

# Treatment of Chemotherapy- and Radiation-Induced Toxicities, Part 2

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*Editor's Note:* This is the second article in a two-part series. [Part one](#), with a complete list of references, appeared in the February 2008 issue.

Chemotherapy and radiation are standard treatments for cancer in Western medicine. However, they are very toxic and affect numerous parts of the body. Many herbal formulas have been used with great success to alleviate the side effects of chemotherapy and radiation.

The information listed below is an abbreviated monograph from *Chinese Herbal Formulas and Applications* by John Chen and Tina Chen, to be published by Art of Medicine Press.

*Bu Zhong Yi Qi Tang* (Tonify the middle and augment the *qi* decoction)

Pinyin Name: *Bu Zhong Yi Qi Tang*

Literal Name: Tonify the middle and augment the *qi* decoction.

Alternate Names: *Pu Chung I Chi Tang (Wan)*, *Bu Zhong Yi Chi Tang (Wan)*, Interior-Nourishing and Qi-Increasing Decoction (Pill), Middle-Reinforcing and Qi-Benefiting Decoction, Ginseng and Astragalus Combination

Original Source: *Pi Wei Lun* (Discussion of the Spleen and Stomach) by Li Gao in 1249.

Composition:

<i>huang qi</i> (Radix astragali)	15-30 g
<i>ren shen</i> (Radix et rhizoma ginseng)	9 g
<i>bai zhu</i> (Rhizoma atractylodis macrocephalae)	9 g
<i>zhi gan cao</i> (Radix et rhizoma glycyrrhizae praeparata cum melle)	15 g
<i>dang gui</i> (Radix angelicae sinensis), <i>bei</i> (stone-baked) with liquor	6 g
<i>chen pi</i> (Pericarpium citri reticulatae)	6-9 g
<i>chai hu</i> (Radix bupleuri)	6-9 g
<i>sheng ma</i> (Rhizoma cimicifugae)	6-9 g

Dosage/Preparation/Administration

Coarsely grind the ingredients into powder and cook in two large bowls of water. Reduce to one large bowl. Take the warm, strained decoction between meals with the suggested doses. It may also be administered as pills, by taking 10-15 g of pills two to three times a day with warm, boiled water or ginger soup.

Chinese Therapeutic Actions

1. Tonifies the middle *jiao* and benefits *qi*.
2. Causes the *yang qi* to ascend and lifts prolapsed organs.

### Clinical Manifestations

1. Spleen and stomach *qi* deficiencies: Warm sensation in the body; spontaneous sweating; thirst with preference for warm drinks; shortness of breath; no desire to speak; fatigue; weakness of the extremities; pale complexion; loose stools; pale tongue with a thin white coating; and a surging, forceless pulse.
2. *Qi* deficiency with prolapse of organs: Prolapse of the rectum or uterus, chronic diarrhea or dysentery, *beng lou* (flooding and spotting), and conditions characterized by inability of *yang qi* to ascend.

### Clinical Applications

Weakness and debility after a severe illness, chronic fatigue syndrome, gastric prolapse, rectal prolapse, uterine prolapse, nephroptosis (renal ptosis), gastritis, nausea and vomiting, constipation, diarrhea, fever, leukopenia, compromised immunity, chronic bronchitis, common cold, dysuria, frequent urination, incontinence, seizure and epilepsy, myasthenia gravis, depression, excessive menstrual bleeding, leukorrhea, pernicious anemia, recurrent miscarriage, postpartum illnesses, postpartum anuria, male infertility, tinnitus, allergic rhinitis, cataract, chronic hepatitis, hepatoma and hepatocellular carcinoma.

### Explanation

The spleen and stomach, which are responsible for the transformation and transportation of food, are the source of *qi* and blood production. When these two organs become deficient, there will be fatigue and weakness of the extremities. Because of *qi* deficiency, the clear *yang* cannot ascend, leading to diarrhea and dysentery.

