

IN THIS EDITION

Soy & Health 2004 Clinical evidence & Dietetic Applications

This edition reports on the symposium 'Soy & Health 2004'.

This symposium gave delegates an overview of the most recent scientific advances in key areas of soy research. The key topics were: cancer, heart disease, 'diabesity', cognitive function and osteoporosis as well as emerging areas of research e.g. such as the role of lignans.

Research on the role of phytoestrogens (lignans and isoflavones) in food, was also conducted in the Phyto-Prevent study. The objective of this project was to study in depth the effects of food containing phytoestrogens on the development of breast and prostate cancers and the influence of individual variation in metabolism on cancer risk.

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SOY & HEALTH 2004 CLINICAL EVIDENCE DIETETIC APPLICATIONS

7th & 8th October 2004, Oud Sint Jan, Brugge, Belgium.
Dr Michele Sadler, MJSR Associates, UK.

This symposium provided an overview of many key areas of soy research and highlighted the most recent scientific advances. It also suggested the most promising areas where future research efforts need to be directed.



The key topics of soy and cancer, heart disease, 'diabesity' (type II diabetes concurrent with obesity), cognitive function and osteoporosis were covered,

as well as emerging research areas such as the role of lignans, anti-inflammatory effects, and early exposure to soy. In addition to the science, soy was considered in a wider context, including the dietary applications of soy and the future scenarios for the soy industry.

One of the most exciting hypotheses for the potential benefits of soy is that early exposure to soy foods may reduce the incidence of breast cancer in later life. The data to support this hypothesis were described as encouraging but currently limited and more studies are needed. If eventually substantiated, this hypothesis has greater implications for public health than any other purported benefits of soy.

Diabetes

The rapidly increasing prevalence of type II diabetes is another major public health concern particularly in view of the complications associated with the disease and the increased risk of other diseases such as cardiovascular disease. Studies in healthy postmenopausal

women show improved insulin resistance following ingestion of isoflavone-rich soy protein. A recent well-controlled trial examined the effects of soy phytoestrogens in 32 postmenopausal women with type II diabetes. Daily supplementation with 30g soy protein containing 132mg isoflavones for 12 weeks favourably altered fasting insulin, glycated haemoglobin, insulin resistance and glycaemic control. Together with reductions in serum total and LDL cholesterol the administration of soy resulted in overall improvements in cardiovascular risk profile in this high-risk group.

Osteoporosis

Promising new data in postmenopausal women have demonstrated a beneficial effect of isoflavone-rich soy milk on bone loss. In a 2-year intervention trial a preventive effect on lumbar spinal bone loss was reported in the treatment group receiving 500ml soy milk containing 80 mg isoflavones each day, compared with the control group given soy milk without isoflavones. This is the latest of eight intervention studies of at least 6 months duration using DEXA measurements as the endpoint. Though the treatment regimes and endpoints differ, and hence not all outcomes are consistent, the results nevertheless suggest that isoflavone-rich foods can prevent spinal bone loss in association with the menopause.



Cognitive function

A decline in cognitive function is a common complaint in post-menopausal women. A synthesis of the studies conducted to date suggests that treatment with soy for periods of 12 weeks to 6 months results in improved long-term memory. Improvement in short-term memory was marginally significant and potentially limited to a younger age group; the results also suggest that any benefit is less pronounced with longer treatments. There is also evidence that the executive functions of mental flexibility and planning may be improved with soy treatment. Attention, however is one area of cognitive function that does not appear to be improved by administration of soy. Further well-controlled studies are needed in this area.

The potential benefits of soy isoflavones against other menopausal symptoms and related health risks have been largely proposed from epidemiological evidence. However evidence from randomised double-blind studies is gradually coming through, and is suggestive of beneficial effects against hot flushes and vaginal dryness.

