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Forkhead protection

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Cells must protect themselves from reactive oxygen species (ROS) to avoid cell death. In proliferating cells this is achieved by protein kinase B (PKB), but the mechanism in quiescent cells is unknown. In the September 19 *Nature*, Kops *et al.* identify the PKB-regulated Forkhead transcription factor FOXO3a as the molecule that protects against oxidative stress in quiescent cells (*Nature* 2002, **419**:316-321). They created an inducible FOXO3a cell line and demonstrated that FOXO3a expression drove cells into a quiescent state and protected cells from ROS-induced apoptosis. FOXO3a expression led to elevated levels of the antioxidant enzyme, mitochondrial manganese superoxide dismutase (MnSOD). They show that FOXO3a directly regulates expression of the gene encoding MnSOD. FOXO3a could prevent mitochondrial damage in fibroblasts deprived of glucose, but not in MnSOD-deficient cells. Thus the same PKB-Forkhead switch regulates proliferation and cell protection.

References

1. The free radical theory of aging matures.
2. *Nature*, [<http://www.Nature.com>]