

## **Phytoestrogens and breast cancer**

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While around five per cent of breast cancers occur because of inherited genetic defects, the development of most breast cancers is influenced by a variety of environmental factors. There is a large body of evidence to indicate that our diet, and probably our diet from an early age, plays an important role. What it is in the diet, however, is not well understood. For many years it was thought that dietary fat was the key factor but this has now been largely disproven, and the search has moved on to other components of the diet which might influence tumour development. One such group of bioactive substances is phytoestrogens.

Phytoestrogens are compounds that have an oestrogen-like action and are found in plants - "phyto" meaning plant in Greek. They are widely distributed in plant foods, particularly legumes, grains, fruit and vegetables. The first plant extracts were reported to have oestrogenic properties in 1926. Their role in disease first became apparent in Western Australia in the 1940s when new clovers were introduced to pastures. Subsequent infertility in ewes devastated the sheep industry and research identified high concentrations of phytoestrogens in the new clovers as the cause<sup>1</sup>.

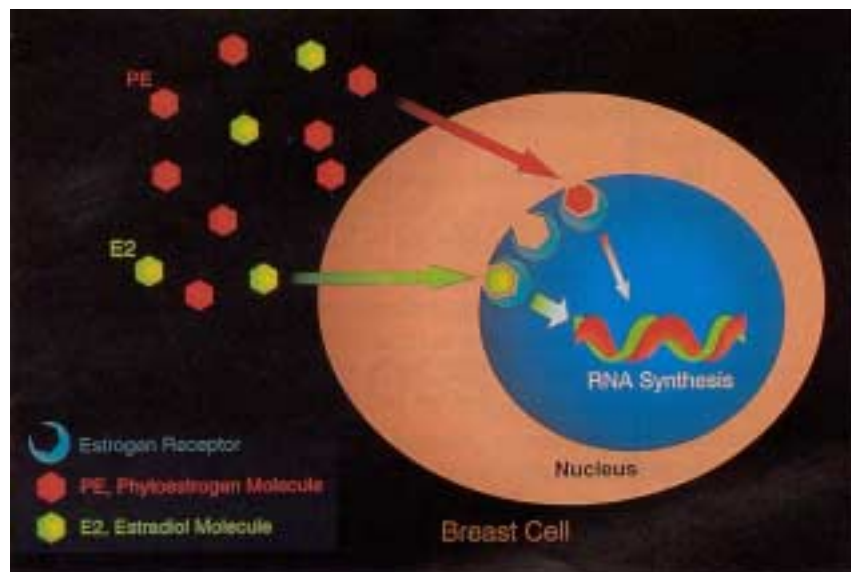
There are two predominant groups of phytoestrogen - the lignans and the isoflavonoids - both with similar chemical structures to the steroid hormones. The main lignans are localised in the outer fibre layers of grains. The main isoflavonoids are mostly found in legumes, especially soy and clover. When eaten, they undergo metabolism by bowel microflora. Antibiotics reduce their metabolism and hence absorption.

Western populations generally have a low consumption of phytoestrogens because milling of grain eliminates the lignan-containing fibre, and because of low levels of consumption of soy products.

Several epidemiological studies have shown that consumption of a phytoestrogen-rich diet in the form of soy results in a reduced risk of breast cancer. A Singaporean study showed that women consuming a high proportion of protein as soy had a markedly reduced risk of breast cancer<sup>2</sup>, a prospective cohort study of Japanese women demonstrated an inverse relation for breast cancer and consumption of miso<sup>3</sup>, and a case control study of Asian-Americans found the risk of breast cancer decreased with increasing intake of tofu<sup>4</sup>.

We have published results of a large study that demonstrated that women who had a high excretion of phytoestrogens had a significant reduction in breast cancer risk. We collected urine samples from 288 women, with matched pairs of breast cancer cases and controls. Phytoestrogen assay (before treatment) demonstrated that both lignan and isoflavone excretion was threefold lower in the breast cancer cases<sup>5</sup>. This study differed from previous studies in that it was the first large study of a Western population with a low level of soy consumption, rather than an Asian population. It was also the first study to measure excretion of phytoestrogens rather than estimating intake of phytoestrogen-containing foods, this being a much more accurate index of intake and metabolism. There have been several subsequent similar, although smaller, studies which have supported our data. A Chinese case-control study of 120 women found similar results<sup>6</sup>, as did a small Melbourne study of 28 women<sup>7</sup> and an as yet unpublished nested case-control Dutch study.

Some authorities suggest phytoestrogens might be harmful from a breast cancer point of view because in cell culture some stimulate breast cancer cell growth. The evidence from human studies however, suggests they are protective and a possible mechanism of protection is demonstrated in the diagram below.



It is likely that there is no one dietary factor responsible for breast cancer development but rather a complex interaction of many consumed substances and their metabolites. I expect that phytoestrogens fit into this jigsaw, contributing to the protective role played by a high intake of vegetable matter.

### References

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