

## Clinical Studies on Asian Ginseng (*Panax ginseng* C.A. Meyer)

### Cancer Prevention

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Yun and Choi, 1998	Cancer prevention	P, CC n=4,587 (mean age 55.5 years)	5 years (1987–92)	Varied	Ginseng root soup (boiled 3 hours), fresh ginseng root extract, and other dosage forms	Intake of ginseng correlated with an overall 60% reduction in risk of dying of any type of cancer compared to non-users. Fresh ginseng extract showed the strongest protective effect, with 69% risk reduction compared to non-users. The risk of gastric and lung cancers was also reduced significantly (67% and 70% protection, respectively).
Yun and Choi, 1995	Cancer prevention	E, CC n=3,974 case control study on 1,987 pairs (average ages men=53.2 years, women=49.8 years)	67 weeks	Varied	Red ginseng root, white ginseng root powder, dried white ginseng extract, fresh white ginseng extract (brands not stated)	Relative risk of cancer in ginseng group was 50% lower than for non-users. Red ginseng users had the lowest risk. Subjects taking ginseng for one year decreased the rate of cancer incidence by 36% compared to 69% in those who used ginseng for 5 years or more. In those who had used ginseng less than 50 times in their lifetime the reduction was 45%, while those who had used ginseng over 500 times had a 72% reduction. Most protective against cancer of the ovaries, larynx, esophagus, pancreas, and stomach. No significant effect on breast, cervical, bladder, or thyroid cancer.
Yun and Choi, 1990	Cancer prevention	E, CC n=1,810 905 pairs, (average ages, men=51 years, women=48 years)	5 years	Varied	Red ginseng root, white ginseng root powder, dried white ginseng extract, fresh white ginseng extract (brands not stated)	Of the cases, 62% had history of ginseng intake compared to 75% of controls; 0.56 odds ratio (OR) ( $p<0.01$ ) of cancer in relation to ginseng intake. A dose-response relationship was observed. The higher the ginseng intake, the lower the risk of cancer. The extract and powder were found to be the most effective forms in reducing the OR.

### Diabetes

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Sotaniemi et al., 1995	Non-insulin-dependent diabetes mellitus (type 2)	DB, PC, R, MC n=36 type II diabetic patients; 3 parallel groups. Average age of 100 mg group=59 years, and 200 mg group=57 years	2 months	1 tablet/day containing 100 mg ginseng/day or 200 mg ginseng/day or placebo	Dansk Droge tablets containing 100 mg ginseng root or 200 mg ginseng root (ginseng composition not stated)	Compared with baseline, both ginseng groups experienced significant improvement ( $p<0.05$ ) in physical performance, mood, reduced fasting blood glucose levels, serum aminoterminal propeptide (PIIINP) of type 2 procollagen concentration; also experienced lowered glycated hemoglobin. But no improvement in memory or sleep. Hemoglobin A1c (HbA1c) significantly improved ( $p<0.05$ ) in patients receiving 200 mg ginseng daily.

### Fatigue/Ergogenic Effects

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Engels and Wirth, 1997	Maximal aerobic exercise	DB, PC n=36 healthy men, mean age 37 years, 3 parallel groups	8 weeks	2 or 4 capsules/day containing 100 mg extract each or placebo	Ginsana® G 115, 100 mg ginseng extract standardized to 4% ginsenosides	No significant effect on oxygen consumption, respiratory exchange ratio, blood lactic acid concentration, or heart rate ( $p>0.05$ ). Study does not support claims that ginseng extract is an ergogenic aid to support submaximal and maximal aerobic exercise.
Engels et al., 1996	Athletic performance parameters	DB, PC, R n=19 healthy women, 21–35 years, 2 parallel groups	8 weeks	2 capsules/day containing 100 mg extract each or placebo	Ginsana® G 115	Athletic performance parameters measured included maximal work performance, oxygen uptake, respiratory exchange rate, blood lactate, and heart rate during graded cycle ergometry test to exhaustion. No significant intergroup differences in any of the measured parameters ( $p>0.05$ ).
Le Gal et al., 1996	Functional fatigue	DB, PC, R n=232 age 25–60 years	42 days	1 capsule containing 40 mg ginseng extract G 115, 2x/day or placebo	Pharmaton® capsules	Compared to placebo, ginseng group noticed improvements in tested parameters including fatigue score at 21 days, but no significant differences noted until day 42 ( $p=0.023$ ).

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### Fatigue/Ergogenic Effects (cont.)

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Cherdrungsi and Rungroeng, 1995	Maximal oxygen uptake, leg muscle strength, body fat, resting heart rate	DB, PC n=41 healthy students, 4 parallel groups	2 months	150 mg extract, 2x/day with exercise or placebo with exercise	Asian ginseng extract (extract composition not stated)	Body fat significantly decreased in both ginseng groups compared with baseline ( $p<0.05$ ): subjects in the ginseng group without exercise improved maximal oxygen uptake, resting heart rate, and leg strength compared with the placebo group without exercise ( $p<0.05$ ).
Van Schepdael, 1993	Effect on physical capacity and endurance	DB, PC, CO n=43 male triathletes	20 weeks during training	1 capsule containing 100 mg extract, 2x/day	Ginsana® G 115	During first 10-week period, no significant changes were observed. In the second 10-week period, ginseng treatment appeared to prevent loss of physical fitness determined by measurement of oxygen uptake and oxygen pulse.

