

# Tibolone protects astrocytic cells from glucose deprivation through a mechanism involving estrogen receptor beta and the upregulation of neuroglobin expression

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Tibolone, a synthetic steroid used for the prevention of osteoporosis and the treatment of climacteric symptoms in post-menopausal women, may exert tissue selective estrogenic actions acting on estrogen receptors (ERs). We previously showed that tibolone protects human T98G astroglial cells against glucose deprivation (GD). In this study we have explored whether the protective effect of tibolone on these cells is mediated by ERs. Experimental studies showed that both ER $\alpha$  and ER $\beta$  were involved in the protection by tibolone on GD cells, being ER $\beta$  preferentially involved on these actions over ER $\alpha$ . Tibolone increased viability of GD cells by a mechanism fully blocked by an ER $\beta$  antagonist and partially blocked by an ER $\alpha$  antagonist. Furthermore, ER $\beta$  inhibition prevented the effect of tibolone on nuclear fragmentation, ROS and mitochondrial membrane potential in GD cells. The protective effect of tibolone was mediated by neuroglobin. Tibolone upregulated neuroglobin in T98G cells and primary mouse astrocytes by a mechanism involving ER $\beta$  and neuroglobin silencing prevented the protective action of tibolone on GD cells. In summary, tibolone protects T98G cells by a mechanism involving ER $\beta$  and the upregulation of neuroglobin. © 2016 Elsevier Ireland Ltd.

Astrocytes

ER $\beta$

Glucose deprivation

Mitochondria

Neuroglobin

Tibolone

estrogen receptor alpha

estrogen receptor beta

glucose

messenger RNA

neuroglobin

tibolone

estrogen

estrogen receptor alpha

estrogen receptor beta

globin

nerve protein

neuroglobin

pregnane derivative

protective agent

reactive oxygen metabolite

selective estrogen receptor modulator

tibolone

animal cell

Article

astrocyte

cell protection

cell viability

controlled study

drug mechanism

gene silencing

in vitro study

male

mitochondrial membrane potential

mouse

Ngb1 gene

nonhuman

priority journal

protein expression

upregulation

animal

astrocyte

drug effects

human

metabolism

tumor cell line

Animals

Astrocytes

Cell Line, Tumor

Estrogen Receptor alpha

Estrogen Receptor beta

Estrogen Receptor Modulators

Estrogens

Globins

Glucose

Humans

Membrane Potential, Mitochondrial

Mice

Nerve Tissue Proteins

Norpregnenes

Protective Agents

Reactive Oxygen Species

Up-Regulation