Soy protein with isoflavones has favorable effects on endothelial function that are independent of lipid and antioxidant effects in healthy postmenopausal women.

Steinberg FM, Guthrie NL, Villablanca A, et al. *Am J Clin Nutr* 2003;78:123-130.

BACKGROUND: Controversy exists about the ability of soy protein and isoflavones to modulate vascular reactivity and biochemical cardiovascular disease risk markers in healthy, normolipidemic postmenopausal women. OBJECTIVE: The objective was to investigate whether the consumption of soy protein with isoflavones would result in improved vascular reactivity and decreased biochemical markers of endothelial dysfunction and inflammation, independent of enhanced lipid and antioxidant effects. DESIGN: Healthy postmenopausal women (n = 28) were enrolled in a randomized, double-blind, crossover study, and they consumed 25 g of 3 protein products/d for 6 wk each, with intervening washout periods. The products were isolated soy protein with isoflavones, ethanol-washed isolated soy protein with trace isoflavones, and total milk protein, which supplied 107, 2, and 0 mg total isoflavone (aglycone) units/d, respectively. We studied vascular function by using brachial artery reactivity values, plasma concentrations of vasoactive factors, endothelial inflammatory markers, and plasma isoflavone concentrations. The resistance of whole plasma and isolated LDL to copper-mediated oxidation was measured by conjugated diene formation. RESULTS: Postocclusion peak flow velocity of the brachial artery was significantly ($P = 0.03$) lower after treatment with isolated soy protein with isoflavones, which is consistent with a vasodilatory response, than after treatment with total milk protein. Plasma isoflavones and metabolites were significantly ($P < 0.01$) higher after treatment with isolated soy protein with isoflavones. There were no significant changes in biochemical cardiovascular disease risk markers or conjugated diene formation between the 3 dietary groups. CONCLUSION: Daily consumption of soy protein with isoflavones can result in positive vascular effects that are independent of lipid and antioxidant effects in healthy postmenopausal women.

Vitamin B-12 status, particularly holotranscobalamin II and methylmalonic acid concentrations, and hyperhomocysteinemia in vegetarians.

Herrmann W, Schorr H, Obeid R, Geisel J. *Am J Clin Nutr* 2003;78:131-136.

BACKGROUND: Vegetarians have a lower intake of vitamin B-12 than do omnivores. Early and reliable diagnosis of vitamin B-12 deficiency is very important. OBJECTIVE: The objective was to investigate vitamin B-12 status in vegetarians and nonvegetarians. DESIGN: The study cohort included 66 lactovegetarians or lactoovovegetarians (LV-LOV group), 29 vegans, and 79 omnivores. Total vitamin B-12, methylmalonic acid, holotranscobalamin II, and total homocysteine concentrations were assayed in serum. RESULTS: Of the 3 groups, the vegans had the lowest vitamin B-12 status. In subjects who did not consume vitamins, low holotranscobalamin II (< 35 pmol/L) was found in 11% of the omnivores, 77% of the LV-LOV group, and 92% of the vegans. Elevated methylmalonic acid (> 271 nmol/L) was found in 5% of the omnivores, 68% of the LV-LOV group, and 83% of the vegans. Hyperhomocysteinemia (> 12 micromol/L) was present in 16% of the omnivores, 38% of the LV-LOV group, and 67% of the vegans. The correlation between holotranscobalamin II and vitamin B-12 was weak in the low serum vitamin B-12 range ($r = 0.403$) and strong in the high serum vitamin B-12 range ($r = 0.769$). Holotranscobalamin II concentration was the main determinant of total homocysteine concentration in the vegetarians ($beta = -0.237$, $P < 0.001$). Vitamin B-12 deficiency led to hyperhomocysteinemia that was not probable in the upper folate range (> 42.0 nmol/L). CONCLUSIONS: Vegan subjects and, to a lesser degree, subjects in the LV-LOV group had metabolic features indicating vitamin B-12 deficiency that led to a substantial increase in total homocysteine concentrations. Vitamin B-12 status should be monitored in vegetarians. Health aspects of vegetarianism should be considered in the light of possible damaging effects arising from vitamin B-12 deficiency and hyperhomocysteinemia.

Could antioxidant supplementation reduce antiretroviral therapy-induced chronic stable hyperlactatemia?

Lopez O, Bonnefont-Rousselot D, Edeas M, et al. *Biomed Pharmacother* 2003;57:113-116.

