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GAMBA European Project (Gene Activated Matrices for Bone and Cartilage Regeneration in Arthritis)

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The European Union has funding a research project coordinated by the Klinikumrechts der Isar der Technischen Universität München (TUM), Munich, Germany. The project develops new methods for treatment of osteoarthritis. Researchers aim at inducing the self healing capacity of damaged cartilage and bone by coordinated cooperation/interaction of gene vectors, mesenchymal stem cells, and carriers.

Looking at the population aged 65 and higher, every second person suffers from the disease, with increasing degeneration of cartilage and ultimately destruction of the underlying bone as well. The etiologyof osteoarthritis (OA) is still unknown. Therapy is currently mainly symptomatic with reduction of pain and inflammation, but not restorative, and is often ending in total joint replacement. The research project GAMBA (Gene Activated Matrices for Bone and Cartilage Regeneration in Arthritis) (www.gamba-project.eu)was investigating new methods to induce regenerative processes within the body.

Project coordinator Dr. Martina Anton and co-initiator Dr. Christian Plank at the Institute for Experimental Oncology and Therapy Research (Director: Prof. Bernd Gänsbacher) at Klinikumrechts der Isar have assembled a team of international specialists with nine research groups from Germany, France, Ireland, Italy, The Netherlands and Switzerland.

The project outline concerns essentially a nano-biotechnological approach for spatiotemporal control of therapeutic bioactivity on command and demand based on a novel gene activated matrix platform complemented with an innovative program of public outreach

- Medical indication of OA.
- Three compartments / Three tissues.
- Three genes: IL-10, TGFb, BMP2.
- Three methods of regulation: Heat, Doxycycline, Inflammation.
- Two types of vectors: non-viral and adenoviral.
- Two biomaterials: biomimetic hyaluronan gel, Bioceramic MBCP + Technology.

Strategies were developed experimentally. Researchers aim at inducing self-healing capacity of patients by use of mesenchymal stem cells (precursors for bone, cartilage and adipose tissue cells). Using gene vectors cells will be equipped with new genetic information that will allow for production of therapeutically relevant proteins in a transiently. Ideally a three-fold combination will be developed addressing inflammation as well as cartilage and bone repair (Figure 1).

Dr. Christian Plank explains that local and temporal regulation are essentials of GAMBA: "By being able to specifically switch on and off gene vector activity and embedding of vectors and cells in synthetic hyaluronic acid gels and synthetic bone substitute (Micro Macroporous Biphasic Calcium Phosphate technology), we aim at limiting of gene vector action to the diseased tissue." Dr. Martina Anton cautions excessive expectations: 'It might well occur that we can only induce one or two of the intended three healing processes.' However, if as hoped for the results point to promising methods, in the next step researchers will investigate how patients can profit from these new results.

Another essential part of the project deals with involving patients and citizens early in the research. Therefore novel ways of outreach methods called patient and citizen panels was used. These will be held indifferent countries in order to enhance awareness of nano-medicine in the public and take into account public expectations and reservations. Aim was to start early on a public debate on ethical, legal and societal issues connected to the research project.

BDA Journal, have the opportunity to publish online the manual of the project and the compendium. These papers have been elaborated by Beatrice Lugger, from the partner of the project Science Dialogue. The paper was realized for patient and citizen panels regarding ethical, legal and social aspects of innovative therapies with adult stem cells, gene therapy and nanoparticles.

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Editor in chief

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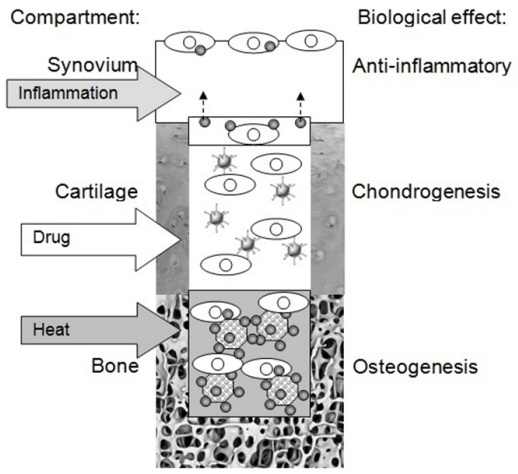

Figure 1: Over-view of GAMBA.

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