Genistein Blunts the Negative Effect of Ischaemia to the Retina Caused by an Elevation of Intraocular Pressure

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Abstract
Aims: Deduc whether the isoflavone genistein blunts the effect of ischaemia to the retina. Methods: Ischaemia was induced in rats by raising the intraocular pressure (120 mmHg) for 50 min. Genistein (10 mg/kg) was injected intraperitonially 1 h before and after ischaemia. Seven days after ischaemia, the level of mRNAs for neurofilament light (NF-L), caspase 3, caspase 8, glial fibrillary acidic protein (GFAP), poly-ADP ribose polymerase (PARP), Thy-1 and proteins (GFAP, NF-L, PARP) in whole retinas were determined. NF-L and tubulin proteins in optic nerves were also determined. RT-PCR was also processed for the localization of choline acetyltransferase (ChAT) and GFAP immunoreactivities. Results: Ischaemia caused a significant reduction in ganglion cell proteins in the optic nerve (NF-L and tubulin) and retina (NF-L). Retinal Thy-1 (mRNA and protein) and NF-L (mRNA) were also reduced while mRNAs of caspase 3, caspase 8, PARP and GFAP (also protein) were increased. Changes in the mRNAs and proteins induced by ischaemia were significantly blunted by genistein with the exception of the increase in GFAP and PARP protein/mRNA levels. Ischaemia-induced changes in the localization of ChAT were also clearly attenuated by genistein treatment. Conclusions: Genistein blunts most of the damaging effects caused to the retina by ischaemia.

Introduction

Phyto-oestrogens are naturally occurring molecules in plants that can bind to oestrogen receptors and activate oestrogen-receptor-mediated transcription in many cell types [1, 2]. Phyto-oestrogens are present in various dietary products, such as soya [3, 4], which contain abundant amounts of the isoflavone genistein [3]. It is now clear that physiological doses of isoflavones can behave as phyto-oestrogens and mimic the well-known neuroprotective effects of oestrogens. Many examples exist which show oestrogens to have neuroprotective actions in the CNS [5] but unfortunately oestrogen can also have potential deleterious side-effects which include increased risk of stroke and cancer [6, 7]. In contrast no good evidence exists to suggest that a high-soya diet has such detrimental side-effects but instead data exist to show that it reduces stroke injury to female and male rats [8]. Moreover, the soya isoflavone genistein blunts the damaging effects...