applied to a tumour is limited by the tolerance of the surrounding normal tissue - this varies greatly between tissues.

• radiosensitivity of tumour cells: some tumour cells are more radiosensitive and others are more radio-resistant, as shown in the table below.

Highly radiosensitive	Moderately radiosensitive	Relatively resistant	Very resistant
Lymphomas	Breast cancer	Squamous cell lung carcinoma	Melanoma
Ewing's sarcoma	Small cell lung cancer	Hypernephroma	Osteosarcoma
Seminoma	Ovarian cancer	Bladder carcinoma	Pancreatic carcinoma
Wilm's tumour	Medulloblastoma	Rectal carcinoma	
Myeloma	Basal cell carcinoma	Soft tissue sarcoma	
	Teratoma	Cervical carcinoma	

When is radiotherapy used?
About four out of ten people with cancer have radiotherapy as part of their treatment. There are five main reasons why radiotherapy is given in the treatment of cancer:

• Curative or radical treatment - a modality of local control alternative to surgery. Radiotherapy may be indicated where a) it will give better functional or cosmetic results than surgery, b) in the case of very radiosensitive tumours c) in inoperable tumours, d) at sites where surgery carries a high rate of morbidity and e) in patients unfit for radical surgery.
• Palliative treatment - to relieve symptoms and reduce pain. The aim is to give sufficient treatment to relieve symptoms without short-term side-effects for as long as the patient is expected to survive.
• Neoadjuvant or induction treatment - *before* surgery to shrink a tumour or reduce the risk of it spreading during surgery.
• Adjuvant treatment - *after* surgery to kill off remnants of the tumour. It may be given to the site of the primary disease to reduce local recurrence or to sites of potential metastatic spread.
• Total Body Irradiation (TBI) - given to patients prior to a bone marrow transplant.

Radiation injury

The tissue penetrating power of high-energy X-rays and γ-rays means that normal tissues will be irradiated as well as the tumour. The important site of radiation damage is nuclear DNA. The damage appears to be induced indirectly.

The radiation first produces highly reactive radicals which in turn damage the DNA, impairing the reproductive integrity of the cell. The amount of cell death following exposure to irradiation is proportional to the dose administered.

There are certain tissues which are damaged acutely by relatively low doses of irradiation (the energy deposited in a tissue is measured in gray (Gy; 1 Gy = J/kg):

• *Bone marrow*: this can regenerate after exposure to 10Gy, but above this dose permanent aplasia may occur. The white count and platelet count begin to fall within 10 days of exposure.

• *Intestine*: doses of 10Gy or over cause severe loss of crypt cells leading to loss of villi and extensive ulceration.

• *Skin*: Erythema occurs at doses below 10Gy. At 20 Gy, the skin starts to desquamate and ulcerate.

• *Lung*: Above 10Gy in a single fraction, pneumonitis occurs and is increasingly severe with increase in dose.

Tissue	Immediate complications	Delayed complications
Skin	Erythema, desquamation	Fibrosis, telangiectasia, squamous carcinoma
Oral cavity	Mucosal ulceration	Loss of saliva
Gut	Nausea, diarrhoea	Fibrosis
Bone	Necrosis	Loss of bone growth in children
Kidney	Acute nephritis	Chronic nephritis, hypertension
CNS	Myelitis, encephalitis	Demyelination
Eyes	Conjunctivitis	Dry eyes, cataract
Gonads	Sterility	Sterility
Bone marrow	Leukopoenia	Suppression of haematopoiesis

The most frequently seen short-term side effects of radiotherapy, although they will vary depending on the area of treatment, are as follows:

- local necrosis
- pain
- inflammation
- local exudation with a burning feeling
- tiredness
- hair loss
- nausea and vomiting
- diarrhoea
- loss of appetite and weight
- shortness of breath
- difficulty in swallowing
- loss of taste or metallic taste
- cystitis

RADIOTHERAPY SIDE-EFFECTS FROM THE POINT OF VIEW OF CHINESE MEDICINE

Obviously side-effects vary depending on the area of the body which is treated. However, looking at the most common side-effects, we can attempt to group them according to the following Chinese pathological patterns:

1. *Deficiency of Qi, Blood and Yin* (of the Stomach, Spleen, Lungs, Liver and Kidneys)

Hair loss, diarrhoea, bone-marrow suppression, fatigue, loss of appetite, neurological damage, shortness of breath, loss of taste.