### Immunology

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Cho et al., 1997	HIV	O, C n=26 HIV-infected patients	40–57 months with follow-up period of 41–69 months	5,400 mg/day	Korean red ginseng root powder (brand not stated)	Markers including CD4+ T-cells, serum beta2-microglobulin, soluble CD8 antigen (sCD8), and ICD p24 antigen were measured every 6 months and compared to control group. The sCD8 significantly decreased ( $p<0.01$ ) in ginseng group. Study suggests that Korean red ginseng has definite long-term, immunomodulating effect without side effects on HIV-infected patients.
Srisurapanon et al., 1997	Immunomodulation parameters	DB, PC n=20 healthy men, age range 21–22, 2 parallel groups	2 months	3 capsules containing 100 mg extract/day	Ginsana® G 115	No significant intergroup differences in any tested parameters including total and differential leukocyte count, lymphocyte subpopulations CD3, CD4, CD8, CD4/8 ratio, CD19, CD25.
Scaglione et al., 1996	Immune response to flu vaccine	DB, PC, R, MC n=227 volunteers, mean age 48 years	3 months with an influenza vaccine at week 4	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G 115	Ginseng group experienced a significant immune response to flu vaccine with a significant rise in antibody levels and number of natural killer (NK) cells. Compared to placebo, ginseng group had significantly fewer ( $p<0.0001$ ) cases of common cold or influenza. Antibody titres ( $p<0.0001$ ) and NK cell activity ( $p<0.0001$ ) significantly higher in ginseng group.
Scaglione et al., 1990	Immunomodulatory effects	DB, PC, Cm n=60 healthy volunteers, 3 parallel groups	8 weeks	One, 100 mg capsule G115, 2x/day or one, 100 mg capsule PKC 167/79, 2x/day or placebo	Ginsana® G115 vs. PKC 167/79 (an aqueous ginseng extract) vs. placebo	After 8 weeks, blood samples from both ginseng groups showed significant increase in intracellular killing of polymorphonuclear leukocytes, phagocytosis, and total number of T3 and T4 lymphocytes compared with baseline and placebo, though a more significant and earlier response was seen in the G115 group. Authors concluded that ginseng extract stimulates the human immune system and that the standardized extract was more effective than the aqueous extract.

### Menopausal Symptoms

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Wickland et al., 1994	Quality of life of post-menopausal women	R, PC n=NA	4 months	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G 115	No major impact on vasomotor symptoms. Significantly superior to placebo in enhancing aspects of well-being: vitality, alertness, mood, and relieving somatic symptoms.
Reinold, 1990	Menopausal symptoms	O, PC n=49	3 months	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	Good to very good effects on headache, dizziness, adynamia, asthenia, depression, and sleep disturbances. Unwanted side effects did not arise from taking the preparation. No changes observed in speculum exams and cytological smears from the cervix and vaginal wall.

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### Psychomotor Response/Circulatory System

