

# Redox-Chemistry of Copper in Biology and Medicine

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Copper ions are essential for almost all living organisms and serves often as a redox active catalytic site in enzymes where it activates dioxygen in a controlled manner. A tight control of copper binding and coordination is important as copper is potentially dangerous. Dioxygen activation by copper in an uncontrolled way can be dangerous for cells, due to the production of reactive oxygen species (ROS), such as hydroxyl radical. Several diseases have been linked to a dyshomeostasis of copper such as Wilson's and Menkes genetic disorders, but also Alzheimer's disease, and cancer. Thus, interfering in copper metabolism *via* small ligands is of interest as therapeutic approach and clinically used in Wilson or Menkes disease.

Our lab is interested in inorganic and/or peptidic copper-ligand complexes (Cu-L). Cu-L can be applied to biological systems or formed *in situ* via chelation by L of Cu present in the organism. Latter is based on the application of the L alone and a selective binding of Cu over other metal ions. Biological activity of Cu-L can consist of supplying, sequestering or transporting Cu. This is of importance for instance for the treatment of the above mentioned Menkes and Wilson disease, but also investigated in Alzheimer or Parkinson. Cu-L can also serve as a catalyst for chemical reactions often via dioxygen activation. Later is thought to be of importance in development of anti-cancer drugs or for antimicrobials. Recent results from our lab in this area will be presented.