In severe cases of spleen and stomach deficiencies, *yang qi* may be unable to hold the organs in their normal position, leading to prolapse of the stomach, uterus and rectum. Furthermore, as *yang qi*, unable to ascend, sinks into *yin*, it causes feverish sensations, spontaneous sweating and a surging, forceless pulse. Thirst is the result of *qi* deficiency not being able to transport fluids to the upper parts of the body.

*Bu Zhong Yi Qi Tang* (Tonify the middle and augment the *qi* decoction) uses *huang qi* (Radix astragali) as the chief herb because it tonifies *zhong* (central) *qi* and causes the *yang qi* to ascend. It also strengthens *wei* (defensive) *qi* and protects the exterior. *Ren shen* (Radix et rhizoma ginseng), *bai zhu* (Rhizoma atractylodis macrocephalae) and *zhi gan cao* (Radix et rhizoma glycyrrhizae praeparata cum melle) strengthen the spleen, benefit *qi* and tonify the middle *jiao*. *Dang gui* (Radix angelicae sinensis) tonifies the blood and enhances the production of *qi*. *Chen pi* (Pericarpium citri reticulatae) regulates *qi* and harmonizes the stomach. It also prevents the tonic herbs from creating stagnation in the middle *jiao*. *Chai hu* (Radix bupleuri) and *sheng ma* (Rhizoma cimicifugae) cause *yang qi* to ascend and lift prolapsed organs.

### Contraindications

*Bu Zhong Yi Qi Tang* is contraindicated in patients with *yin* deficiency or interior heat. The dose of this formula should be small. This formula consists of sweet and warm tonic herbs, which tend to be heavy and immobile in nature. Thus, a large dose may actually defeat the purpose of causing *yang qi* to ascend. For the individual ingredients, it is important keep the dose of *huang qi* (Radix astragali) high to tonify *qi*, and the doses of *chai hu* (Radix bupleuri) and *sheng ma* (Rhizoma

cimicifugae) should be just sufficient to raise *yang qi*.

## Pharmacological Effects

**Immunostimulant:** Administration of *Bu Zhong Yi Qi Tang* has been associated with an immune-enhancing effect. According to one study, the formula was linked with increased T-lymphocyte count, elevated levels of IFN and IL-2, and increased NK cells and macrophage activity.<sup>24</sup> According to another study, *Bu Zhong Yi Qi Tang* enhances interleukin-18-induced cell-mediated immunity and may enhance host defense mechanisms against pathogens.<sup>25</sup>

**Anticancer:** In one study, *Bu Zhong Yi Qi Tang* was associated with a dose-dependent effect to inhibit the proliferation of human hepatoma cell lines (Hep3B, HepG2, and HA22T), but not normal human hepatocytes (Chang liver, CCL-13). The anti-cancer effect was attributed to the formula's ability to suppress the proliferation of hepatoma cells by inducing apoptosis via G0/G1 arrest.<sup>26</sup> Another study reported a marked prophylactic antitumor effect by enhancing the natural killer cell activity.<sup>27</sup>

**Radio-protective:** One study reported marked protective effects using *Bu Zhong Yi Qi Tang* in mice irradiated with high and low doses of gamma-rays. *Bu Zhong Yi Qi Tang* protected the jejunal crypts ( $p < 0.0001$ ), increased the formation of the endogenous spleen colony ( $p < 0.05$ ), and reduced the frequency of radiation-induced apoptosis ( $p < 0.05$ ). The study also noted that while the individual ingredients also have radio-protective effects, the formula as a whole is much more effective.<sup>28</sup>

## Clinical Studies and Research

**Leukopenia:** One study reported good results using modified *Bu Zhong Yi Qi Tang* in 80 patients (32 male, 48 female) with low white blood cell count. In addition to the base formula, modifications included *gu ya* (Fructus setariae germinatus) and *mai ya* (Fructus hordei germinatus) for poor appetite; *mai dong* (Radix ophiopogonis) and *wu wei zi* (Fructus schisandrae chinensis) for palpitations; and *cang zhu* (Rhizoma atractylodis) for damp. Of 80 patients, the study reported a marked effect in 70 patients ( $> 2.0 \times 10^9/L$  increase of WBC in 2 weeks); moderate improvement in four patients ( $1.0\text{-}1.9 \times 10^9/L$  increase of WBC in 2 weeks), and no benefit in six patients ( $<0.9 \times 10^9/L$  increase of WBC in 2 weeks).<sup>29</sup>

