

リノレン酸を負荷させた培養ラット肝細胞に
おける金属誘発脂質過酸化に対する
フラボノイド類の促進及び抑制作用

杉原成美、荒川隆之、大西美佳恵、古野浩二

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**Anti-and Pro-Oxidative Effects of Flavonoids on
Metal-induced Lipid Hydroperoxide-Dependent
Lipid Peroxidation in Cultured Hepatocytes Loaded
with α -Linoleic Acid**

Narumi Sugihara, Takayuki Arakawa,
Mikae Ohnishi and Koji Furuno

ABSTRACT Lipid hydroperoxide (LOOH)-dependent lipid peroxidation was induced in α -linolenic acid (LNA)-loaded hepatocytes by adding Fe, Cu, V or Cd ions at concentrations from 20 to 500 μ M. The effects of structurally-related flavonoids at concentrations from 10 to 500 μ M on the lipid peroxidation were examined. The results with regard to each flavonoid subclass are as follows. 1) Flavonols such as myricetin, quercetin, fisetin and kaempferol, but not morin, showed dose-dependent antioxidative activity against metal-induced lipid peroxidation at all metal concentrations. Myricetin, quercetin and fisetin were the most effective antioxidants, although their efficacies depended on the metal ion. Kaempferol and morin had antioxidative activity equal to the other flavonols in the presence of Cu ions, but were much less effective for the other three metal ions. 2) Flavones, luteolin, apigenin and chrysin were antioxidative at low Fe concentrations but were prooxidative at high Fe concentrations. Luteolin exhibited antioxidative activity similar to that of catechol-containing flavonols in the presence of the other three metal ions. Apigenin and chrysin also acted as prooxidants with V or with all metal ions, respectively. 3) Taxifolin, a flavanone, also showed both anti-and prooxidative

activity depending on Fe concentrations but showed only antioxidative activity with other metal ions. 4) Epigallocatechin, a flavanol, was antioxidative with all metal ions and its activity was similar to that of catechol-containing flavonols. The various effects of flavonoids on metal-induced lipid peroxidation in LNA-loaded hepatocytes is discussed in terms of the change in redox-potential of flavonoid-metal complexes.

抄録 培養肝細胞にリノレン酸を取り込ませて、脂質過酸化に対する感受性を増大させた脂肪肝細胞に20 から 500 μ MのFe, Cu, V or Cdイオンを添加して脂質過酸化を誘起した。この際にフラボノイド類を10 to 500 μ M添加して以下の結果を得た。Myricetin, quercetinそしてfisetin等のフラボノールは最も強い抑制作用を示したが、その効果は金属によって異なった。KaempferolとmorinはCuイオンの場合は他のフラボノールと同等の効力を示したが、他の金属の場合は著しく弱い効力を示した。2) フラボンであるluteolin, apigeninそしてchrysinは低濃度のFeイオンでは抑制作用を示したが、高濃度のFeイオンでは促進効果を示した。又、Luteolinは他の3種の金属イオンで抗酸化作用を示し、ApigeninはVイオンで、chrysinは全てのイオンで促進作用を示した。3) フラバノンであるTaxifolinはLuteolinと同様な挙動を示した。4) フラバノールであるEpigallocatechinは全てのイオンでquercetinと同等の抗酸化抗力を示した。フラボノイド類の金属誘発脂質過酸化に対するこのような作用に関してフラボノイド-金属錯体の酸化還元電位から考察した。