Novel iPSC Platform to Study Host Pathogen Interaction

#### iPSC technology helps scientists model liver-stage malaria in a dish

Malaria is a parasitic disease which kills millions of lives worldwide. The life cycle of the parasite revolves between a mosquito vector and a human host. Malaria is transmitted when Anophelesmosquitoes bite a human being and release hundreds of sporozoites into the bloodstream of the host. After entering into the bloodstream, parasites migrate to the liver, where they can either remain dormant or initiate an asexual multiplication cycle to produce thousands of merozoites. The newly formed merozoites attack red blood cells and further initiate the asexual replication cycle. Some of the merozoites differentiate into male and female gametocytes, which are the only parasite form that can be transmitted from humans to the mosquito vector.

Recent drug development focus is to target the malaria parasite at the liver stages. This strategy could prevent the disease from flaring up. Recently, researchers at MIT have differentiated liver-like cells from induced pluripotent stem cells (iPSCs), which bio-mimic the mature human liver cells [1]. It has been already established that [iPSCs](http://www.hemacare.com/blog/index.php/skin-cells-stem-cells-new-face-cellular-therapy/) offer new opportunities for the treatment of many incurable diseases. This new discovery potentially offers a powerful tool to assess donor-specific drug responses, and such cells can facilitate the study of host genetics, host-pathogen interactions, and novel targets for antimalarial drug development.



*Researchers have engineered malaria in a petridish using iPSCs. Image Credit:*

In one investigation, researchers established in vitro liver-stage malaria infections in iPSC-derived hepatocyte-like cells (iHLCs) using Plasmodium sporozoites and found that cells did not have the same drug responses as adult liver cells. They found that the non-responsiveness towards drugs is due to the lack of drug-metabolism enzymes that are predominantly found in mature liver cells. They further demonstrate that chemically matured iPSC-derived hepatocyte-like cells acquire sensitivity towards the drugs, highlighting the potential to use iHLCs for antimalarial drug testing.

The team is now focusing on testing different existing and new malaria drugs using adult donor liver cells and then the iPSC-derived hepatocyte-like cells generated in this study. This novel study provides a tremendous opportunity to study disease in a dish, which would ultimately help scientists to screen drugs on patient-specific cells with varying genetic backgrounds, and discover the best treatment for each group.

This project clearly showed the therapeutic potential of iPSCs. We at [HemaCare](http://hemacare.com/) are proud to offer [stem cells](http://hemacare.com/biological_products_stem_cells.asp) that could contribute to your life-saving research.

Reference:

[1.] Ng S et al., Human iPSC-Derived Hepatocyte-like Cells Support Plasmodium Liver-Stage Infection In Vitro. Stem Cell Reports 2015 Feb 4: S2213-6711.

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