

Chair's introduction

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In my introduction I would like to frame some of the questions that we will be addressing over the next several days. Some of these are obvious, but I hope that out of this meeting we will synthesize some new ones.

Clearly, we would like to know what stem cells are, and how we can define them functionally and molecularly. What are their properties? What is this entity known as 'stemness' that has now appeared in the literature? Are we talking about epigenetics or chromatin structure? All of these are likely to be involved. What are the sources of stem cells? In fetal tissues, embryonic tissues, adult tissues, how do we recognize, isolate, characterize and grow them? These are all issues that will be central to our discussions over the next three days. Most importantly, we are concerned about how we can control these cells in the laboratory. How do we get them to do the things that we want them to do, such as differentiating into specific cell types with high efficiency? What strategies are currently used and how successful are these? In grafts, can we get stem cells or their derivatives to do what we want them to do, for example differentiating in a tissue appropriate manner, with no migration and no tumour formation? Also, it is clear that stem cells exist *in situ*. Will it be possible to manipulate them *in situ* without taking them out and then grafting them back? Somatic cell nuclear transfer (SCNT, or cell nuclear transfer, CNT) is an important technology in stem cell research. Embryonic stem cells derived from patients will be important in avoiding the immune response to grafted cells and in studying diseases. SCNT will also enable us to study and therefore gain an understanding of the basis of cell differentiation.

Then there is the whole issue of the development of cell-based therapies. While there are some published proofs of principle, there remain many obstacles to developing safe and effective cell-based therapies. Some believe that there should be a more complete understanding of the pathogenesis of the disease and of injuries, so we know exactly what we are doing when we go in and try to replace diseased, injured or dead cells. One area that should receive more attention in the public discussions is the issue of time-frames for the development of safe and effective therapies. We are faced with an issue in the USA of politicians who are elected for 2, 4 or 6 years and want something done within that time-frame. We

must be circumspect in making predictions about time-frames. The expectations that go with these predictions or promises that are not met will have serious repercussions. At this meeting we have Tom Murray, who refers to himself as our token ethicist. There are many ethical issues in this field that need to be dealt with fairly. All of us as scientists would feel more comfortable if suitable guidelines were in place. This will come from discussions which not only reflect the sensitivity of the issues, but would also permit robust forward movement of our research. In the USA we see the increasing politicization of the stem cell debate: two members of the President's Council on Bioethics were recently replaced because their views were not in sync with those of the chairman of the Council. We do not know how this will affect recommendations for national policy, but it results in less credibility for the Council.

I am sure that everyone in this room will contribute something significant over the next few days, and we look forward to this mixing of scientists which is at the heart of these symposia.

Many of us have heroes in embryology. One person who stands out for me is Karl Ernst von Baer, and I wanted to reflect on a paraphrase of what he wrote more than 100 years ago: 'All new and truly important ideas and discoveries must pass through three stages: first, dismissed as nonsense, then rejected as against religion, and finally acknowledged as true, with the proviso from initial opponents that they knew it all along.' We are currently between stages two and three.