2. *Blood-Heat*

Skin reactions, cystitis, burning feeling, local necrosis.

3. *Blood stasis*

Pain, inflammation, local necrosis.

The treatment principles to adopt are therefore:

• Tonify Qi, Blood and Yin (Huang Qi *Radix Astragali membranacei*, Dang Gui *Radix Angelicae sinensis*, Shou Wu *Radix Polygoni multiflori*, Gou Qi Zi *Fructus Lycii chinensis*, Sheng Di Huang *Radix Rehmanniae glutinosae*, Wu Wei Zi *Fructus Schisandrae chinensis*, Yu Zhu *Rhizoma Poligonati odorati,* Zhi Mu *Radix Anemarrhenae asphodeloidis*)

• Cool Blood (Mu Dan Pi *Cortex Moutan radicis*, Sheng Di Huang *Radix Rehmanniae glutinosae*, Zhi Mu *Radix Anemarrhenae asphodeloidis*)

• Invigorate Blood (Mu Dan Pi *Cortex Moutan radicis*, Hong Hua *Flos Carthami tinctorii*, Dan Shen *Radix Salviae miltiorrhizae*).

Analysis of individual herbs in *Radio-Support*

- Huang Qi: tonify Qi and raise immune response
- Dang Gui: nourish Blood
- Hong Hua: invigorate Blood
- Dan Shen: invigorate Blood
- Shou Wu: nourish Blood
- Gou Qi Zi: nourish Blood
- Wu Wei Zi: nourish Yin
- Nu Zhen Zi: nourish Yin
- Zhi Mu: nourish Yin and cool Blood
- Mu Dan Pi: cool and invigorate Blood
- Sheng Di Huang: nourish Yin and cool Blood
- Yu Zhu: nourish Yin
- Chen Pi: resolve Dampness to balance the cloying effect of the Blood tonics
- Gan Cao: harmonize

Pharmacology of *Radio-Support* ingredients

I shall report only the pharmacology of the above plants that is relevant to radiotherapy, immune function, inflammation, digestion or carcinoma. Thus, for each plant, there are many other pharmacological actions not reported below. These data are not available for all of *Radio-Support*'s ingredients.

It should also be noted that such data are reported for reference only as they reflect a reductionist view of the action of herbs that is at variance with the Chinese medicine view. Some of the research studies reported present a doubly-reductionist view: firstly, they use single herbs and secondly, many of them use single constituents of a herb.

By contrast, Chinese medicine uses only formulae composed of several herbs. It is a well-known fact that, first of all, the action of a herb is more than the sum-total of the actions of its individual constituents and secondly, the synergistic action of the herbs within a formula is more than the sum-total of its individual herbs.

Furthermore, many of the studies reported are based on animal experiments which could be criticized on ethical grounds.

HUANG QI *Radix Astragali membranacei*

Constituents

2'4'-dihydroxy-5,6-dimethoxyisoflavone, kumatakenin, cholinc, betaine, polysaccharides, glucoronic acid, folic acid.

Pharmacology

. Enhancement of immune function

The decoction given to mice increased the phagocytic activity of the reticuloendothelial system. Oral administration or nasal spray of Huang Qi offered protection against the common cold. Intraperitoneal administration of the polysaccharides from the root of *Astragalus membranaceus* antagonized the atrophy of immune tissues such as spleen, thymus and intestinal lymph nodes as well as leukopenia caused by immunosuppressant prednisolone in mice. Intraperitoneal administration of the homogeneous fraction of the polysaccharides astragalan I and II increased the weight and cell number of mouse spleen. Two months of oral treatment with the herb in subjects susceptible to common cold greatly increased the levels of SigA and IgG in the nasal secretion.

. Antibacterial effect

In vitro, Huang Qi was effective against *Shigella shigae, Bacillum anthracis, Streptococcus hemolyticus, Corynebaccterium diphtheriae, Diplococcus pneumoniae* and *Staphyloccus aureus*.

. Effect on endurance

Decoction of Huang Qi given to mice significantly increased their endurance in swimming tests.

