

From bench to bedside and back again

The Center for Applied Biotechnology and Molecular Biology (CABMM) provides a unique platform for translational research, as Prof Dr Brigitte von Rechenberg outlines

Translational research has become fashionable in our research community and everybody seeks to be part of this trend. Consortiums dedicated to this trend get together all over Europe and are partners in various research projects. This will also be true for the EU's new framework programme, Horizon 2020.

However there are not many centres that, independently from grant projects, have a translational research network set up at their own universities, where basic scientists, clinicians, material scientists and industrial partners routinely work together to bring novel solutions and innovations in the field of biotechnology and molecular medicine to the medical market. CABMM is such a network and an official competence centre at the University of Zurich (UZH), Switzerland.

A unique approach

The location in Zurich is ideal for this network, where leading research institutions at the medical faculty and Vetsuisse faculty of the UZH, as well as the Federal Institute of Technology (ETHZ), are almost within walking distance, and where scientific exchange is facilitated by close and daily interactions on all levels. All three schools belong to the leading institutions in Europe and again being unique, there is no other location in Europe, where the expertise of the medical and veterinary school with facilities for preclinical studies and researchers from the technology side at the ETHZ can encounter this daily exchange. An ultramodern and

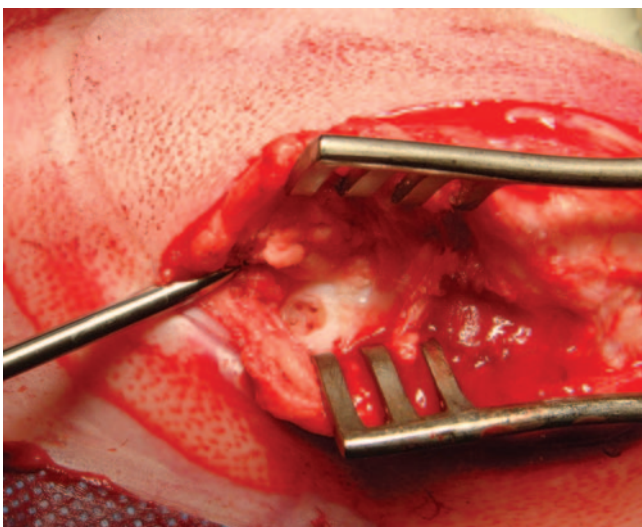


Fig. 1 A cartilage defect in the stifle joint of a knee treated with a microfracturing technique before cell constructs are filled in for regeneration of cartilage surface

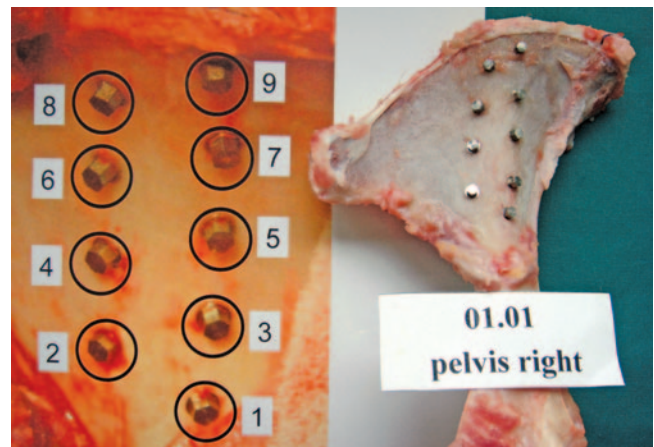


Fig. 2 A pelvic animal model in sheep is used to test the biocompatibility and osseointegration for dental implants with modified metal surface. The insertion in the iliac wing allows comparison of different implants within the same animal, and can be used for histological and biomechanical evaluation. The animal model is well suited for translation of results to the human patient

vast infrastructure at all institutions guarantees access to the most modern technologies in the field of biotechnology.

Furthermore, CABMM is also the only network at a European university that offers solutions for regulatory affairs under one roof. Accreditations for Good Manufacturing Practice (GMP), Good Clinical Practice (GCP) and Good Laboratory Practice (GLP) that are required for registration of novel medical products at the Food and Drug Administration (FDA) are available at CABMM and make it possible to keep translation from the very beginning of an innovation in focus and get there effectively also for industrial partners.