Objective. - To determine if asymptomatic stable chronic hyperlactatemia in human immunodeficiency virus (HIV)-infected patients under highly active antiretroviral therapy (HAART, including nucleoside analog reverse transcriptase inhibitors (NRTI)) could be improved by antioxidant supplementation. Design. - To match two groups of patients taking NRTI for at least 24 months: 15 without and 15 with antioxidant supplementation (vitamin E, beta-carotene, N-acetylcysteine, selenium, Gingko biloba extracts and nutritional supplements). For both the groups, the supplementation by antioxidants or its lack was carefully assessed. Venous lactatemia, blood oxidative stress markers (plasma lipid peroxidation, enzymatic and non-enzymatic antioxidants), CDC revisited classification, CD4 count and viral load, NRTI (with or without stavudine) and other antiretroviral drugs used, lipoatrophy, central fat accumulation were assessed. Results - Patients were not statistically different with respect to the CDC classification, CD4 count, viral load and characteristics of antiretroviral therapy. Blood oxidative stress markers, i.e. vitamin E, vitamin A and beta-carotene tended to be higher in the supplemented group. The difference observed in venous lactate concentration between the two groups was significant (1.37 +/- 0.10 vs. 1.82 +/- 0.19 mmol/l in the supplemented and non-supplemented groups, respectively P = 0.04). Conclusion - Antioxidant supplementation improves the asymptomatic stable chronic hyperlactatemia observed in HIV-infected patients taking HAART including NRTI for a long time. Controlled studies are needed to demonstrate the efficacy of this supplementation on mitochondrial toxicity observed during HAART and the possible usefulness of its combination with mitochondrial cofactors like carnitine, riboflavine, coenzyme Q, alpha-lipoic acid.

Cholesterol-lowering effect of a theaflavin-enriched green tea extract: a randomized controlled trial.

Maron DJ, Lu GP, Cai NS, et al. *Arch Intern Med* 2003;163:1448-1453.

BACKGROUND: Tea consumption has been associated with decreased cardiovascular risk, but potential mechanisms of benefit are ill-defined. While epidemiologic studies suggest that drinking multiple cups of tea per day lowers low-density lipoprotein cholesterol (LDL-C), previous trials of tea drinking and administration of green tea extract have failed to show any impact on lipids and lipoproteins in humans. Our objective was to study the impact of a theaflavin-enriched green tea extract on the lipids and lipoproteins of subjects with mild to moderate hypercholesterolemia. METHODS: Double-blind, randomized, placebo-controlled, parallel-group trial set in outpatient clinics in 6 urban hospitals in China. A total of 240 men and women 18 years or older on a low-fat diet with mild to moderate hypercholesterolemia were randomly assigned to receive a daily capsule containing theaflavin-enriched green tea extract (375 mg) or placebo for 12 weeks. Main outcome measures were mean percentage changes in total cholesterol, LDL-C, high-density lipoprotein cholesterol (HDL-C), and triglyceride levels compared with baseline. RESULTS: After 12 weeks, the mean +/- SEM changes from baseline in total cholesterol, LDL-C, HDL-C, and triglyceride levels were -11.3% +/- 0.9% (P =.01), -16.4% +/- 1.1% (P =.01), 2.3% +/- 2.1% (P =.27), and 2.6% +/- 3.5% (P =.47), respectively, in the tea extract group. The mean levels of total cholesterol, LDL-C, HDL-C, and triglycerides did not change significantly in the placebo group. No significant adverse events were observed. CONCLUSION: The theaflavin-enriched green tea extract we studied is an effective adjunct to a low-saturated-fat diet to reduce LDL-C in hypercholesterolemic adults and is well tolerated.

Topical treatment of atopic dermatitis with St. John's wort cream – a randomized, placebo controlled, double blind half-side comparison.

Schempp CM, Windeck T, Hezel S, Simon JC. *Phytomedicine* 2003;10:S31-S37.

