

Editorial

The 18th European Conference on Biomaterials was held in Stuttgart, Germany from 1 to 4 October 2003 including a third forum for young scientists. For us, the organisers, it was really a great pleasure to welcome more than 400 scientists from all over the world and listen to the latest findings in biomaterial development. Within the last 26 years this traditional meeting has established a reputation not only in the European Biomaterials Community but also world-wide. Scientists came from 31 countries and included delegates from Australia, Brazil, Japan, Korea and Siberia.

Research and development in the field of Biomaterials is typically a very interdisciplinary activity. When the Society started its activities, research was focused on the selection of available materials, the testing of their properties and their biocompatibility. In recent years more and more materials were modified or even specially developed to meet biological requirements, needing the co-operation of chemists, engineers and biologists. At the same time scientists from the medical field (biologist, surgeons) established the new field of tissue engineering. These two groups had some difficulties to overcome together: as most of the biomaterials available did not fulfil the requirements for tissue engineering, e.g. to simulate the natural environment of the tissue, to degrade without side-effects, to sustain the differentiation status of the cells over longer periods of time and so on. Simultaneously the developer of biomaterials had difficulties to fulfil the increasing requirements for biocompatibility. As a consequence tissue engineers considered the use of natural (e.g. biological) materials like collagen, starch and alginate. They also went back from the laboratory to the body as probably the best bioreactor. It seemed that in many cases no biomaterial is needed at all for this promising method of treatment, as in the transplantation of chondrocytes into articular cartilage. Material scientists, on the other hand, made efforts to functionalise materials by combining natural with synthetic materials, often with biological signalling substances like RGD – peptide. For some time it remained unclear, if these two groups would ever meet.

Today the term “Tissue Engineering” is often replaced by “Regenerative Medicine”, reflecting a wider point of view of this kind of medical treatment. This term means that the regeneration of a tissue or an organ is the primary goal. For this objective, biomaterials as carriers and shaping components, cells, signalling molecules like growth factors or mechanical stimulation or different combinations of these factors are considered, depending on the specific situation, the type of tissue and disease. Hence, in some cases, it might also be possible to use a material alone or in combination with biochemical signal to regenerate tissue. The increasing interest in drug delivery materials reflects this development also in the European Society for Biomaterials.

Both parties have learned from failures in many projects and so today there is much fundamental work to understand how cells and the body react on materials and signals on one side and how tissues develop and how they are organised on the other side. This situation has also been reflected in the abstracts that we received for the Conference: more than 50% of papers, presented in this special issue analyse the biological reaction *in vitro* or *in vivo*. Compared to former Conferences, new topics like bio mimetic materials, infection, *in vivo* evaluation, drug delivery materials and vascular systems filled several oral sessions. Others, like wear/bone materials, were significantly less represented. The program, including 160 oral and 154 poster presentations completed by 38 last minute posters represented a variety of the ongoing research in the field of Biomaterials.

Today we have many beautiful experimental tools to observe and understand the complex reaction of the body to materials. If they are sufficient to improve significantly and develop materials for the treatment, or even for the complete regeneration of defects, further Conferences will be highly exciting. What we already understand today is that each defect, each tissue, needs its own special solution. All areas of science have to be included to develop these solutions. As a first step new “intelligent” materials consider or even profit from dynamics in living tissues by changing their characteristics depending on the environment.

This special issue includes the best papers of the wide range of topics that had been presented and discussed in Stuttgart last year. We invite you not only to have a look on your special field of interest, but also to consider ideas for your work from people working in other fields. We believe that this issue of *Materials in Medicine* gives a wide overview over the highly sophisticated work in Biomaterials and we hope you enjoy and profit from reading it.

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