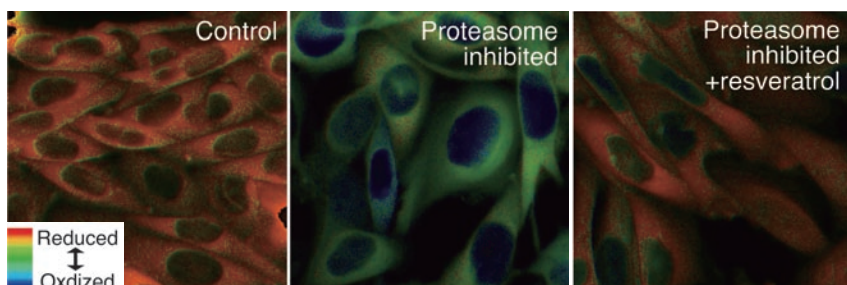


# Cutting-Edge Research at Kyoto University

Kyoto University is known for the quality and diversity of its research. Each issue of Research Activities can only highlight a small selection of those endeavors, but we hope to convey an impression of the university's rich academic milieu.

## Anti-aging Compounds Act in Mitochondria

*Resveratrol and sesamin function as antioxidants in mitochondria against cell death.*



Visualized intracellular redox state

Impairment of proteasome that is the protein machinery responsible for degradation of abnormal proteins have been strongly associated with cell death-mediated aging and the pathogenesis of neurodegenerative disorders, eg Alzheimer's and Parkinson's disease. However, the mechanism by which inhibition of proteasome

in cells causes cell death is still unclear. By visualizing intracellular redox state, we revealed that proteasome inhibition led to mitochondrial oxidation followed by cytosolic oxidation, which could be prevented by mitochondrial-targeted antioxidants. Moreover, compounds found in red wine and sesame — resveratrol and sesamin, respectively — prevented intracellular oxidation and improved cellular survival by maintaining mitochondrial function.

**Yasuyoshi Sakai, PhD** (left) *Professor, Graduate School of Agriculture*  
**Jun Hoseki, PhD** *Associate Professor, Research Unit for Physiological Chemistry*

[www.seigyo.kais.kyoto-u.ac.jp/](http://www.seigyo.kais.kyoto-u.ac.jp/)



## Battery Materials with a 70-Year Cycle-Life

*Computer-Aided Discovery of New Materials.*

Large-scale battery systems are essential for efficiently utilizing renewable energy power sources from solar and wind, which can generate electricity only intermittently. The use of lithium-ion batteries (LIB) to store the generated energy is one solution. A long cycle life is critical for LIB when used in these applications. Together with an industry partner, we demonstrate a novel cathode material with estimated capacity