BACKGROUND: Recent investigations suggest an anti-inflammatory and antibacterial effect of hyperforin, which is a major constituent of Hypericum perforatum L. (Saint John's wort). OBJECTIVE: In the present half-side comparison study we assessed the efficacy of a cream containing Hypericum: extract standardised to 1.5% hyperforin (verum) in comparison to the corresponding vehicle (placebo) for the treatment of subacute Atopic Dermatitis. The study design was a prospective randomised placebo-controlled double-blind monocentric study. METHODS: In twenty one patients suffering from mild to moderate Atopic Dermatitis (mean SCORAD 44.5) the treatment with verum or placebo was randomly allocated to the left or right site of the body, respectively. The patients were treated twice daily over a period of four weeks. Eighteen patients completed the study. The severity of the skin lesions on the left and right site was determined by means of a modified SCORAD-index (primary endpoint). RESULTS: The intensity of the eczematous lesions improved on both sites of treatment. However, the hypericum-cream was significantly superior to the vehicle at all clinical visits (days 7, 14, 28) ($p < 0.05$). Skin colonisation with Staphylococcus aureus was reduced by both verum and placebo, showing a trend to better antibacterial activity of the hypericum-cream ($p = 0.064$). Skin tolerance and cosmetic acceptability was good or excellent with both the hypericum-cream and the vehicle (secondary endpoints). CONCLUSION: Taken together, the present study shows a significant superiority of the hypericum-cream compared to the vehicle in the topical treatment of mild to moderate Atopic Dermatitis. The therapeutic efficacy of the hypericum-cream, however, has to be evaluated in further studies with larger patient cohorts, in comparison to therapeutic standards (i.e. glucocorticoids).

Soy, isoflavones, and breast cancer risk in Japan.

Yamamoto S, Sobue T, Kobayashi M, et al. *J Natl Cancer Inst* 2003;95:906-913.

BACKGROUND: Although isoflavones, such as those found in soy, have been shown to inhibit breast cancer in laboratory studies, associations between consumption of isoflavone-containing foods and breast cancer risk have been inconsistent in epidemiologic studies. We evaluated the relationship between isoflavone consumption and breast cancer risk among women in the Japan Public Health Center-Based Prospective Study on Cancer and Cardiovascular Diseases (JPHC Study). METHODS: In January 1990, 21,852 Japanese female residents (aged 40-59 years) from four public health center areas completed a self-administered questionnaire, which included items about the frequency of soy consumption. Through December 1999 and 209,354 person-years of follow-up, 179 women were diagnosed with breast cancer. Cox proportional hazards regression was used to estimate the relative risks (RRs) and 95% confidence intervals (CIs) for breast cancer in relation to consumption of miso soup, soyfoods, and estimated isoflavones. All statistical tests were two-sided. RESULTS: Consumption of miso soup and isoflavones, but not of soyfoods, was inversely associated with the risk of breast cancer. The associations did not change substantially after adjustment for potential confounders, including reproductive history, family history, smoking, and other dietary factors. Compared with those in the lowest quartile of isoflavone intake, the adjusted RRs for breast cancer for women in the second, third, and highest quartiles were 0.76 (95% CI = 0.47 to 1.2), 0.90 (95% CI = 0.56 to 1.5), and 0.46 (95% CI = 0.25 to 0.84), respectively (P(trend) =.043). The inverse association was stronger in postmenopausal women (P(trend) =.006). CONCLUSION: In a population-based, prospective cohort study in Japan, frequent miso soup and isoflavone consumption was associated with a reduced risk of breast cancer.

Ginseng improves pulmonary functions and exercise capacity in patients with COPD.

Gross D, Shenkman Z, Bleiberg B, et al. *Monaldi Arch Chest Dis* 2002;57:242-246.

Ginseng is a root that has been used to treat patients with various illnesses for the last 2000 years. The purpose of this study was to evaluate the effects of Ginseng extract (G115) on Pulmonary Function Tests (PFTs), Maximum Voluntary Ventilation (MVV), Maximum Inspiratory Pressure (MIP) and Maximal Oxygen Consumption (VO2max) in patients with moderately-severe Chronic Obstructive Pulmonary Disease (COPD). Ninety-two adults were randomly divided into the experimental (n = 49, G115 100 mg bid for three months) and placebo-control (n = 43) groups. PFTs, MVV and MIP were studied before treatment and every two weeks for the 3-month-study period. Exercise test and VO2max measurements were performed before the beginning and after six weeks and three months. P lower than 0.05 was considered significant. Baseline demographics and pulmonary parameters were similar between the groups. In the experimental, but not in the control group, all parameters significantly increased above baseline and compared with the placebo group. Maximum increase, compared with baseline was FVC-32.5%, FEV1.0-27.0%, PEF-27.5%, FEF50-45.4%, FEF75-56.9%, MVV-40.4%, MIP-47.0% and VO2max-37.5%. No side effects were observed. G115 100 mg bid for three months, but not placebo, improved PFTs, MVV, MIP and VO2 max in patients with moderately-severe COPD with no side effects.

