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Patient, heal thyself: Solution to personalised treatment for chronic infections could lie in patient's own blood

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A recent discovery by scientists at A*STAR's Singapore Institute for Clinical Sciences (SICS), in close collaboration with researchers at the Singapore Immunology Network (SIgN), provides hope for a new personalised treatment strategy that could use a patient's own blood to treat the infection. This could help treat millions of people living with chronic infections such as HIV, Hepatitis B or Hepatitis C. These findings were published in the August 2013 issue of *The Journal of Clinical Investigation*.

Patients suffering from chronic infections often have to undergo long periods of anti-viral drug therapy to control the virus. Anti-viral drugs are not fully effective against viruses such as Hepatitis B and Hepatitis C, which have chronically-infected about 400 million worldwide with more than 1,000,000 people dying from Hepatitis-related diseases every year.

Vaccines are a potentially effective means to treat chronic viral infections such as this because they can eliminate the virus naturally. However, vaccines for patients with chronic infections are often difficult to produce since these patients already have weak immune responses or the vaccine is not effective due to genetic diversity amongst viruses.

The team at SICS led by Prof Antonio Bertoletti has discovered that monocytes, a type of white blood cell that can activate an immune

response, are able to capture the virus in chronically-infected patients and use the captured virus to boost the patient's own immune response.

By using the viral antigen already present in the blood of the patient suffering from a chronic illness, this strategy redefines therapeutic vaccines by cutting down on time and resources as there is no need to specially isolate the viral proteins from patients, purify it, and then inactivate it to create a vaccine.

All the proteins present within the virus can be used to create a personalised vaccine for each individual. This also means that many of the complex issues associated with current vaccine therapy against chronic infections can be overcome, such as that of genetic diversity of viruses.

One of the greatest beneficiaries of this discovery would be chronically-infected patient populations in lower socio-economic strata. By tailoring vaccines to be more specific to each virus and each patient, vaccine production can be simplified and thus less costly. Vaccines produced via this discovery could improve the accessibility of such treatments.

Prof Bertoletti said, "Mobilizing the immune system to use the virus within the patient for a vaccine is a simple idea that could lead to a personalised, yet widely applicable, vaccine for chronic infections."

Prof Judith Swain, Executive Director of SICS said, "This excellent collaborative discovery between SICS and SIgN is a milestone in vaccine therapy for chronic infections. I believe that these findings will go a long way in improving future therapeutic treatments for chronic infections."

More information: Gehring, A. et al. Mobilizing monocytes to cross-present circulating viral antigen in chronic infection, The *Journal of Clinical Investigation*, August 2013, 2013.