• Endocrine effect in patients undergoing radiotherapy

In a randomized clinical trial, the plasma hydrocortisone level in stage II carcinoma of the cervix was observed. The average level in 18 patients before and after irradiation were 8.0 and 6.1 µg/100ml, whereas the before and after levels were 9.5 and 9.1 µg/100ml in patients who received a decoction of Huang Qi *Radix Astragali membranacei* and Nu Zhen Zi *Fructus Ligustri lucidi* for two months.

. Anti-inflammatory effect

Intravenous dose of 5mg/Kg or oral dose of 50mg/Kg of astramembranin I inhibited the increase in vascular permeability induced by serotonin or histamine in rats.

DANG GUI *Radix Angelicae sinensis*

Constituents

Ligustilide, n-butylidene phthalide, palmitic acid, beta-sitosterol, bta-sitosteryl palmitate, sucrose, vitamin B_{12}, nicotinic acid, folic acid, folinic acid, biotin, vitamin A and E.

Pharmacology

. Effect on coronary flow

Perfusion of the 2% fluid extract into the isolated heart of guinea pigs significantly dilated the coronary vessels and increased coronary flow.

- Effect on platelet aggregation

The aqueous extract of the root and its ingredient ferulic acid inhibited rat platelet aggregation and serotonin release.

- Effect on immune system

The herb enhanced the phagocytic function of abdominal macrophages of animals.

- Anti-inflammatory effect

The aqueous extract of the root decreased vascular permeability. The inhibitory activity in mice by oral administration was comparable to that of aspirin; like aspirin, it also inhibited the release of 5-HT and

HONG HUA *Flos Carthami tinctorii*

Constituents

Red pigment carthamin, yellow pigments safflor yellow A, safflor yellow B, safflomin A, luteolin and 7-O-β-D-glucopyranoside, β-sitosterol and 3-O-β-D-glucopyranoside.

. Cardiovascular effect

Intravenous administration of 10mg/kg of the injection solution of the herb increased coronary flow by 60.4% in the *in situ* heart of dogs with catheterized coronary sinus.

. Anticoagulation effect

The alcoholic extract of the herb prolonged the clotting time of the blood, plasma recalcification time and serum thrombin time, and reduced serum prothrombin time of dogs. The alcoholic extract and decoction of the herb also inhibited rabbit or rat platelet aggregation induced by ADP and collagen.

. Effect on hypoxic endurance

In rats with acute hypoxic encephalopathy, daily oral dose of 0.5g of the alcoholic extract of the herb for 5 days and one intraperitoneal dose of 1g prior to operation resulted in a 83% survival rate whereas the survival rate in the control group was 30%. The pathology of ischemic damage was milder and recovery was faster in the medication group than in the control.

DAN SHEN *Radix Salviae miltiorrhizae*

Constituents

Tanshiones I, II_A and II_B, isotanshinones I and II, cryptotanshinone, isocryptotanshinone, methyl tanshinonate, hydroxytanshinone II_A, miltirone, 1-dihydrotanshinon I, salviol, protocatechuic aldehyde, protocatechuic acid, β-(3,4-dihydroxyphenyl) lactic acid, and vitamin E.

Pharmacology

. Effect on Coronary Circulation

In anaethetized dogs and cats, intravenous infusion of 3-4g/kg of the injection solution of the herb significantly increased coronary flow and reduced coronary resistance. At 4g/kg the coronary flow was increased by 70.47% and the resistance reduced by 46.4%.

. Anticoagulant and anti-platelet aggregation effects

In vitro experiments showed that the decoction of the herb was inhibitory on all three stages of the coagulation process. It transformed fibrinogen to fibirin which then degraded into FDP (fibrinogen degradation products). The ethanolic extract of the herb inhibited rabbit platelet aggregation induced by ADP r collagen. Tanshinone II_A sodium sulfonate inhibited ADP-induced platelet aggregation of the blood from coronary patients.

SHOU WU *Radix Polygoni multiflori*

Constituents

Emidon, physcion, chrysophanol, rhein, chrysolphanol anthrone, 2,3,5,4'-tetrahydroxystilbene 2-O-β-D-glucopyranoside and its 2"- and 3"-O-monogalloyl esters, 3-O-galloyl procyanidin B-2, catechin, epicatechin, 3-O-galloylcatechin, 3-O-galloylepicatechin, polygoacetophenoside, lecithin.