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Sørensen and Sonne, 1996	Effect on cognitive functions	DB, PC, R n=112 healthy volunteers (> 40 years), 2 parallel groups	8–9 weeks	400 mg extract/day or placebo	Gerimax®	Ginseng group had non-significant tendency to faster speed of simple reactions and significantly improved abstract thinking skills compared with placebo (p<0.02). No significant differentiation in concentration, memory, or subjective experience.
Smith et al., 1995	Effect on mood and perception	PC n=19 women, 2 parallel groups	2 months	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	No significant intergroup differences in tested parameters including mood profile and rating of perceived exertion after submaximal and maximal ergometer exercise.
Rosenfeld, 1989	Psycho-physical asthenia, depressive syndrome and neurological disorder	PC n=50 24 men, 26 women (mean age 39.7 years)	56 days, 2 week wash-out or placebo	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	G115® led to clinical improvement evidenced by the positive results of the psychometric tests used: Toulouettes (changes in total scores) (p<0.01); Wechsler-Bellevue test (intelligence and cognition function) (p<0.01); SCAG questionnaire (p<0.01).
Von Ardenne and Klemm, 1987	Oxygen status of human body in the elderly	C n=6 (venous), n=10 (arterial)	1 month	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	Increase in the resting pO <sub>2</sub> uptake and O <sub>2</sub> transport to the organs and tissues of the body from 100% before treatment to 129% after.
D'Angelo et al., 1986	Psychomotor performance	DB, PC n=32 healthy male volunteers (20–24 years old)	3 months	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	Compared to baseline, ginseng and placebo group experienced favorable effects on attention, processing, integrated sensory-motor function, and auditory reaction time. Significant intergroup differences (p<0.05) in favor of ginseng compared to placebo in mental arithmetic test.
Fulder et al., 1984	Mental performance	DB, PC, CO n=49 with depression and reduced abilities associated with elderly senescence	20 days (10 days ginseng, 10 days placebo, with 3-week wash-out period between)	1,500 mg dried root/day or placebo	Korean red ginseng root (brand not stated)	Small improvements were noted in mood and well-being. Based on analog scales, subjects reported increased energy and alertness, but slightly worse sleep and reduced happiness. However, highly significant improvements were seen in the most objective and accurate tests of the trial: reactivity, speed, and coordination at the tapping test, and the visual, auditory, and disjunctive reaction timer. The authors concluded that ginseng can increase function in senile individuals.
Forgo et al., 1981	Effect on mental and physical functions	DB, PC n=120 60 men, 60 women, Divided by sex (male vs. female) and age, 30–39 years vs. 40–60 years)	3 months	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	Significant difference between groups in favor of ginseng in self-assessment for women, ages 30–39 years (p=0.01). Significant changes in reaction capacity, pulmonary function, and self-assessment in patients ages 40–60 years. No significant difference in tests for mood, well-being, or general health.
Dörfling, 1980	Effects on physical and mental performance	DB, PC n=60 22–80 years	90 days	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	Improvements in reaction time to visual and auditory stimuli, coordination, respiratory quotients, and length of recovery phase.
Johnson et al., 1980	Effect on mental performance	DB, PC, Cm n=38	30 days	Approximately 2 g/day	Asian red ginseng root, or American ginseng root or eleuthero root (Siberian ginseng)	All 3 types of ginseng improved proofreading performance, while only Asian and American improved mood-fatigue. None significantly affected mathematical performance or final grade performance, nor did they affect urinary concentrations of catecholamines.

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### Reproductive System, Male

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Salvati et al., 1996	Fertility in men	O, C n=66 20 normal controls; 30 with idiopathic low sperm count, 16 with low sperm count due to varicocele	3 months	4,000 mg extract/day	Brand not stated	After 3 months, all 3 groups showed a rise in sperm count, total testosterone, sperm motility, free testosterone, and dihydrotestosterone (DHT) levels. Normal control subjects showed lowest increases. Prolactin levels fell in all 3 groups.
Choi et al., 1995	Erectile dysfunction	PC, Cm n=90 patients with erectile dysfunction	3 months	3 groups: 1,800 mg/day extract or 25 mg/day trazodone or placebo	Red ginseng extract (brand not stated), vs. trazodone or placebo	Compared to trazodone and placebo, ginseng caused significant improvements ( $p<0.05$ ) in parameters of rigidity and tumescence in erection, early detumescence, libido, and patient satisfaction. No significant changes found in frequency of coitus, premature ejaculation, or morning erection.

### Respiratory System

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Scaglione et al., 2001	Acute bacterial attacks of chronic bronchitis (ACB)	R, Cm, PS n=75 (44 completed study) patients with acute attacks of chronic bronchitis (ages >18 years)	9 days	Initially 875 mg amoxicillin and 125 mg clavulanic acid 2x daily for 9 days then one group received antibiotic with 100 mg standardized ginseng extract G115 2x daily, the other group received antibacterial treatment only.	Ginsana® G 115	Both groups responded positively to treatment. In ginseng group, bacterial clearance was significantly faster than in the subjects receiving antibacterials alone. Statistically significant differences between treatment groups were observed on days 4, 5, 6, and 7 ( $p=0.0049$ , $p=0.0104$ , $p=0.0175$ , $p=0.0182$ , respectively). Borderline trend seen on day 8 ( $p=0.0554$ ). Log rank test showed significant difference after analysis of time to clearance of infection ( $\chi^2=6.2127$ , $p=0.0127$ ). The authors concluded that due to the sample size, definitive conclusions could not be drawn, but the study suggests that patients with ACB may heal faster if ginseng is given with antibacterial treatment.
Gross et al., 1995	Severe chronic respiratory diseases	C, PS n=120 patients with severe chronic respiratory disease (mean age 67 years)	3 months	1 capsule containing 100 mg extract, 2x/day or placebo	Ginsana® G115	Improvement demonstrated in pulmonary functions, oxygenation capacity and walking capacity. Forced vital capacity increased from 32.1% to 72.8% ( $p<0.05$ ), forced expiratory volume from 34.75% to 47.3% ( $p<0.05$ ), and peak expiratory flow from 37.5% to 47.2% ( $p<0.01$ ). Distance walked in 6 minutes increased from 600 m to 1,123 m.
Scaglione et al., 1994	Chronic bronchitis	SB, PC n=40 patients with smoker's chronic bronchitis	2 months	1 capsule containing 100 mg extract/12 hours or placebo	Ginsana® G 115	Intracellular killing of alveolar macrophages increased significantly by the eighth week in the treatment group but not in the control group. The study concluded G115 restored and increased the activity of alveolar macrophages in patients with chronic bronchitis ( $p<0.001$ ).

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