

# Bioactive glasses with tuned ion releasing capability to stimulate stem cells for tissue engineering

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## Abstract

Biochemical reactions occurring at the interface between bioactive glasses (BGs) and the biological environment, involving the release of BG ionic dissolution products, are relevant for both hard and soft tissue regeneration. The development and characterization of ion doped BGs will be discussed with focus on the effect of different biologically active ions released from BGs on stem cells, mainly umbilical cord and adipose derived stem cells as well as bone marrow-derived mesenchymal stem cells (BMSCs). BGs incorporating biologically active ions, such as B, Sr, Cu, Nb, Co, Li, Mn, will be considered. Indirect cell culture methods using endothelial cells with or without BMSCs in cell culture inserts exposed to ion dissolution products from BG scaffolds (e.g. Cu doped) will be presented to show that BMSCs secrete an increased concentration of vascular endothelial growth factor, thus confirming the angiogenic potential of such BGs. The results are evaluated regarding the stimulating effect of metallic ions on stem cells, also based on literature results. The variation of ion concentration in medium as function of time and the time dependent effects on stem cells will be discussed, which is required for the comprehensive assessment of BG biological performance with implication for clinical applications.

## Biography

Aldo R. Boccaccini is Professor of Biomaterials and Head of the Institute of Biomaterials at University of Erlangen-Nuremberg, Germany. He is also Visiting Professor at Imperial College London. His research activities are in the broad area of glasses, ceramics and composites for biomedical applications. He has co-authored more than 850 scientific papers. His work has been cited more than 36,000 times (Scopus®). Boccaccini is Fellow of the Institute of Materials, Minerals and Mining, American Ceramic Society, Society of Glass Technology and European Ceramic Society. He is the Editor-in-Chief of the journal "Materials Letters" and founding Editor of "Biomedical Glasses". He has received numerous international awards, including the Materials Science Prize of German Materials Society and Turner Award of International Commission on Glass. He is also a member of the World Academy of Ceramics, National Academy of Engineering and Applied Sciences of Germany and advisor to the Science and Technology Ministry of Argentina. Boccaccini serves in the Executive Committee of the Federation of European Materials Societies and in the Council of the European Society for Biomaterials.

