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# Triggering and modulation of apoptosis by oxidative stress

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## Abstract

Cell survival requires multiple factors, including appropriate proportions of molecular oxygen and various antioxidants. Although most oxidative insults can be overcome by the cell's natural defenses, sustained perturbation of this balance may result in either apoptotic or necrotic cell death. Numerous, recent studies have shown that the mode of cell death that occurs depends on the severity of the insult. Oxidants and antioxidants can not only determine cell fate, but can also modulate the mode of cell death. Effects of oxidative stress on components of the apoptotic machinery may mediate this modulation. This review will address some of the current paradigms for oxidative stress and apoptosis, and discuss the potential mechanisms by which oxidants can modulate the apoptotic pathway.



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## Keywords

Caspases; Glutathione; Hydrogen peroxide; Dithiocarbamates; Necrosis; Free radicals

## Abbreviations

ALS, amyotrophic lateral sclerosis; ROS, reactive oxygen species; DISC, death-inducing signaling complex; Apaf-1, apoptotic protease activating factor 1; CARD, caspase recruitment domain; PARP, poly(ADP-ribose) polymerase; GSH, glutathione; NAC, N-acetylcysteine; GSSG, glutathione disulfide; BSP, bromosulphophthalein; diBSP, phenol-3, 6-dibromosulphophthalein; BPS, bathophenanthroline disulfonate; BCPS, bathocuproine disulfonate; BSO, buthione sulfoximine; DEM, diethyl maleate; NEM, N-ethyl maleamide; SOD, superoxide dismutase; NO<sub>•</sub>, nitric oxide; NOS, NO<sub>•</sub> synthase; O<sub>2</sub><sup>•-</sup>, superoxide; H<sub>2</sub>O<sub>2</sub>, hydrogen peroxide; PDTTC, pyrrolidine dithiocarbamate; Hsps, heat shock proteins

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