

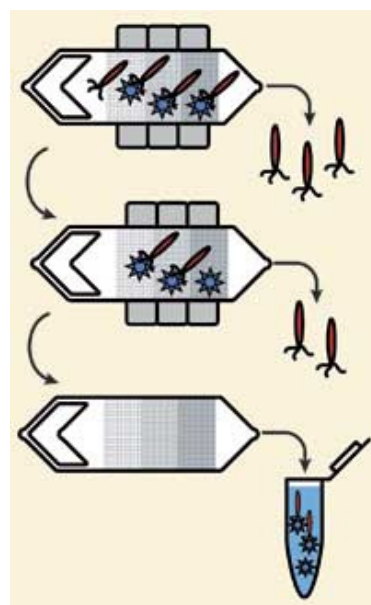


## Magnetic beads clean up phage display

24 March 2009

Microfluidic washing can improve drug candidate identification, according to US scientists.

Tom Soh at the University of California, Santa Barbara, and colleagues used micro-magnetic separation (MMS) to standardise the washing step in phage display, a method used to find proteins that interact strongly with disease-causing molecules, such as certain enzymes.



Some of the phages bind to the magnetic beads while the others are washed away

A bacteriophage (phage) is a virus that infects only bacteria. In phage display, scientists insert a new gene into a phage's genetic material. When bacteria process the new gene, they make a new protein, which is exposed on the phage's surface. Using a collection of around a billion phages each with a different inserted gene, scientists can create a library of phages, each displaying a different protein. They then expose the library to the immobilised target molecule. Some of the proteins bind to the target while the unbound phages are washed away. The bound proteins are potential drug candidates and are studied further.

The process requires a lot of the target molecule, explains Soh, which is problematic when it is in limited supply. It also yields false positives when proteins bind to the target's solid support rather than the target itself. 'It is also challenging to control accurately the stringency of washing in a reproducible way,' Soh adds - using a faster or longer wash flow can strip off bound phages from the target.

Soh's MMS device consists of a glass channel with nickel patterns on its surface. Soh coated magnetic beads with a target molecule then mixed the beads with a phage library in the channel. He left the mixture for 30 minutes, during which time some of the phages bound to the beads. When he applied a magnetic field to the channel, the beads stuck to the nickel and were held firmly in place while the unbound phages were washed away. He then removed the magnetic field, eluting the phage-carrying beads. Soh explains that he can alter the flow rate

**"Micro-magnetic separation provides a foundation for rapid and directed phage display"**

- Tom Soh, University of California, Santa Barbara, US

through the channel to maximise the quantity and diversity of the protein yield.

'MMS readily lends itself to incorporation into an automated system and provides a foundation for rapid and directed phage display,' Soh concludes.

*Michael Spencelayh*

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#### **Controlling the selection stringency of phage display using a microfluidic device**

Yanli Liu, Jonathan D. Adams, Kelisha Turner, Frank V. Cochran, Sanjiv Sam Gambhir and H. Tom Soh, *Lab Chip*, 2009

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