

Henry Lai, Research Professor



Research Themes:

Molecular and Cellular Engineering

Education

PhD (psychology), University of Washington, 1978

Research Interests

- Biological effects of electromagnetic fields
- Cancer treatment using artemisinin and synthetic compounds

Contact Information

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Research Description

My main research interest is on the biological effects of nonionizing radiation, from extremely-low-frequency to radiofrequency electromagnetic fields. Research end points cover molecular biology, neurochemistry, and behavior. The main goals of the research are to understand the mechanism of interaction between electromagnetic fields and biological systems and to correlate biological changes with energy absorption in the body. The data would be useful in the setting of electromagnetic field exposure standards for humans. This area of research has gained public attention in recent years because of the increased use of electric power and radiofrequency energy. In the case of radiofrequency radiation, the tremendous increase in the use of cellular telephone and wireless communication systems have raised concern on the possible health effects of the radiation.

Another area of my research is to investigate the use of electromagnetic fields for the treatment of various diseases. We are exploring the use of low frequency magnetic fields for the treatment of malaria. Other related projects include use of magnetic fields for cancer treatment.

Another of research is to investigate the use of the compound artemisinin and its analogs for cancer treatment and prevention. New relating synthetic compounds have been synthesized and are being tested in our laboratory. These compounds have very high potency and selectivity in killing cancer cells and tumors in animals.

Artemisinin information

Questions?

Honors & Awards

- 2002: Honorary Professor, Tropical Medicine Institute, Guangzhou University of Traditional Chinese Medicine, China

Selected Publications

- Lai, H. Research on the neurological effects of nonionizing radiation at the University of Washington. *Bioelectromagnetics* 13:513–526, 1992.
- Lai, H. Neurological effects of microwave irradiation. In: *Advances in Electro-magnetic Fields in Living Systems* (Vol. 1), J.C. Lin (ed.), Plenum Press, New York, 1994.
- Lai, H. and Singh, N.P. Selective cancer cell cytotoxicity from exposure to dihydroartemisinin and holotransferrin. *Cancer Letters* 91:41–46, 1995.
- Chandos, B., Khan, A., Lai, H. and Lin, J.C. The application of electromagnetic energy to the treatment of neurological and psychiatric diseases. In: *Biological Effects of Magnetic and Electromagnetic Fields*, E. Ueno (ed.), Plenum Press, New York, 1996, pp. 161–169.
- Lai, H. and Singh, N.P. DNA single- and double- strand DNA breaks in rat brain cells after acute exposure to low-level radiofrequency electromagnetic radiation. *Int. J. Radiat. Biol.* 69:513–521, 1996.
- Lai, H. Spatial learning deficit in the rat after exposure to a 60 Hz magnetic field. *Bioelectromagnetics*. 17:494–496, 1996.
- Feagin, J.E., Wurscher, M.A., Ramon, C. and Lai, H. Magnetic fields and malaria. In "Biologic Effects of Light: Proceedings of the Biologic Effects of Light Symposium" Holick, M.F. and Jung, E. G. (eds.), Kluwer Academic Publishers, Hingham, MA, 1999, pp. 343-349.
- Lai, H. Biological effects of radiofrequency radiation from wireless transmission towers. In "Cell Towers: Wireless Convenience? Or Environmental Hazard?" Levitt, B.B. (ed.), New Century Publishing, East Canaan, CT, 2001, pp. 65–74.
- Singh, N.P. and Lai, H. Selective toxicity of dehydroartemisinin and holotransferrin on human breast cancer cells. *Life Sciences* 70:49–56, 2001.
- Lai, H. and Singh N.P. Magnetic field-induced DNA strand breaks in brain cells of the rat. *Environmental Health Perspectives* 112:687–694, 2004.
- Singh N.P. and Lai H. Artemisinin induces apoptosis in human cancer cells. *Anticancer Research* 24:2277–2280, 2004.
- Lai, H. Interaction of microwaves and a temporally incoherent magnetic field on spatial learning in the rat. *Physiology and Behavior* 82:785–789, 2004.
- Lai, H., Sasaki, T., Singh, N.P., and Messay, A. Effects of artemisinin-tagged holotransferrin on cancer cells. *Life Sciences* 76:1267–1279, 2005.
- Lai, H., Sasaki, T. and Singh N.P. Targeted treatment of cancer with artemisinin and artemisinin-tagged iron-carrying compounds. *Expert Opinion on Therapeutic Targets* 9:995–1007, 2005.
- Lai, H. Biological effects of radiofrequency electromagnetic fields. In G. E. Wnek and G. L. Bowlin, eds. *Encyclopedia of Biomaterials and Biomedical Engineering*, Marcel Decker, New York, 2005. DOI: 10.1081/E-EBBE-120041846
- Lai, H and Singh, N.P. Oral artemisinin prevents and delays the development of 7, 12-dimethylbenz(a)anthracene (DMBA)-induced breast cancer in the rat. *Cancer Letters* 231:43–48, 2006.