From the CSIRO

New method for harvesting stem cells could improve donor-patient treatment

Scientists in Australia have developed a novel, less invasive stem cell-harvesting method that reduces side effects for donors.

Current harvesting methods are lengthy and require numerous injections of the growth factor granulocyte colony-stimulating factor (G-CSF) to boost stem cell numbers.[1]

As described in *Nature Communications*,[2] the discovery reduces the time required to obtain sufficient stem cell numbers without the growth factor.

Developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), working with the Australian Regenerative Medicine Institute (ARMI) from Monash University, the method uses a newly discovered small molecule (BOP; (*N*-(benzenesulfonyl)-L-prolyl-L-*O*-(1-pyrrolidinylcarbonyl)tyrosine)) with an existing small molecule (AMD3100) to mobilise stem cells from bone marrow to the blood stream.

Susie Nilsson, from CSIRO, and her team demonstrated that stem cells could be seen in the blood stream an hour after a single dose of the combined molecules was administered.

"The new method eliminates the need for the growth factor G-CSF, reducing a procedure that once took days down to around an hour," Nilsson said.

"Until now, AMD3100 has only been effective in increasing stem cell numbers when combined with the growth factor," she said.

Not only does the combination eliminate the need for the growth factor, but transplanted harvested cells replenish the entire bone marrow system.

The scientists found no known side effects from combining the two small molecules.

According to ARMI Director, Professor Peter Currie, harvesting stem cells will become more effective and efficient using this method and will considerably reduce donor stress.

Successful pre-clinical studies in mice and humanised mouse models have so far demonstrated the efficacy of the treatment.[2]

A phase 1 clinical trial will assess the combination of the BOP molecule and G-CSF, before the eventual combination of the BOP and AMD3100 molecules.

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doi:10.5694/mja16.00608

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2 Cao B, Zhang Z, Grassinger J, et al. Therapeutic targeting and rapid mobilization of endosteal HSC using a small molecule integrin antagonist. *Nat Commun* 2016; 7: 11007. ■