Editorial

Despite significant investment in tissue engineering research, few successful products have come to market. Hence, there is a need to accelerate tissue engineering research. One approach to accelerating development is combinatorial and high throughput (CHT) screening. Combinatorial approaches are utilized extensively for pharmaceutical research and their application to biomaterials development is growing. This special issue is a collection of primary research articles and reviews that highlight the state of the art in this exciting and burgeoning field of research.

The basic premise of combinatorial and high throughput biomaterials research is the development of methods for rapidly screening cell response to libraries of biomaterials. Just as combinatorial libraries of candidate drug compounds are screened for therapeutic effects using *in vitro* cell culture, combinatorial libraries of biomaterials can be screened for their ability to positively influence cells. Typically, miniaturized specimens of biomaterials are fabricated in the form of gradients or arrays such that many biomaterials, compositions and material properties are present in each specimen or library. Cells are then seeded onto the library specimens and responses such as adhesion, morphology, proliferation, migration and differentiation are assessed.

Instead of responding to soluble factors as is characteristic in drug screening, the cells in a biomaterials screen are responding to the properties of their adhesive biomaterial substrate. The chemical and physical properties of a material will strongly influence cell response. It is also important to keep in mind that cells rarely interact directly with a biomaterial. Proteins present in blood *in vivo* or serum *in vitro* immediately adsorb onto most materials. Thus, cell response to a biomaterial is strongly influenced (and some would say dominated) by the species, amount and conformation of proteins that adsorb onto a biomaterial.

Advances in combinatorial screening of biomaterials are being made at all levels including biomaterials synthesis, library fabrication, cell screening and data analysis; and articles that focus on each of these levels have been contributed to this special issue. In addition to their applications in screening, biomaterial gradients also have potential applications as functional materials. A scaffold with a gradient in properties could serve as a template for the generation of a graded tissue. Gradients in composition and properties are common at the boundaries of most tissues and the need for “interface tissue engineering” is well-recognized. I hope you enjoy the articles in this special issue. It will be exciting to see where the innovators in this field will take us next.

All articles and reviews in this special issue were peer-reviewed by 2 referees according to the journal’s standard editorial policies. I would like to thank all of the contributors and reviewers who helped make this issue possible. I would also like to thank Richard van Breemen (Editor-in-Chief), Samina Khan, Sadaf Zehra, as well as the entire staff at *Combinatorial Chemistry and High Throughput Screening* for their assistance in putting this issue together.

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