GS03-4 **Disruption of gene expression associated with hydroxylation of aromatic ring and the expression modulation by side chain of chemicals**

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Aromatic compounds involve a risk to gain several toxic potentials via ring-hydroxylation. A risk of ring-mono-hydroxylation is disruption of estrogen-dependent gene expression, and that of ring-two-hydroxylation (adjacent) is metal-mediated DNA damage leading to disruption of the gene expression. These activities can be regulated by side chain moieties other than the hydroxyl groups. Ring-mono-hydroxylation endowed flavonoids and benzophenone-derivatives with binding affinity to estrogen receptor, and then the activation mode, whether agonistic or antagonistic, was regulated by the length or position of side chain moieties. Ring-two-hydroxylated (catechol) compounds such as quersetin or dopamine induced oxidative damage and conformational change through reduction-oxidation reaction with Cu(II) in the vicinity of DNA, by which transcription of the damaged gene was inhibited. Moreover, in the reaction with Fe(III)-NTA, a model of liganded form of Fe, catechol compounds induced weaker oxidative DNA damage than that in Cu(II). There was no detectable conformational change, due to the difference in mode of DNA-interaction between Cu and Fe. These DNA damages were suppressed by attaching α-carbonyl side chain on catechol. UV spectrum and ^{1}H NMR analyses suggest that the suppression is ascribed to the strong chelate formation interrupting a redox reaction between catechols and metals. This study will unveil mechanisms for the regulation of adverse activities of ring-hydroxylated aromatic compounds and contribute to control useful potential of these compounds.