Obesity

With public health concerns currently focused on the ever-rising prevalence of obesity, is there any evidence to support a benefit of soy in weight control? One-year trials comparing the effects of high protein against high carbohydrate, low-fat weight-reducing diets tend to show a significantly greater weight loss at 6 months with high protein diets but this difference is no longer apparent by 12 months. However high protein diets are associated with better compliance. Five studies have compared the effects of animal with vegetable protein, and these show no significant differences on weight loss, satiety or renal health, but generally show improvements in serum cholesterol levels with soy versus animal protein. There is a need for longer-term studies to compare more fully the effects of animal versus soy protein.

Hypercholesterolemia

Health claims for a beneficial effect of 25g soy protein per day on serum cholesterol have been approved in both the USA and UK, based on consistent evidence that soy protein reduces serum cholesterol in hypercholesterolemic patients. The postulated mechanism for this effect is modulation of the LDL receptor pathway by soy proteins or specific peptides. Recent studies using advanced separation techniques have now demonstrated that a particular protein subunit from soy (α' of the 7S globulin) achieves an equivalent cholesterol-lowering effect to that of clofibrate. In an animal model, suggesting that this particular subunit is involved in the cholesterol lowering effect. Familial hypercholesterolemia (FHC) is one of the most common metabolic disorders in children, affecting 1:500. Diet is the cornerstone of treatment and needs to be started immediately on diagnosis. Conventional lipid lowering diets generally achieve 5-10% reduction in serum cholesterol depending on the particular metabolic defect. A study is currently underway looking at the inclusion of Alpro soy products in the diets of children with FHC. Data so far suggest the products were highly accepted with most children using them at least 6 times per week and there were no reported side effects. Preliminary clinical data suggest that there is an additional benefit of soy on reducing total and LDL cholesterol.

Prostate cancer

Prostate cancer mortality is lower in men living in Eastern countries than in men in the West, and soy isoflavones levels are higher in the plasma and prostatic fluid of Eastern vs Western men. Epidemiological studies suggest that the risk reduction associated with soy foods is about 40-50%, though not all studies have found an association. Other lines of evidence including human intervention studies, animal model data and in vitro studies also provide positive supportive data for a beneficial effect of soy, and this is a promising area of research.

Equol

Equol is a fermentation metabolite of daidzin produced in the human gut. It is superior in bioactivity than all the other isoflavones and has greater affinity for the estrogen receptor. Only 20-30% of Western adults produce equol, and evidence suggests that equol producers may show more favourable responses to diets containing soy-isoflavones compared with non-producers. Equol has been shown to exist in 2 isomeric forms. More than one bacterial species is thought to be involved in its production, and it has been demonstrated that the intestinal flora produces exclusively the S enantiomer.

Data from nutritional intervention studies in animals and humans suggest a potentially beneficial role for soy consumption in chronic kidney disease, and this is a promising new line of research. There is also evidence, from animal and human studies that soy may slow down the progression of inflammatory disease.

In practice

A key issue to gaining the benefits from soy is encouraging consumers to incorporate soy products into their diet. While the health claims clearly communicate that 25g soy protein per day is needed to achieve cholesterol lowering, this is a challenge for Western consumers as it requires an intake of approximately 3 servings of soy foods each day. Some of the experts suggested that regular intakes in the order of 10g soy protein per day may make a useful contribution to health, and that it is easier to incorporate this amount into the daily diet. Consumers are helped by the increasing range of tasty, ready prepared foods made with soy protein.

THE ROLE OF DIETARY PHYTO-ESTROGENS IN THE PREVENTION OF BREAST AND PROSTATE CANCER

PhytoPrevent, project n° QLK1 – 2000 – 00266.

The PhytoPrevent project was set up in order to study the effect of phyto-estrogens on the development on breast and prostate cancer and to make recommendation to the European population as to dietary changes leading to improving health. Further research is needed in order to fully explain how these food components contribute to improve health.

