Columbia Technology Ventures

**Treating malaria using a simple magnetic-resonance method**

Technology #m09-014

“Lead Inventor: Paul Diament, Ph.D.

Rising Malaria Mortality Rates Due to Drug Resistance Malaria is a significant cause of death and illness in children and adults in tropical countries, with over a million people per year dying from malaria worldwide. Mortality rates are expected to rise due to high levels of resistance developed by malarial parasites, which face strong selective pressure from widespread and indiscriminate use of antimalarial medicines (such as chloroquine and sulfadoxine-pyrimethamine). As a result, there is a need for new malaria treatments. This technology describes a simple, magnetic-based method for treating malaria.

Using Magnetic Fields to Destroy Malarial Parasites The parasite invades red blood cells, feeds on the hemoglobin and discharges hemozoin, an iron crystal, that remains within the parasite in the host cell. By applying a mechanical torque through magnetic field to the hemozoin in the malaria parasite, one can get the iron crystals to rotate, oscillate, agitate, vibrate, and churn. This can achieve the destruction of the parasite, either directly by mechanical battery that can tear the parasite’s internal membranes or indirectly by conversion of the mechanical energy into heat. In more detail, the magnetic field can agitate paramagnetic fragments in the hemozoin to selectively heat up and destroy malarial parasites. Upon application of a magnetic field, the paramagnetic crystals will become weak bar magnets experiencing a torque seeking to orient them along the applied field direction. This alignment is opposed by the thermal energy of their environment, which constantly acts to randomize their assembly.

Applications: • Malaria treatment which is not based on chemical compounds • Exploiting paramagnetic properties of hemozoin crystals for developing malaria diagnostics • Cancer therapy applications

Advantages: • Non invasive method • Non chemical treatment, so no drug resistance


Licensing Status: Available for Licensing and Sponsored Research Support”

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