**Compromised immunity in elderly people:** Administration of *Bu Zhong Yi Qi Tang* was effective in improving immunological capacity in a group of elderly patients. Clinical improvements included significantly enhanced natural killer (NK) activity and serum IFN-gamma level. The treatment protocol was to administer 7.5g of the formula daily for at least 120 days.<sup>30</sup>

**Hepatoma:** Administration of *Bu Zhong Yi Qi Tang* had a dose-dependent effect to inhibit the proliferation of human hepatoma cell lines (Hep3B, HepG2 and HA22T). The same formula, however, did not significantly inhibit the proliferation of normal human hepatocytes (Chang liver, CCL-13) at a concentration under 5,000 mcg/mL. The mechanism of this action was attributed to suppressed proliferation of hepatoma cells via G0/G1 cell cycle arrest and inhibition of DNA synthesis followed by apoptosis.<sup>31</sup>

**Hepatocellular carcinoma:** In vitro studies have shown that *Bu Zhong Yi Qi Tang* is capable of increasing granulocyte colony-stimulating-factor (G-CSF) and tumor necrosis factor-alpha (TNF-alpha) production by peripheral blood mononuclear cells. This effect was also observed in healthy

volunteers. Because of this unique effect to stimulate the production of TNF-alpha and G-CSF and activate the biological defensive mechanism, the researchers stated that *Bu Zhong Yi Qi Tang* may be beneficial for patients with hepatocellular carcinoma.<sup>32</sup>

#### Treatment of Chemotherapy- and Radiation-Induced Toxicities

Mitomycin C-induced immunosuppression: Administration of mitomycin C, a chemotherapy agent for cancer, is often associated with immunosuppression and infectious diseases. One study reported that *Bu Zhong Yi Qi Tang* had beneficial effects in mice, with improvements in spleen weight, number of colonies of granulocytes and macrophages forming in the bone-marrow cells, natural killer activity in splenocytes, and in susceptibility to lethal herpes simplex virus type-1 infection.<sup>33</sup>

Cyclophosphamide-induced leukopenia: Administration of *Bu Zhong Yi Qi Tang* (1,000 mg/kg) in mice treated with cyclophosphamide significantly prevented leukopenia. *Bu Zhong Yi Qi Tang* enhanced the production of hematopoietic lymphokines, stimulated the proliferation of hematopoietic progenitor cells, and consequently accelerated recovery from leukopenia. *Bu Zhong Yi Qi Tang* also contributed a protective effect against bacterial infection by activating phagocyte cells.<sup>34</sup>

Radiation-induced hypotension: According to one study, 30 patients between 25-50 years of age who had worked in areas with high exposure to radiation, were treated for hypotension. The average blood pressure was 25 mmHg below normal. The patients were divided into three groups according to diagnosis of spleen *qi* deficiency, *qi* and *yang* deficiencies, and *qi* and *yin* deficiencies. Patients in all three groups received *Bu Zhong Yi Qi Tang* as the base formula. *Fu zi* (Radix aconiti lateralis praeparata) and *yin yang huo* (Herba epimedii) were added for those who had *qi* and *yang* deficiencies. *Sheng Mai San* (Generate the Pulse Powder) was added for those who had *qi* and *yin* deficiencies. After five days of treatment, the study reported marked improvement in 47 percent of patients, moderate improvement in 40 percent, and no improvement in 13 percent. Marked improvement was defined as subjective improvement of symptoms according to the patients with an objective increase in blood pressure of 15-24 mmHg, and moderate improvement was defined as no significant changes in subjective symptoms, but an increase of 15 mmHg of blood pressure.<sup>35</sup>

#### Toxicology

In an acute toxicology study, no fatality or abnormal reactions were noted in mice, following oral ingestion of the formula at the dose of 166 g/kg twice daily for three days.<sup>36</sup>

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