Iron dysregulation: an important aspect in toxicology

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All organisms, from archaea to mammals, have iron-containing proteins. As a result, the proper management of iron levels in cells is critical for normal physiological function (Lee et al. 2006). Cells have evolved to accomplish such iron homeostasis by iron's ability to form ligands with various proteins. However, when not properly liganded, iron will show its dark side: unliganded iron can trigger the Fenton reaction, thereby producing highly reactive hydroxyl radicals.

Oxidative stress, one of the most relevant and cutting-edge topics presented in our journal (Hengstler and Bolt 2008a, 2008b; Yang et al. 2009; Beyersmann and Hartwig 2008; Adam and Laufs 2008), is particularly relevant in the brain with its high respiratory activity (Bolt and Hengstler 2008; Kumar and Gill 2009; Verstraeten et al. 2008; Carmo et al. 2006), liver (Cederbaum et al. 2009; Cervinková et al. 2009; Dewa et al. 2009; Pardo Andreu et al. 2009; Abe et al. 2008; Schober et al. 2009; Bauer et al. 2009; Schumann et al. 2009; Hewitt et al. 2007), kidney (Wang et al. 2009), lung (Glahn et al. 2008), and breast cancer (Cadenas et al. 2010). In the current issue, Douglas B. Kell from the University of Manchester, UK, presents a comprehensive review demonstrating that many diseases and toxicological insults converge on iron dysregulation. Huntington's, Parkinson's, Gaucher's, Alzheimer's, Creutzfeldt-Jakob's, and Lou Gehrig's disease all seem to involve poorly liganded iron. In addition, iron-based mechanisms contribute to the toxicity of a large number of compounds, including acetaminophen, aniline, asbestos, dioxins,

hydrazines, methyl mercury and paraquat. Douglas B. Kell's review is a must-read for anyone interested in the role of dysregulated iron homeostasis and reactive oxygen species in cell/tissue degeneration and toxicity in general.

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