

合成培地培養 *Caenorhabditis elegans* の成長促進を指標とする 食品機能性・安全性評価法の有用性

(2015年6月9日受付)

(2015年11月16日受理)

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Efficacy of *Caenorhabditis elegans* growth cultured by chemical defined synthetic medium for function and safety analyses of food ingredients

(Received June 9, 2015)

(Accepted November 16, 2015)

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Abstract

To investigate functionally activity of food components, we used *Caenorhabditis elegans* (*C. elegans*) as a model organism and prepared the chemically defined (CD) medium for cultivation. We evaluated the effects of flavonoids such as quercetin, rutin, and catechin which are known as anti-oxidant compounds, and α -tocopherol by their growth stimulation potency. The results indicated that the magnitude of growth stimulation potencies were quercetin > catechin > rutin > α -tocopherol. This order did not coincident the order of DPPH radical scavenging activity. Moreover, α -tocopherol did not show the growth stimulation at low concentration and affected an adverse effect on *C. elegans* growth at high concentration. The gene expression analyses by DNA microarray indicated that 141 and 10 genes were changed expression levels significantly by 0.1 mM quercetin and rutin, respectively. All of the rutin responsive genes were included in quercetin responsive ones. Therefore gene expression levels were reflected their *C. elegans* growth stimulation potencies. *dod-6*, which were regulated by DAF-16 was up-regulated by both flavonoids. These results suggest flavonoids may act as an antioxidant as well as modulator of DAF signaling processes to exert its growth stimulating properties. Our findings indicate that *C. elegans* growth cultured by chemical defined synthetic medium is a useful endpoint for function and safety analyses of food ingredients.

Keywords: 食品機能性、線虫、合成培地、クエルセチン、トコフェロール

food function, *Caenorhabditis elegans*, chemical defined synthetic medium, quercetin, tocopherol

I 緒論

食品成分の機能性表示が可能になり、続々と表示申請が出ている現状がある。一方、製品の選択は、消費者に任されていることから、過剰な摂取や機能性成分同士あるいは医薬品等との複合影響は十分に注意する必要がある、食品安

全性の点からは、より適切な機能性および安全性評価法の開発が重要である。機能性成分とされるカテキン類などは直接的な定量分析がなされ、DPPH ラジカル補足能測定、 β -カロテン退色法等の抗酸化能評価法が簡易な方法として、さらに、がん細胞のアポトーシス誘導、コメットアッセイ等 *in vitro* 試験が比較的容易であるため、機能性の評価法として広く利