Protective Effects of Low Alcohol Concentrations Against Salsolinol-Induced Toxicity

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Background

Parkinson’s Disease (PD)
- Progressive neurodegenerative disease
- Characterized by the loss of dopaminergic neurons in the substantia nigra

http://www.abc.net.au/health/library/img/parkinsons_diag.jpg
Background (continued)

PD Symptoms
- Tremors at rest
- Muscle rigidity
- Bradykinesia (slow movement)
- Postural instability
- Shuffling walk

http://cache.eb.com/eb/image?id=82609&rendTypeId=4
Background (continued)

Possible Causes

- Genetic
- Head trauma
- Environmental toxins
- Drugs that cause PD-like symptoms, MPTP
Salsolinol (Sals)
(1-methyl-6,7-dihydroxy-1,2,3,4-tetra-hydroquinoline)

- Structurally similar to MPTP, a neurotoxin in high doses
- Condensation product of dopamine and acetaldehyde
- Shown to be toxic to dopaminergic cells
- Present in the blood of alcoholics
Aim

In this study, we investigate possible protective effects of low alcohol concentrations on salsolinol-induced toxicity in SH-SY5Y dopaminergic cells.
Cell Culture Model
SH-SY5Y Cells

- Human neuroblastoma cells
- Similar to neuronal cells damaged in substantia nigra of PD patients

Methods

- SH-SY5Y cells cultured in media
- 12,000 cells/well placed in 96 well plates
- Addition of fresh media made with various concentrations of Sals or Ethanol
Methods (continued)

- Cell viability measured by MTT assay
- Plates were read spectrophotometrically at 570nm
Results

Sals shows a dose dependent toxicity in SH-SY5Y cells

Cell Viability at Various Salsolinol Concentrations

- Cell Viability (% of Control)
- Salsolinol (uM)
- Untreated, 1, 10, 100, 200, 400, 800
Methods - Pretreatment

- New plates were used
- Various concentrations of ethanol were added to the plates
- After 1 hour pretreatment, various concentrations of Sals added
- The MTT assay determined cell viability
Graph shows drug treatment of SH-SY5Y cells: Sals alone, pretreatment with 1 mM Ethanol followed by either 200, 400 or 800 uM of Sals and 10 mM Ethanol pretreatment followed by either 200, 400 or 800 uM of Salsolinol.
Summary

- Low alcohol concentrations were shown to be protective against salsolinol-induced toxicity in SH-SY5Y cells.
- Ethanol protection is greatest at lower concentrations of Sals.
Implications

A low ethanol concentration can possibly be protective against the progression of PD
Direction for Further Studies

- Mechanism of actions in salsolinol-induced toxicity and ethanol protection
- Perform in-vivo studies
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