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Molecular Toxicology

Research Interests

The major interest of our laboratory is to investigate the biological responses to environmental stress. The actions of heavy metals on the cellular metabolisms, signal transduction and transcriptional regulations are focused. We are currently investigating the regulation of metallothionein (MT) gene expression under various stresses. MT is a low molecular weight, cysteine-rich, metal-binding protein that is synthesized to protect against heavy metal toxicity. Upon metal stimulation, the transcriptional factor of MT gene, MTF-1, translocates from cytoplasm to nuclei and binds to metal responsive elements in the promoter region to initiate the transcription of MT genes. Our study shows that MTF-1 is subjected to various modifications under heavy metal stress, which may lead to a functional alternation of the transcriptional factor. We are looking for the molecular mechanism and factors involved in the modifications to elucidate the physiological roles of the modification. MTF-1 is an essential protein that required for the development of the mammals. The genes under the regulation of MTF-1 are also investigated.

Recent Publications

1. Yang, P.-M., Chen, H.-C., Tsai, J.-S., and **Lin, L.-Y.*** (2007). Cadmium induces Ca^{2+} -dependent necrotic cell death through calpain-triggered mitochondrial depolarization and reactive oxygen species-mediated inhibition of nuclear factor-kappa B activity. *Chem. Res. Toxicol.* 20, 406-415.
2. Lin, K.-A., Chen, J.-H., Lee, D.-F., and **Lin, L.-Y.*** (2005). Alkaline induces metallothionein gene expression and potentiates cell proliferation in Chinese hamster ovary cells. *J. Cell. Physiol.* 205, 428-436.
3. Yang, P.-M., Chiu, S.-J., and **Lin, L.-Y.*** (2005). Differential effects of salen and manganese-salen complex (EUK-8) on the regulation of cellular cadmium uptake and toxicity. *Toxicol. Sci.* 85, 551-559.
4. Wu, C.-M., and **Lin, L.-Y.*** (2005). Utilization of albumin-based sensor chips for the detection of metal content and characterization of metal-protein interaction by surface plasmon resonance. *Sensors and Actuators B: Chemical* 110, 231-238.
5. Yang, P.-M., Chiu, S.-J., Lin, K.-A., and **Lin, L.-Y.*** (2004). Effect of Cadmium on Cell Cycle Progression in Chinese Hamster Ovary Cells. *Chemico-Biol. Interact.* 149, 125-136.
6. Wu, C.-M., and **Lin, L.-Y.*** (2004). Immobilization of metallothionein as a sensitive

biosensor chip for the detection of metal ions by surface plasmon resonance. *Biosens. Bioelectron.* 20, 864-871.

7. Chiu, S.-J., Lee, M.-Y., Chou, W.-G., and **Lin, L.-Y.*** (2003). Germanium Oxide Enhances Radiosensitivity of Cells. *Radia. Res.* 159, 391-400.
8. Sheu, W. H.-H., Chen, Y.-T., Lee, W.-J., Wang, C.-W., and **Lin, L.-Y.** (2003). A relationship between serum ferritin and the insulin resistance syndrome is present in non-diabetic women but not in non-diabetic men. *Clin. Endocrinol.* 58, 380-385.