Coriolus versicolor polysaccharide peptide slows progression of advanced non-small cell lung cancer.

Tsang KW, Lam CL, Yan C, et al. *Respir Med* 2003;97:618-624.

BACKGROUND: Non-small cell lung cancer (NSCLC) is a leading cause of cancer deaths, and over 60% of patients present with advanced stages. Although polysaccharide peptides (PSP), isolated from the fungus Coriolus versicolor, have been reported to have anti-tumor effects, its clinical efficacy has not been properly evaluated. METHODS: Double-blind placebo-controlled randomized study to evaluate the effects of 28-day administration of PSP (Windsor Pharmaceutical, Hong Kong) on patients, who had completed conventional treatment for advanced NSCLC. RESULTS: Thirty-four patients, with no significant difference in their baseline demographic, clinical or tumor characteristics, or previous treatment regimes ($P>0.05$) were recruited into each of the PSP and control arms. After 28-day treatment, there was a significant improvement in blood leukocyte and neutrophil counts, serum IgG and IgM, and percent of body fat among the PSP, but not the control, patients ($P<0.05$). Although the evaluable PSP patients did not improve in NSCLC-related symptoms, there were significantly less PSP patients withdrawn due to disease progression, than their control counterparts (5.9 and 23.5%, respectively; $P=0.04$; OR 4.00). There was no reported adverse reaction attributable to the trial medications. CONCLUSION: PSP treatment appears to be associated with slower deterioration in patients with advanced NSCLC.

Effects of a betaine-containing toothpaste on subjective symptoms of dry mouth: a randomized clinical trial.

Rantanen I, Tenovuo J, Pienihakkinen K, Soderling E. *J Contemp Dent Pract* 2003;4:11-23.

Our aim was to study the effects of mildly flavoured sodium lauryl sulphate (SLS)-containing and detergent-free toothpastes with and without betaine (BET) on subjective symptoms of dry mouth in a randomised clinical trial. BET is an osmoprotectant that reacts with molecules to supply the surface with a water coating that protects cells from surfactants. Twenty-seven xerostomic patients and 18 healthy controls took part in the randomised, double-blind clinical trial with a crossover design. Three mildly flavoured toothpastes: (1) 4% BET, (2) 1% SLS and 4% BET, and (3) 1% SLS were used for six weeks each. The reference or washout paste contained neither SLS nor BET. The subjects' dental appointments were at the beginning of the trial and before and after the use of each toothpaste. At each appointment, the subjects were interviewed about subjective sensations of dry mouth (Visual Assessment Scoring (VAS) Index). The subjects did not report any adverse effects in connection with the use of the toothpastes. The VAS scores for lip dryness and eating difficulties were significantly lower for the BET paste (lip dryness: BET<BET+SLS; $p < 0.005$ and eating difficulties: BET<BET+SLS; $p = 0.02$; BET<reference; $p = 0.003$). The BET paste relieved dry mouth symptoms in 44% of the xerostomic patients, the corresponding figures for the other pastes being BET+SLS 22% ($p = 0.002$ as compared with BET), SLS 18% ($p = 0.022$), and reference 7% ($p = 0.000$). In conclusion, all the mildly flavoured toothpastes used in this study were well accepted by the xerostomic subjects. Thus, other toothpaste components may be more mucosa-irritating than just SLS, or else they enhance the effect of SLS. The detergent-free, BET-containing toothpaste appeared to be associated with relief of some symptoms of dry mouth.

Effect of eicosapentaenoic acid, an omega-3 polyunsaturated fatty acid, on UVR-related cancer risk in humans. An assessment of early genotoxic markers.

Rhodes LE, Shahbakhti H, Azurdia RM, et al. *Carcinogenesis* 2003;24:919-925.