Pharmacology

. Immunologic and adrenocorticotropic effects

The herb significantly increased the weights of the thymus, peritoneal lymph node and adrenal gland of mice and potentiated the phagocytosis of murine peritoneal macrophages. It also antagonized the immuno-suppressive effect of prednisolone and leukocyte reduction due to prednisolone. The thymus atrophy and serum γ-glubulin reduction in mice were also blocked by administration of the herb. In adrenoprival mice, administration of the herb resulted in increase of hepatic glycogen.

. Antioxidant activity

The aqueous extract of the herb produced antioxidant activities both *in vitro* and *in vivo* as indicated by its ability to protect against carbon tetrachloride-induced hepatotoxicity in rats and to scavenge ferri-heme oxidants generated in an *in vitro* system. The antioxidant components were contained in the ethyl acetate fraction of the extract.

. Antibacterial action

In vitro studies showed that the herb was inhibitory againt *Mycobacterium tuberculosis* var. *hominis* and *Shigella flexneri*.

GOU QI ZI *Fructus Lycii chinensis*

Constituents

Betaine, dehydro-α-cyperone and solavetivone, polyene alcohols zeaxanthine, physalien and cryptoxanthine, β-Sitosterol and melissic acid, 1-O-β-D-glycopyranosyl-(2S, 3R, 4E, 8Z)-2-N-palmitoyloctadecasphinga-4,8-dienine and 1-O-β-D-glycopyranosyl-(2S,3R,4E,8Z)-2-N-(2'hydroxypalmitoyl)octadecasphinga-4,8-dienine,

Pharmacology

. Immunoregulating effects

Daily oral administration of 0.4ml of the 100% water extract of the fruit of *L. barbarum* for 3 days or one intramuscular injection of 0.1 ml of the 100% ethanolic extract significantly increased phagocytosis of the reticuloendothelial system of mice. In mice, *L. bararum* polysaccharides (LBP) at intraperitoneal dose of 5 or 10mg/kg increased T lymphocyte proliferation. At 5mg/kg it also enhanced the cytotoxicity of CTL and NK cells. The splenic plaque-forming cells (PFC) in aged mice were increased to a normal adult mouse level following intraperitoneal administration of 1-2mg/kg of LBP.

GOU QI ZI *Fructus Lycii chinensis*

. Adjuvant therapeutic effect on tumours

The herb showed synergistic actions with chemo- and radio-therapy and reduced their side effects. The inhibition of sarcoma W_{256} in rats by cyclophophamide (Cy) was augmented after oral dose of the aqueous extract of the herb and white cell reduction due to Cy was attenuated. In another experiment with mouse brain G_{422} tumour, combination of LBP with cranial irradiation of ^{60}Co and BCNU not only increased the life span of the tumour-bearing mice but also improved cellular immune functions.

• Hematopoietic effect

Oral administration of 0.5ml of the 10% decoction daily for 10 days promoted the hematopoiesis in mice, increasing the number of leukocytes. It also protected from leukocytogenesis-inhibition by cyclophosphamide. Three daily doses of 10mg/kg of LBP stimulated the proliferation of the bone marrow stem cells and increased the number of progenitors of granulocytes and macrophages of mice.

In 50 healthy subjects taking 50g of the herb daily for 10 days, the white cell count was significantly increased from 6446±2811 to 7143±2938. The same dosage given to 28 malignant cancer patients receiving chemotherapy increased the white cell count from 3909±310 to 6371±2500.

. Anti-peroxidation and anti-hepatotoxic effects

The herb showed inhibition on lipid peroxidation of RBC membrane induced by H-20-2. The effect of free radicals on the cells was prevented and reversed by incubation with LBP as shown by determining the changes in electrical parameters of the cell membrane of Xenopus oocytes. The resting membrane potential was raised, and the membrane resistance and time constant were decreased.

. Adjuvant cancer treatment

79 advanced cancer patients were treated with LAK/IL-2 combining with LBP. Initial results of the treatment from 75 valuable patients indicated that objective regression of cancer was achieved in patients with malignant melanoma, renal cell carcinoma, colorectal carcinoma, lung cancer, nasopharyngeal carcinoma or malignant hydrothroax.

WU WEI ZI *Fructus Schisandrae chinensis*

Constituents

Lignan compounds including schisandrol A and schisandrin B, citral, α- and β-chamigrene, and β-chamigrenal, citric acid, malic acid, tartaric acid, vitamin C, fatty oil.