Food	isoflavones ⁽¹⁾	lignans ⁽²⁾	
Soy products			
	soy milk	☺☺	-
	soy cheese, tofu	☺☺☺	-
	soybased meat substitutes	☺	-
	soy yoghurts, soy desserts	☺☺☺	-
Grains, cereals			
	cereals (oat, wheat)	-	☺ ⁽⁴⁾
	brown rice	-	☺
	muesli	-	☺
	rye	-	☺ ⁽⁴⁾
Legumes			
	legumes (peas, beans)	☺	☺
	soybeans	☺☺☺	☺ ⁽³⁾
Nuts, seeds			
	peanuts	-	☺
	walnuts	-	☺
	hazelnuts	-	☺
	cashew nuts	-	☺
	linseed (flaxseed)	-	☺☺☺
	sesamseed	-	☺☺☺☺ ⁽⁴⁾
Bread			
	whole grain bread	-	☺
	rye bread	-	☺
Others			
	berries (lingonberry, strawberry, cranberry, blueberry)	-	☺ ⁽⁵⁾
	broccoli	-	☺ ⁽⁵⁾
	cauliflower	-	☺ ⁽⁵⁾
Source	isoflavones	lignans	
(1) Phytoestrogens and health – May 2003	☺☺☺☺ > 100 mg/100g	☺☺☺☺ > 50 mg/100g	
(2) L.K.Boker et al.; J.Nutr. 132:1319-1328, 2002 (secoisolariciresinol+matairesinol)	☺☺ > 5 mg/100g	☺ < 5 mg/100g	
(3) Penalvo et al; J Agric Food Chem 2004,52,4133-4138)(total lignans)	☺ < 5 mg/100g		
(4) PhytoPrevent data – in press (total lignans)			
(5) Mazur Pure&Appl Chem,1998,70(9) (secoisolariciresinol+matairesinol)			

FOCUS ON LIGNANS

Dr Michele Sadler, MJSR Associates, UK.

One of the talks at the Soy & Health 2004 conference in Bruges focussed on the less-researched area of lignans, and Jose Penalvo, (Helsinki, Finland) discussed **Lignans in Soy and in Isoflavone Supplements**. Lignans such as pinoresinol and lariciresinol are a minor component of soy.

The end products of the intestinal metabolism of lignans in humans include enterolactone and enterodiol and these compounds have estrogenic activity. This has led to the hypothesis for one potential mechanism explaining the positive association between the presence of enterolactone in human plasma and urine with lower incidence of certain types of cancer and CVD.

Dr Penalvo's group have analysed 5 samples of commercial soybeans and found lower concentrations of lignans than in rye, but more than in other legumes and cereals such as lentils, wheat, buckwheat and oat. Approximately 25% of lignans are modified or destroyed on processing.

However, analysis of 14 different soy-based supplements showed that the total concentration in the different samples was high. It was concluded that during the manufacture of protein isolates or isoflavone concentrates lignans are co-extracted and concentrated. This needs to be considered when explaining the beneficial effects of soy. Phyto-estrogens are thought to act through several ways on cancer.

RECENT PUBLICATIONS

Direct comparison of a dietary portfolio of cholesterol-lowering foods with a statin in hypercholesterolemic participants.

Jenkins DJ, Kendall CW et al.

Am J Clin Nutr. 2005 Feb;81(2):380-7.

Meta-analysis of the effects of soy protein containing isoflavones on the lipid profile.

Zhan S, Ho SC.

Am J Clin Nutr. 2005 Feb;81(2):397-408.

Lack of effect of isoflavonoids on the vagina and endometrium in postmenopausal women.

Nikander E et al.

Fertil Steril. 2005 Jan;83(1):137-42.

The novel targets for anti-angiogenesis of genistein on human cancer cells.

Su SJ et al.

Biochem Pharmacol. 2005 Jan 15;69(2):307-18.

Epub 2004 Nov 19.

Blocking effects of genistein on cell proliferation and possible mechanism in human gastric carcinoma.

Cui HB et al.

World J Gastroenterol. 2005 Jan 7;11(1):69-72.

Genistein activates the 3',5'-cyclic adenosine monophosphate signaling pathway in vascular endothelial cells and protects endothelial barrier function.

Liu D, Jiang H, Grange RW.

Endocrinology. 2005 Mar;146(3):1312-20. Epub

2004 Dec 9.

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