Fusaric acid induces a notochord malformation in zebrafish via copper chelation

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Authors Authors and affiliations

Emily S. Yin, Malika Rakhmankulova, Kaury Kucera, Jose Guedes de Sena Filho, Carolina E. Portero, Alexandra Narváez-Trujillo, Scott A. Holley, Scott A. Strobel

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Abstract

Over a thousand extracts were tested for phenotypic effects in developing zebrafish embryos to identify bioactive molecules produced by endophytic fungi. One extract isolated from *Fusarium* sp., a widely distributed fungal genus found in soil and often associated with plants, induced an undulated notochord in developing zebrafish embryos. The active compound was isolated and identified as fusaric acid. Previous literature has shown this phenotype to be associated with copper chelation from the active site of lysyl oxidase, but the ability of fusaric acid to bind copper ions has not been well described. Isothermal titration calorimetry revealed that fusaric acid is a modest copper chelator with a binding constant of $4.4 \times 10^5\ M^{-1}$. These results shed light on the toxicity of fusaric acid and the potential teratogenic effects of consuming plants infected with *Fusarium* sp.

Keywords

Copper chelation Endophytic fungi Fusaric acid Natural products Zebrafish

notochord

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