Dietary omega-3 polyunsaturated fatty acids (omega-3 PUFAs) protect against photocarcinogenesis in animals, but prospective human studies are scarce. The mechanism(s) underlying the photoprotection are uncertain, although omega-3 PUFAs may influence oxidative stress. We examined the effect of supplementation on a range of indicators of ultraviolet radiation (UVR)-induced DNA damage in humans, and assessed effect on basal and post-UVR oxidative status. In a double-blind randomized study, 42 healthy subjects took 4 g daily of purified omega-3 PUFA, eicosapentaenoic acid (EPA), or monounsaturated, oleic acid (OA), for 3 months. EPA was bioavailable; the skin content at 3 months showing an 8-fold rise from baseline, $P < 0.01$. No consistent pattern of alteration in basal and UVR-exposed skin content of the antioxidants glutathione, vitamins E and C or lipid peroxidation, was seen on supplementation. Sunburn sensitivity was reduced on EPA, the UVR-induced erythemal threshold rising from a mean of 36 (SD 10) mJ/cm(2) at baseline to 49 (16) mJ/cm(2) after supplementation, $P < 0.01$. Moreover, UVR-induced skin p53 expression, assessed immunohistochemically at 24 h post-UVR exposure, fell from a mean of 16 (SD 5) positive cells/100 epidermal cells at baseline to 8 (4) after EPA supplementation, $P < 0.01$. Peripheral blood lymphocytes (PBL) sampled on 3 successive days both pre- and post-supplementation, showed no change with respect to basal DNA single-strand breaks or oxidative base modification (8-oxo-dG). However, when susceptibility of PBL to ex vivo UVR was examined using the comet assay, this revealed a reduction in tail moment from 84.4 (SD 3.4) at baseline to 69.4 (3.1) after EPA, $P = 0.03$. No significant changes were seen in any of the above parameters following OA supplementation. Reduction in this range of early markers, i.e. sunburn, UVR-induced p53 in skin and strand breaks in PBL, indicate protection by dietary EPA against acute UVR-induced genotoxicity; longer-term supplementation might reduce skin cancer in humans.

Hesperidin, a citrus flavonoid, inhibits bone loss and decreases serum and hepatic lipids in ovariectomized mice.

Chiba H, Uehara M, Wu J, et al. *J Nutr* 2003;133:1892-1897.

The purpose of this study was to examine whether hesperidin inhibits bone loss in ovariectomized mice (OVX), an animal model of postmenopausal osteoporosis. Forty 8-wk-old female ddY mice were assigned to five groups: a sham-operated group fed the control diet (AIN-93G), an OVX group fed the control diet, an OVX+HesA group fed the control diet containing 0.5 g/100 g hesperidin, and an OVX+HesB group fed the control diet containing 0.7 g/100 g alpha-glucosylhesperidin and an OVX+17beta-estradiol (E(2)) group fed the control diet and administered 0.03 micro g E(2)/d with a mini-osmotic pump. After 4 wk, the mice were killed and blood, femoral, uterine and liver were sampled immediately. Hesperidin administration did not affect the uterine weight. In OVX mice, the bone mineral density of the femur was lower than in the sham group ($P < 0.05$) and this bone loss was significantly prevented by dietary hesperidin or alpha-glucosylhesperidin. The Ca, P and Zn concentrations in the femur were significantly higher in the hesperidin-fed and E(2) groups than in the OVX group. Histomorphometric analyses showed that the trabecular bone volume and trabecular thickness in the femoral distal metaphysis were markedly decreased ($P < 0.05$) by OVX, and alpha-glucosylhesperidin significantly prevented this bone loss. Furthermore, hesperidin decreased the osteoclast number of the femoral metaphysis in OVX mice, as did E(2). Serum and hepatic lipids were lower in mice that consumed the hesperidin-containing diets ($P < 0.05$) than in the OVX group fed the control diet. These results suggest a possible role for citrus flavonoids in the prevention of lifestyle-related diseases because of their beneficial effects on bone and lipids.

A randomized placebo-controlled crossover trial with phytoestrogens in treatment of menopause in breast cancer patients.

Nikander E, Kilkkinen A, Metsa-Heikkila M, et al. *Obstet Gynecol* 2003;101:1213-1220.

