Trivalent and Hexavalent Chromium as Mediators of Fenton-type Reactions

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Chromium is an important component of human nutrition due to its participation in the insulin metabolism. Nevertheless, literature commonly reports Cr(VI) as a toxic and carcinogenic element both *in vivo* and *in vitro*. Previous studies from our group showed the capacity of trivalent chromium in slowly generating $^{\bullet}OH$ by reacting with H_2O_2 *in vitro* (SFRR Meeting, 2005, abstract 173-1). This study further investigates the potential and mechanisms of trivalent and hexavalent chromium to mediate oxyradical formation in the presence of H_2O_2. We have already shown that free radical damage to 2-deoxyribose (2-DR) is much faster when mediated by Cr(VI) (<1 min to saturate 2-DR damage) than by Cr(III), in which the reaction lasts for more than 4 days (SBBq-2008, abstract T-69). These reactions equally depend on the metal concentration and on the presence of H_2O_2. Recent results demonstrate that saturation of Cr(VI)-mediated 2-DR damage occurs at 0.5 mM H_2O_2. However, in systems containing Cr(III) saturation is not observed up to 5 mM H_2O_2. Moreover, 2-DR damage induced by 50 µM Cr(III) or 50 µM Cr(VI) (in the presence of H_2O_2) produced A_{532} values of 0.076 and 0.204, respectively. When Cr(III) and Cr(VI) were incubated together 2-DR damage resulted in A_{532} of 0.279, which is the sum of A_{532} values produced by the individual chromium forms. These results indicate that each chromium form – Cr(III) and Cr(VI) – act independently in promoting oxyradical formation and 2-DR degradation. Possibly, intermediate and unstable forms of chromium, such as Cr(II), Cr(IV) and/or Cr(V), participate on the mechanism of $^{\bullet}OH$ production. This hypothesis is currently under evaluation by EPR methods. **Acknowledgments**: Redoxoma-CNPq, CNPq. **Keywords**: Oxidative stress; Free radical; Hydroxyl radical.