

**Identification of
Mitochondrial Cytochrome c Oxidase Subunit 1 (COI) from
Wolf Spider, *Pardosa astrigera*,
as a Potential Molecular Biomarker for Heavy Metal Exposure**

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To search for a molecular biomarker from the wolf spider *Pardosa astrigera* potentially associated with heavy metal exposure, we have employed 2-dimensional electrophoresis (2DE) proteomics followed by quantitative real-time PCR. The spiders were regularly fed with up to 4 months with heavy metal-coated fruit flies (20 mM CdCl₂, 10 mM PbCl₂, 10 mM HgCl₂ singly or altogether), and their protein extracted and analyzed by 2DE. Among 6 protein spots showing different expression patterns between Cd-exposed and non-exposed spiders, one with a significantly reduced expression level in the Cd-exposed spiders was identified as the mitochondrial cytochrome c oxidase subunit 1 (COI) by tandem Mass analysis. The COI gene was cloned and its sequences identified from the spider using a homology probing strategy. To investigate the correlation between the extent (length) of Cd exposure and the reduction level of the COI transcription, quantitative real-time RT-PCR was conducted. The level of COI transcript from the Cd-exposed spiders was gradually decreased as the exposure duration increased, suggesting that the level of COI transcription is inversely proportional to the extent of Cd exposure. In addition, the level of COI expression in the spiders collected from the Cd-contaminated Sin-gil stream area (Kyeonggi-do, Korea) was significantly lower compared to control spiders. Taken together, our findings suggest that the COI gene can be used as a molecular biomarker to predict the Cd exposure level of *Pardosa astrigera*.