Pharmacology

- Anti-hepatotoxic effect

Anti hepatotoxic effects of 22 lignans from Schisandra fruit were evaulated by utilizing $CC1_4$ and Ga1N-induced cytotoxicity in primary cultured rat hepatocytes as model systems. Prominent protective actions were found with wuweizisu C and schisantherin D against $CC1_4$-produced cytotoxicity. Deoxygomisin A, gomisin N, Wuweizisu C, gomisin C, and schisantherin D were effective in preventing Ga1N-induced cell damage.

. Respiratory Stimulation

Intravenous administration of the decoction of the herb produced respiratory stimulating effects in normal and anaesthetized rabbits and dogs. It increased both frequency and amplitude of respiration.

. Adaptogen-Like and Immune Regulation actions

The fruit can increase the resistance of the body against nonspecific stimuli. It decreased local oedema due to burns in mice and increased survival rate and survival time of the animals.

. Neurasthenia

The 40-100% tincture of the herb at 2.5ml twice to three times daily for a course of two weeks to one month alleviated or relieved insomnia, headache, dizziness, blurred vision, palpitation and nocturnal emission.

NU ZHEN ZI *Fructus Ligustri lucidi*

Constituents

Oleanolic acid, acetyloleanolic acid, betulin, lupeol, salidroside, mannitol, oleic acid, linolic acid, palmitic acid.

Pharmacology

. Incremental effect on white blood cells

The fruit increased white blood cells in leukopoenia due to chemotherapy or radiotherapy in mice.

. Effect on immune function

The fruit promoted lymphoblast transformation and increased the number of cells with haemolytic plaques. The *in vitro* restorative effect of the aqueous extract of the herb was studied in cancer patients and in normal, healthy donors. Using the local graft versus host (GvH) reaction as a test assay for T-cell function, the extract affected an immune restoration in 9 of 13 cancer patients with an increase in local GvH reaction from 32.3/36.1 mm^3 to 118/104.9mm^3; these results suggest the herb contains powerful immune stimulants.

. Antineoplastic action

The extract given by intragastric administration to mice gave a 49% inhibition rate against cervical cancer. The extract of the herb has been found to reverse tumour-associated macrophage suppression; these data suggest that the herb has cancer chemo-preventative properties.

. Effect on leukopenia

The injection of an extract of the fruit given once or twice daily could be used in cancer patients to prevent and treat leukopenia caused by chemotherapy.

. Anti-inflammatory effect

Paw oedema in rats was inhibited by oral administration of 12.5 or 25g/kg of the decoction of the herb for 5 days.

ZHI MU *Radix Anemarrhenae asphodeloidis*

Constituents

Timosaponins A_1, A_2, A_3, and A_4, timosaponins B_1, B_2, etc., sarsasapongenin, markogenin, neogitogenin, norlignans such as hinokiresinol and oxy-hinokiresinol, anemarans A-D, xanthone C-glucoside and mangiferin.

Pharmacology

. Antipyretic effect

Subcutaneous injection of the aqueous extract of the rhizome (4g/kg) decreased the body temperature of rabbits inoculated with *Escherichia coli*.

. Antimicrobial effect

The rhizome decoction showed in vitro inhibitory effect on *Bacillus dysenteriae, B. typhosus, B. paratyphosus, B. coli, B. proteus, B. diphtheriae, Vibro comma, Staphylococcus, Diplococcus pneumoniae, Streptococcus hemolyticus,* and *Candida albicans.*

. Effects on blood glucose

The aqueous extract of the herb could lower the blood glucose level in normal rabbits.

MU DAN PI *Cortex Moutan radicis*

Constituents

Paenol, paenoside, pasenolide, paeniflorin, volatile oil and phytoesterol.

Pharmacology

. Antimicrobial action

The decoction of the root showed strong antibacterial action *in vitro* aginst *Bacillus subtilis, Escherichia coli, Salmonella typhi, Salmonella paratyphi, Proteus vulgaris, Staphylococcus aureus, Streptococcus haemolyticus, Doplococcus pneumonia* and *Vibrio cholerae*.

. Anti-inflammatory action

Paenol given intragastrically inhibited swelling of rat paws induced by dextran. Paenol inhibited the increase of intra-abdominal capillary permeability of mice and cutaneous capillary permeability of guinea pigs caused by acetic acid. The methanolic extract, the glycosidic fraction and paenol inhibited blood platelet aggregation.

