Australian National University

The relict chloroplast of malaria parasites. Where did it come from, what does it do and can we kill it?

Director's School Seminar Series.

Tuesday 26 June 2012 1pm

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Slatyer Seminar Room R N Robertson Building (#46), ANU

Malaria is a global world health problem. There is no vaccine, the available drugs are losing the battle against parasite resistance, and global warming threatens to exacerbate the situation. A crisis looms. Australia is currently malaria free, but in neighbouring countries such as Papua New Guinea, Indonesia, Timor Leste and the Solomons the disease is a serious problem.

Australia has a remarkably strong and diverse malaria research community that is well networked, well resourced and internationally renowned. My group is a relative newcomer to the discipline, but we have brought a novel perspective and some unique insights to malariology. We identified a relict chloroplast in malaria parasites, and we have focused on it as a new target for antimalarial drugs. The relict chloroplast is non-photosynthetic but essential to parasite survival. The parasite chloroplast is homologous to plant and algal chloroplasts and derives from an endosymbiotic blue green bacterium, which makes it an excellent target for drug therapy.

Our goal has been to understand the origin, function and biogenesis of the relict chloroplast in human parasites. We showed that malaria and related parasites are close relatives of the dinoflagellate algae that are symbionts of coral. We unravelled the mechanism of how the parasite targets nucleus-encoded proteins to the relict chloroplast, and we generated a map of the metabolism. From this map we predicted vulnerable pathways and explored the use of antibacterials and herbicides to kill parasites by blocking the relict chloroplast's metabolism. We developed Australia's first malaria life cycle facility allowing us to cycle parasites between mosquitoes and mice to facilitate genetic, metabolic, immunological and drug sensitivity studies.

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