

# Disturbance of redox homeostasis in Down Syndrome: Role of iron dysmetabolism

Barone E.

Arena A.

Head E.

Butterfield D.A.

Perluigi M.

Down Syndrome (DS) is the most common genetic form of intellectual disability that leads in the majority of cases to development of early-onset Alzheimer-like dementia (AD). The neuropathology of DS has several common features with AD including alteration of redox homeostasis, mitochondrial deficits, and inflammation among others. Interestingly, some of the genes encoded by chromosome 21 are responsible of increased oxidative stress (OS) conditions that are further exacerbated by decreased antioxidant defense. Previous studies from our groups showed that accumulation of oxidative damage is an early event in DS neurodegeneration and that oxidative modifications of selected proteins affects the integrity of the protein degradative systems, antioxidant response, neuronal integrity and energy metabolism. In particular, the current review elaborates recent findings demonstrating the accumulation of oxidative damage in DS and we focus attention on specific deregulation of iron metabolism, which affects both the central nervous system and the periphery. Iron dysmetabolism is a well-recognized factor that contributes to neurodegeneration; thus we opine that better understanding how and to what extent the concerted loss of iron dyshomeostasis and increased OS occur in DS could provide novel insights for the development of therapeutic strategies for the treatment of Alzheimer-like dementia. © 2017 Elsevier

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Iron

Oxidative stress

Protein oxidation

Redox proteomics

Trisomy 21

4 hydroxynonenal

amyloid beta protein

amyloid precursor protein

ceruloplasmin

copper zinc superoxide dismutase

heme oxygenase 1

heme oxygenase 2

transferrin

iron

Alzheimer disease

antioxidant responsive element

cognitive defect

Down syndrome

endosome

energy metabolism

human

iron deficiency anemia

iron homeostasis

iron metabolism

iron transport

lipid peroxidation

mitochondrial respiration

nerve degeneration

neuropathology

nonhuman

oxidation reduction state

oxidative stress

prenatal diagnosis

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protein carbonylation

protein degradation

protein expression

proteomics

Review

trisomy 21

animal

Down syndrome

homeostasis

metabolism

oxidation reduction reaction

oxidative stress

pathophysiology

Animals

Down Syndrome

Homeostasis

Humans

Iron

Oxidation-Reduction

Oxidative Stress