THE POTENTIAL ADVERSE EFFECTS OF SOYBEAN PHYTOESTROGENS IN INFANT FEEDING

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It is well established that soybean products contain the phytoestrogens daidzein and genistein.[1-3] We have measured the levels of these compounds in several soy-based infant formulas available in New Zealand. The quantities recommended by manufacturers for infant feeding provide an intake (per kg body weight) of approximately three to five times as much daidzein and genistein than amounts which disrupt the menstrual cycle when fed to pre-menopausal women[4]. Exposure to phytoestrogens during soy-formula feeding is cause for considerable concern given the greater susceptibility of neonates to oestrogens and the likely duration of exposure through infancy.

The soy phytoestrogens act by: 1) Inhibiting the enzyme 17-□-hyroxysteroid oxidoreductase, type 1, which converts the relatively impotent oestrone to the much more potent oestradiol; 2) Occupying the oestrogen receptor, thus acting as antagonists to the naturally-produced oestradiol, inhibiting its effects (this behaviour is similar to that of another oestrogen agonist-antagonist, tamoxifen).[4] The consequent reduction in oestrogenic action appears to have a useful prophylactic effect against many oestrogen-dependent disorders in adults, including mammary and prostatic tumours.[5] However, the same effect is deleterious in infants. Considerable research has shown that adequate oestradiol is necessary for the imprinting and development of many physical, physiological and behavioural characteristics during the neonatal period and infancy.[6-7] Any decrease in the amount of oestradiol available is potentially harmful. Unfortunately, no specific research has investigated the effects of soy on these characteristics in the human infant, although it has been shown that phytoestrogens are absorbed similarly in infants and adults.[8]

It has been claimed that soy-formulas are unlikely to cause harm to infants because they have been used for years without adverse reports (O'Regan, personal communications, 1 February 1995). However, another oestrogen, diethylstilbestrol (DES), was administered extensively to women over three decades before the spectrum of harmful effects appeared, some manifesting themselves only when DES offspring reached adulthood.[9] Furthermore, although many women have consumed soy products without reports of problems, when a definitive experiment was conducted, consumption of 60g of soy protein per day for one month disrupted the menstrual cycle during, and for up to three months after, administration.[4] Therefore the argument that no adverse effects were observed, therefore none occurred, is incogent. It is also plausible that harmful effects have occurred but have not been linked to soy consumption.

Other researchers have similar concerns about exposing young infants to phytoestrogens. The introductory paper presented by the USFDA Department of Health at a recent phytoestrogen conference notes 'phytoestrogens have some of the same capabilities to induce developmental toxicity as do other estrogens' and 'given the DES tragedy, it would be foolish to ignore the possibility that some phytoestrogens constitute a developmental hazard'.[10]

The NZ Ministry of Health has advised that parents 'continue to feed their infants soy-based milk formula if they have been advised to do so by their health specialists' (O'Regan, personal communications, 29 March 1995). However, soy-formulas are available at supermarkets enabling parents to choose them without medical advice. It would be prudent for general sales of soy-formulas to be stopped. Failing this there is a need for information to be made available to both physicians and parents. As a minimum we suggest a recent review[5] on the risks and benefits of soybean phytoestrogens.

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