. Hypotensive effect

The blood pressure of dogs with essential or renal hypertension was significantly reduced after oral administration of 5g/Kg of the decoction of the root bark for 5 days and 10g/Kg for two more days.

- CNS effects

Intraperitoneal or oral administration of paenol decreased the spontaneous activity of mice, antagonized caffeine-induced hyperactivity and prolonged cyclobarbital-induced sleep.

GAN CAO *Radix Glycyrrhizae uralensis*

Constituents

Triterpenes glycyrrhizin, flavonoids berniarin, umbelliferone, ferulic acid, sinapic acid, amino-acids, biotin, beta-sitosterol.

Pharmacology

. Glucocorticoid-like action

Injection of glycyrrhizin in healthy subjects increased free cortisol levels in the blood. Intraperitoneal administration of a low dose of glycyrrhizin to rats caused atrophy of the thymus gland and increased weight of the adrenal gland suggesting a cortico-tropin-like action; in patients with mild Addison's disease requiring daily intramuscular injection of 12.5mg of cortisone, concurrent daily intramuscular dose of glycyrrhizin increased urinary free 17-hydroxycorticosterone and decreased the conjugated 17-hydroxycorticosterone.

. Mineralocorticoid-like action

The extract reduced the urinary volume and sodium excretion and increased potassium excretion in various animal species.

GAN CAO *Radix Glycyrrhizae uralensis*

. Anti-inflammatory action

The anti-inflammatory effect of the herb resembles that of butazone or hydrocortisone; cotton pledget-induced granulation, formaldehyde-induced paw swelling and subcutaneous granulomatous inflammation in rats were all inhibited by glycyrrhetic acid.

.Effect on the immune system

Glycyrrhizin inhibited egg-white-induced allergic reaction in guinea pigs. Glycyrrhizin inhibited the degranulation of mast cells elicited by the histamine liberation agent, Compound 48/80, so that it suppressed the release of the allergy mediators.

. Anti-ulcer action

Injection of the herb extract produced significant inhibition of ulcers in albino rats, together with marked reduction in gastric juice and free acid. In many clinical studies on the use of Gan Cao for ulcers, the effectiveness was usually around 90%.

. Anti-neoplastic action

Glycyrrhetinic acid inhibited the transplanted Oberling-Guerin myeloma in rats.

. Effect on lipid metabolism

In rats with atherosclerosis, Gan Cao lowered cholesterol levels and stopped the progression of the lesions.

. Antihepatotoxic effect

Oral administration of the extract of the herb showed hepatoprotective effects against carbon tetrachloride-induced cytotoxicity in rats; it markedly abated hepatic degeneration and necrosis, promoted the recovery of hepatocellular glycogen and ribonucleic acid and also lowered serum glutamic pyruvic transaminase. Glycyrrhizin and glycyrrhetic acid are able to prevent the development of cirrhosis.

CHEN PI *Pericarpium Citri reticulatae*

Constituents

Dlimonen, citral, hesperidin, neohesperidin, tangeretin, nobiletin, citromitin, 5-O-desmethylcitromitin, inositol, Vitamin B1.

Pharmacology

. Actions on the gastro-intestinal smooth muscles

The herb decoction inhibited the motility of the isolated small intestines of mice and rabbits.

. Action against gastric ulcers

Daily injections of methylhesperidinfor 6 days markedlly reduced the incidence of ulcers and inhibited gastric secretions.

. Anti-inflammatory action

Both hesperidin and methylhesperidin had vitamin P-like actions. Hesperidin inhibited the inflammatory reaction of croton oil granulation in rats. Intraperitoneal dose of 10mg/Kg of hesperidin inhibited increased permeability caused by histamine in mice.

YU ZHU *Rhizoma Poligonati odorati*

Constituents

Convallamarin, convallarin, odospiroside, polyfuroside and POD-II, or 3-O-β-glucopyranosyl-(1→2)-(β-D-xylopyranosyl-(1→3)-β-D-glucopyranosyl-(1→4)-galactopyranosyl-25(R)-spirost-5-en-3-β,14α-diol, quercetin glycoside, kaempferol, vitexin-2"-O-sophoroside, cosmosiin, vitexin, vitexin-2"-O-dlucoside, saponarin.