OBJECTIVE: Phytoestrogens are popular in treatment of menopause, although scientific evidence is insufficient as to their efficacy. We studied the effects of daily use of isoflavonoids on climacteric symptoms and quality of life in patients with a history of breast cancer. METHODS: Sixty-two postmenopausal symptomatic women were randomized to use either phytoestrogen (tablets containing 114 mg of isoflavonoids) or a placebo for 3 months; the treatment regimens were reversed after a 2-month washout period. Fifty-six women completed the study. Menopausal symptoms were recorded on the Kupperman index and the visual analogue scale, and working capacity and mood changes were assessed via validated questionnaires. In addition, we followed the levels of phytoestrogens, follicle-stimulating hormone (FSH), luteinizing hormone (LH), estradiol, and sex hormone-binding globulin. Liver enzymes and creatinine were also assessed at each visit. RESULTS: The phytoestrogen regimen raised the circulating levels of phytoestrogens (daidzein, genistein, equol) 19- to 106-fold. The Kupperman index was reduced by 4.2 +/- 9.6 (mean +/- standard deviation) (15.5%) during phytoestrogen use and similarly by 4.0 +/- 8.1 (14.7%) during placebo use (P nonsignificant). The quality of life parameters (working capacity, mood changes) were unaffected by phytoestrogen. In addition, the phytoestrogen regimen caused no changes in FSH, LH, estradiol, or sex hormone-binding globulin. Phytoestrogen treatment was well tolerated and caused no changes in liver enzymes, creatinine, body mass index, or blood pressure. Of the 56 women, 25 (44.6%) preferred the phytoestrogen regimen, 15 preferred the placebo (26.8%), and 16 (28.6%) reported no preference (nonsignificant). CONCLUSION: Pure isoflavonoids did not alleviate subjective menopausal symptoms in breast cancer patients.

Combined efficacies of lipoic acid and meso-2,3-dimercaptosuccinic acid on lead-induced erythrocyte membrane lipid peroxidation and antioxidant status in rats.

Sivaprasad R, Nagaraj M, Varalakshmi P. *Hum Exp Toxicol* 2003;22:183-192.

One of the most intriguing phenomenon observed during lead toxicity has been attributed to lead-induced oxidative stress. The combined effect of DL-alpha-lipoic acid (LA) and meso-2,3-dimercaptosuccinic acid (DMSA) on lead-induced alterations in selected parameters, which are indicators of oxidative stress in erythrocytes, have been studied. Lead acetate (Pb, 0.2%) was administered in drinking water for 5 weeks to induce toxicity. LA (25 mg/ kg body weight per day i.p.) and DMSA (20 mg/ kg body weight per day i.p.) were administered individually and also in combination during week 6. Clinical evidence of toxic exposure was evident from the elevated blood lead levels (BPb) along with lowered levels of haemoglobin (Hb) and haematocrit (Ht). Lead-exposed animals showed enhanced membrane lipid peroxidation (LPO) in the erythrocytes. Damage to the erythrocyte membrane was evident from the decline in the activities of the transmembrane enzymes, viz., Na+, K(+)-ATPase, Ca(2+)-ATPase and Mg(2+)-ATPase. Lead-exposed rats also suffered an onslaught on the antioxidant defence system witnessed by lowered activities of catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPx) and reduced glutathione (GSH). Serum glutamic-oxoloacetic transaminase (SGOT) and serum glutamic-pyruvic transaminase (SGPT) were also elevated in lead-exposed rats. Treatment with either LA or DMSA reversed the lead-induced biochemical disturbances encountered by the erythrocytes, but combined treatment with LA and DMSA was very effective in mitigating all the parameters indicative of oxidative stress.

Corrections to *Alternative Medicine Review* 8(2)

In the article: Probiotics in Health Maintenance and Disease Prevention*, the following paragraphs were inadvertently omitted from the top of the second page of the article.*

Colonization

The protective and immune barrier of the human gastrointestinal (GI) tract is diverse. It includes the epithelial layer, the mucous layer, the mechanics of peristalsis and desquamation, and actions of secretory IgA, all of which impact bacterial attachment (Figure 1).[2] After attachment, colonic bacteria are prevented from mixing with the host's eukaryotic cells by the epithelial layer, which acts as a vital barrier to invasion.[16] The barrier's healthy structure and proper functioning are essential for the health of the human host. In this complex system, the delicate balance between the gastrointestinal tract and the microflora is cooperatively maintained.

The GI tract is sterile until an infant ingests vaginal and fecal microflora at delivery.[17] The population of microflora in the infant GI tract is further enhanced by feeding. The breast-fed infant contains a colon population of 90-percent Bifidobacteria with some Enterobacteriaceae and Enterococci present, but virtually no Bacteroides, Staphylococci, Lactobacilli, or Clostridia. In contrast, Bifidobacteria do not predominate in the bottle-fed infant. Breast-fed infants switched to cow's milk or solid foods colonize Bifidobacteria, Clostridia, Lactobacilli, Bacteroides, Streptococci, and enterics.[13]

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