Normally, research networks centre on a research topic, for instance the 'osteoarthritis network' that was sponsored by the Canadian Government. A different approach makes CABMM unique, since translation in applied biotechnology and molecular medicine is not centred on a research topic, but includes many different areas in the medical, veterinary and materials field that finally make translation possible. Four major fields are represented: a) experimental medicine and surgery; b) molecular medicine; c) regenerative medicine; and d) applied biotechnology.

To become a member of CABMM, one has to prove that translation is real, and not just an empty word. Collaborations between partners are a prerequisite and are encouraged between basic researchers, material scientists and clinicians. The focus is always placed on bringing novel developments to the patients and thus

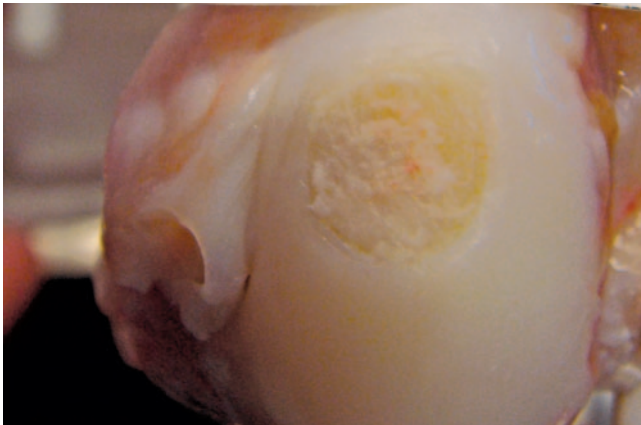


Fig. 3 A cartilage defect is filled with a synthetic scaffold and stem cells to regenerate the surface. This picture is taken four weeks after surgery and the surface already shows some new cartilage formation

keep regulatory issues abreast from the very beginning of each novelty. This includes as well the industrial partners and their knowledge of how to bring a new medical product to the market. A specific translational board is being set up at CABMM to facilitate this process, where industrial partners and major players in the field of biotechnology accompany new strategies and developments.

Translational research

The setup at the CABMM and its symposia and workshops are instrumental in disseminating knowledge in translational research. Even though partners may be engaged in different research fields, they may have technologies available that are helpful and supportive for other groups. After each of these meetings, new groups unite and new collaborations are started which makes the network stronger and growing almost monthly.

The network is now already so strong that researchers applying for support can be set up with adequate partners in a reasonably short time such that new research projects with academic and industrial partners can be up and running within a period of three to four months. Due to the already existing tight connections there is no loss of time when everybody has to search for appropriate partners, which is a big advantage for academic, but also for industrial, partners. Funding possibilities are also improved for such a network and, as the years since the existence of the CABMM has shown, successful applications for competitive grants were quite common on the national as well as on the international level.



Fig. 4 A synthetic restorable material consisting of a hydrogel and biomimetic is tested as bone replacement in a standardised tibia defect in sheep



Fig. 5 Histology of synthetic material in the tibia defect after 12 weeks. Note the new bone formation within the defect (Ground section, toluidine blue)

A steering board with the support of the managing and scientific directors of CABMM lays out the CABMM strategy and works closely together with an international scientific advisory board that consists of internationally known experts in the field of biotechnology and molecular medicine. This board is supported by both deans from the medical and Vetsuisse faculty *ex officio* and thus, is well embedded in the overall strategy of both medical schools. The overall strategies are also well funded in the membership since major decisions are brought to the membership and voted on democratically – as you would expect in Switzerland, the core of people’s democracies. This ensures that all different fields are respected and decisions are bundled for the benefit of all members and their research groups.

Apart from the visual network, CABMM also offers a research and laboratory platform where lab space can be rented for scientists and their research projects can be supported by the already existing network. This is especially attractive for new groups that can also profit from the already existing infrastructure.

Regular scientific meetings and lecture series also ensure the academic exchange between (young) scientists of different fields; setting them up in the broad aspects of translational research and bringing clinicians and basic scientists together to speak a common language – the language that allows the development from bench to bedside and back again.



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