

## BIOMIMETICS: THE DIRECTION FOR BIOSENSORS

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### Abstract

Hematopoietic stem and progenitor cells (HSPCs) are the key regulators of hematopoiesis which give rise to different, mature and committed lineages. Exposure to acute whole-body radiation results in the loss of HSPCs leading to the inability of the system to generate differentiated lineages which ultimately cause hematopoietic form of acute radiation syndrome (hs-ARS). Currently no safe and effective molecule as a radiation countermeasure is available for human applications. Due to this bone marrow transplantation (BMT) has become an indispensable strategy for the management of radiation over-exposed victims, hematopoietic malignancies and planned chemotherapy induced bone marrow depression. Several strategies have been employed to achieve successful Hematopoietic stem cell transplantation (HSCT), capable of enhancing HSC homing and engraftment potential but at a high cost. Here in this study, we have reported an inexpensive strategy involving short-term ex-vivo exposure of bone marrow mononuclear cells (BMMNCs) to a small molecule which successfully enhances the HSPCs proliferation, migration and homing to its BM niche after transplantation. Results indicate that ex-vivo exposure led to a significant increase in CXCR4 expression and migration of HSPCs towards SDF-1 $\alpha$  as evident from in-vitro studies. In-vivo data displayed that ex-vivo exposure of BMMNCs with the molecule resulted in a significant increase in the number of homed cells to the BM niche as compared to the vehicle treated group. Hence, the above strategy suggests an efficient and cost-effective method for achieving successful HSC transplantation for a variety of scenarios including management of hs-ARS.

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### Biography

Alan started his career as an academic, but moved into industry with Laporte/Interox and BDH/Merck rising to R&D management and business director roles. He was a member of two of the UK Government's Foresight Panels (Chemicals and Materials) and was a member of two university advisory boards. He was Chairman of a UK Faraday Partnership on electronic displays and an officer of one on colloids and formulation science. Alan set up a consultancy which helped manage a number of Government projects such as: Programme Director for the Manufacturing Molecules Initiative; Programme Coordinator for ACORN (a nanoparticles initiative); Associate Director of the Micro

Nanotechnology Network, a major initiative on nanotechnology, generating interest in nanotechnology and lectures in 5 continents. He has also worked with the World Bank in South America. He has been the author of 3 books on strategies and roadmapping and has facilitated over 50 technology roadmaps in a variety of sectors. Voluntary work includes being President of the Industrial Affairs Division of the Royal Society of Chemistry, and a Bureau member for the International Union of Pure and Applied Chemistry (IUPAC). Alan has worked with Presidents and S&T ministers in numerous Commonwealth countries on emerging technologies.