Pharmacology

. Immunostimulating effect

Oral administration of 10.4g/kg of the ethanolic extract of the herb to mice with burn injury markedly increased serum hemolysin level, stimulated antibody production and phagocytosis of the peritoneal macrophages. The hot water extract of the herb also stimulated phagocytes as measured with carbon clearance activity in mice.

. Effect on blood glucose

Intramuscular administration of 0.5g/kg of the macerate of the herb to rabbits increased blood glucose, but oral administration resulted in reduction of blood glucose after an initial increase. Oral dose of the macerate also decreased blood sugar levels in rats with diabetes induced by epinephrine, glucose or alloxan. In mice the methanolic extract of the herb produced anti-diabetic effect against epinephrine- or streptozotocin-induced hyperglycemia.

. Action on smooth muscles

The 20% decoction of the herb initially excited the isolated intestine of mice and inhibited it thereafter; it had a weak excitatory action on the isolated uteri of mice.

SHENG DI HUANG *Radix Rehmanniae glutinosae*

Constituents

Catalpol, ajugol, leonuride, aucubin, melittoside, rehmanniosides A-D (glycosides). E-feruloylajugol, Z-feruloylajugol, p-coumaroylajugol, p-hydroxybenzoylajugol, vanilloylajugol, 4-(α-L-rhamnopyranoxyloxy)-3-methoxybenzoylajugol (ajugol esters). Jioglutoside A and jioglutoside B (iridoid glycosides). Acetoside, isoacetoside, purpureaside C, echinacoside, castanosides A and F, rehmaglutins A-D, glutinoside, rehmaionosides A, B and C, rehmapicroside, β-sitosterol, mannitol, campesterol.

Pharmacology

. Effects on adrenocortical function and cortisol metabolism

The herb was able to stop the decrease of plasma corticosterone concentration due to administration of dexamethasone and prevent the adrenal cortex from atrophy.

. Anti-inflammatory and immuno-suppressive effects

Formaldehyde-induced oedema of rat paws subsided after oral administration of the decoction or alcoholic extract at the daily dose of 10g/kg for 5 days. At the oral dose of 100mg/kg, jionoside B and acetoside produced 36% and 18% suppression of hemolytic plaque forming cells in the spleens of mice. In the same test conditions intraperitoneal dose of 30mg/kg of cyclophosphamide had a 52.5% suppression.

SHENG DI HUANG *Radix Rehmanniae glutinosae*

. Effect on Hemorheology

The effects of the herb on the hemorheology of inflammatory, thrombosic and intact animals were examined. Oral administration of 200mg/kg of the 50% ethanolic extract of the herb inhibited the reduction of fibrinolytic activity and erythrocyte deformability, the decrease in erythrocyte counts and the increase in connective tissue of the thoracic artery in a chronic inflammatory model, adjuvant-induced arthritis.

. Antiradiation effect

The 100% injection solution of the root given intraperitoneally at 1ml daily for 6 days mitigated platelet damage in rats caused by 600 rad of γ-irradiation. The aqueous extract of the root inhibited in vitro fungi mentagrphyton, *Microsporum gypseum* and M. *audouini*. The decoction of the root showed protective effect in mice against $CC1_4$-caused liver intoxication. Oral or intraperitoneal administration of 10g/kg of the decoction or the alcoholic extract potentiated the hypnotic effect of pentobarbital sodium. Intraperitoneal dose of 20g/kg of the decoction or the alcoholic extract protected mice from hypobaric hypoxia.

DOSAGE AND PROTOCOL

Radio-support works better if it is started some time before the beginning of radiotherapy. As for the duration of the therapy, my ideas have changed on the basis of experience. Radiotherapy have very long-lasting consequences and I would say that *Radio-Support* should be taken for up to year after the end of radiotherapy.

It is important to note that "during the treatment" means during the course of treatment, i.e. also in the days of break from the treatment. The dosage is as follows:

- Two weeks before start of treatment: 2 tablets twice a day
- Four days before the start of treatment: 2 tablets three times a day
- During the treatment: 3 tablets three times a day (or more)
- After the end of the treatment: 1-2 tablets three times a day

It is best to take the tablets away from meals. i.e. about 1 hour before or after a meal, swallowed with hot water. The tablets should also be taken separately from other medication, at least 1 hour away. If the patient feels very nauseous and finds it difficult to swallow the tablets, these could be crushed and powdered, immersed in a small amount of hot water with three slices of fresh ginger and the water sipped slowly.

