



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY
Division of Life Science

LIFS Seminar Series

Increased TRPC5 glutathionylation contributes to
striatal neuron loss in Huntington's disease

by

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Abstract:

Aberrant glutathione or Ca^{2+} homeostasis due to oxidative stress is associated with the pathogenesis of neurodegenerative disorders. The Ca^{2+} -permeable transient receptor potential cation (TRPC) channel is predominantly expressed in the brain, which is sensitive to oxidative stress. However, the role of the TRPC channel in neurodegeneration is not known. Here, we report a mechanism of TRPC5 activation by oxidants and the effect of glutathionylated TRPC5 on striatal neurons in Huntington's disease. Intracellular oxidized glutathione leads to TRPC5 activation via TRPC5 S-glutathionylation at Cys176/Cys178 residues. The oxidized glutathione-activated TRPC5-like current results in a sustained increase in cytosolic Ca^{2+} , activated calmodulin-dependent protein kinase and the calpain-caspase pathway, ultimately inducing striatal neuronal cell death. We observed an abnormal glutathione pool indicative of an oxidized state in the striatum of Huntington's disease transgenic (YAC128) mice. Increased levels of endogenous TRPC5 S-glutathionylation were observed in the striatum in both transgenic mice and patients with Huntington's disease. Both knockdown and inhibition of TRPC5 significantly attenuated oxidation-induced striatal neuronal cell death. Moreover, a TRPC5 blocker improved rearing behaviour in Huntington's disease transgenic mice and motor behavioural symptoms in littermate control mice by increasing striatal neuron survival. Notably, low levels of TRPC1 increased the formation of TRPC5 homotetramer, a highly Ca^{2+} -permeable channel, and stimulated Ca^{2+} -dependent apoptosis in Huntington's disease cells (STHdh^{Q111/111}). Taken together, these novel findings indicate that increased TRPC5 S-glutathionylation by oxidative stress and decreased TRPC1 expression contribute to neuronal damage in the striatum and may underlie neurodegeneration in Huntington's disease.

Date : **24 November 2017 (Friday)**
Time : **4:00 p.m.**
Venue : **Lecture Theatre C**
**The Hong Kong University of Science
& Technology**
Clear Water Bay, Kowloon

(Host faculty: Dr. HyoKeun Park)

All are Welcome!!