

# Effects of Metal Coordination on the Antioxidant and Cytotoxic Properties of the Natural Flavonoid Primuletin †

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**Abstract:** The antioxidant, anticancer, anti-inflammatory, and antidiabetic activities of flavonoids and their metal complexes, among other biological activities, are well documented in the literature [1]. Our previous studies identified the complex of Cr(III) with primuletin (HPri), Cr(Pri)<sub>3</sub>, to display excellent antiadipogenic activity, a premise for its antidiabetic activity. To further analyze the spectrum of biological activities of Cr(Pri)<sub>3</sub>, we assessed its antioxidant and cytotoxic activities in comparison with two other primuletin complexes, VO(Pri)<sub>2</sub> and Zn(Pri)<sub>2</sub>. ABTS and DPPH assays revealed that the antioxidant effects of all tested compounds are time- and concentration-dependent. Generally, complexation increases the antioxidant capacity as compared to the free ligand. Interestingly, the Zn(II) complex showed the strongest activity when tested via the ABTS method, whereas Cr(Pri)<sub>3</sub> had the highest ability to scavenge DPPH radicals. This finding can be explained by the differences in the reaction mechanisms between the two methods. The cytotoxic effects were tested on five cancer cell lines, namely HeLa (human cervical adenocarcinoma), SK-OV-3 (human ovarian adenocarcinoma), LoVo (human colon adenocarcinoma), MCF-7 (human breast adenocarcinoma), and HepG2 (human hepatic adenocarcinoma), as well as on one normal human cell line, HUVEC. Metal coordination generally enhances the cytotoxic effects, with a general increase in activity as follows: HPri < Zn(pri)<sub>2</sub> < Cr(pri)<sub>3</sub> < VO(pri)<sub>2</sub>. With the exception of MCF-7, VO(Pri)<sub>2</sub> and Cr(Pri)<sub>3</sub> displayed lower IC<sub>50</sub> values when compared to cisplatin. As such, they have been identified as excellent candidates for further *in vivo* studies.

**Keywords:** chromium; flavonoid; antioxidant; anticancer.

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## References

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## **Conflicts of Interest**

The authors declare no conflict of interest.