The dosage during treatment indicated above should be adjusted according to the severity of the side-effects and the above dosage could be reduced or increased.

If the patient is receiving both radio- and chemo-therapy and is taking both *Radio-Support* and *Chemo-Support*, the dosage of each should be reduced. Adjustments can be made according to the patient's side-effects and timing of therapies in this situation by using a higher ratio of *Radio-Support* during days surrounding radiotherapy or when its side-effects are heightened.

Similarly, the dosage of *Chemo-Support* can be increased if the side-effects experienced from chemotherapy are more severe, or during the days surrounding the administration of chemotherapy.

ACUPUNCTURE TREATMENT OF RADIOTHERAPY SIDE EFFECTS

Acupuncture used along side *Radio-Support* can further help to reduce the side-effects of radiotherapy. Furthermore, it has the additional advantage that it can be tailored to the specific side-effects of the individual patient. The following are suggested point combinations for specific symptoms and signs.

Fatigue

Ren-12 Zhongwan, ST-36 Zusanli, SP-6 Sanyinjiao, BL-20 Pishu, BL-21 Weishu, BL-23 Shenshu.

Nausea and vomiting

Ren-13 Shangwan, P-6 Neiguan, ST-34 Lianqui, ST-36 Zusanli. In addition to acupuncture, the following massage technique is very effective to combat nausea and vomiting: apply a massage oil liberally to the lower legs, make a loose fist with your hands, starting from ST-36, massage downwards along the Stomach channel using the knuckles of the index fingers all the way down to the ankle and then massage upwards along the spleen channel using your thumbs. This technique harmonizes the ascending and descending of Stomach- and Spleen-Qi, stimulating Stomach-Qi to descend and Spleen-Qi to ascend.

Loss of appetite
ST-36 Zusanli, SP-6 Sanyinjiao, BL-20 Pishu, BL-21 Weishu, Ren-12 Zhongwan.
Loss of taste
ST-36 Zusanli, SP-6 Sanyinjiao, BL-20 Pishu, BL-21 Weishu, Ren-12 Zhongwan, L.I.-4 Hegu.
Diarrhoea
ST-25 Tianshu, ST-37 Shangjuxu
Stomatitis, mouth ulcers
ST-44 Neiting, L.I.-4 Hegu, L.I.-11 Quchi.
Metallic taste
LIV-2 Xingjian, LIV-3 Taichong, L.I.-4 Hegu, L.I.-11 Quchi, Ren-12 Zhongwan.
Alopecia
BL-17, Geshu (with direct moxa cones), BL-11 Dashu (with direct moxa cones), BL-20 Pishu, BL-23 Shenshu.
Cystitis
Ren-3 Zhongji, BL-63 Jinmen, BL-28 Pangguangshu, BL-32 Ciliao, SP-9 Yinlingquan.
Fever
L.I-11 Quchi, KI-2 Rangu, Du-14 Dazhui.
Skin rash
L.I.-11 Quchi, SP-10 Xuehai.
Shortness of breath
LU-7 Lieque, LU-9 Taiyuan, BL-13 Feishu, Du-12 Shenzhu, BL-43 Gaohuangshu.
Difficulty in swallowing
Ren-23 Lianquan, L.I.-4 Hegu, LIV-3 Taichong.

BIBLIOGRAPHY (for radiotherapy)

Levitt S, Kahn F, Potish R, Perez C, *Technological Basis of Radiation Therapy*, Lippincott, Williams and Wilkins, Maryland 1992.

Souhami R, Moxham J, *Textbook of Medicine*, Churchill Livingstone, Edinburgh, 1994.

Zhu YP, *Chinese Materia Medica*, Harwood Academic Publishers, Amsterdam, 1998.

Chang H.M. and But P.P. Hay, *Pharmacology and Applications of Chinese Materia Medica*, World Scientific, Hong Kong, Vols. I and II, 1986.

Radiotherapy case history

A 66-year old woman had been given radiotherapy for bowel cancer 11 years previously. She now presented with vaginal bleeding and lower abdominal pain.

After tests, the diagnosis was that the damage from the radiotherapy had caused severe inflammation and necrosis and also caused the posterior wall of the uterus to adhere to the posterior abdominal wall.

This also caused infections.

I gave her:
Clear Empty Heat and Cool the Menses
Radio-Support