A wide palette of bone, cartilage, nerve and soft tissue defects as a consequence of injuries and surgeries pose a challenging medical problem. Frequent post-traumatic complications additionally burden the affected patients with a long and painful period of recuperation, without a satisfactory end result in some cases. Our research strives to supply medical professionals with a variety of products and methods that will pave the way to a successful and full recovery – even in the most difficult and severe scenarios.

Research that saves lives

Ludwig Boltzmann Institut
für experimentelle und klinische Traumatologie
Donaueschingenstraße 13
A-1200 Vienna
Tel.: +43-1-33110-464
Fax.: +43-1-33110-460
E-Mail: office@trauma.lbg.ac.at

„A wide palette of bone, cartilage, nerve and soft tissue defects as a consequence of injuries and surgeries pose a challenging medical problem. Frequent post-traumatic complications additionally burden the affected patients with a long and painful period of recuperation, without a satisfactory end result in some cases. Our research strives to supply medical professionals with a variety of products and methods that will pave the way to a successful and full recovery – even in the most difficult and severe scenarios. ”

Doz. Dr. Thomas Nau

LBI Trauma
Tissue Regeneration
“Don’t repair, regenerate!”

Bone
Cartilage
Nerves
Soft Tissue

Ludwig Boltzmann Institut
für experimentelle und klinische Traumatologie

AUVA

LBI Trauma
From Lab to Patient: Nerve Regeneration

"Regarding the basic coordination of neuronal signal transmission, we are on the right track to answer the question on how a single nerve can control two completely different motor functions in the body."

Prof. Robert Schmidhammer

In a recent clinical case of permanent, non-repairable elbow nerve damage, fibers of an adjoining respiratory nerve were adapted to serve as a functional substitution for the elbow nerve transmission. While the procedure had no negative impact on the synchronization of breathing whatsoever, the patient has regained function of the elbow joint.

Non-viral Gene Therapy

"Non-viral somatic gene therapy enables the control of various cell differentiation processes by transient modulation of genetic information."

Mag. Georg Feichtinger

In our most recent studies, we have concentrated on applying non-viral gene therapy for bone repair. Coding sequences of several Bone Morphogenetic Proteins (BMPs), growth factors with an already recognized clinical relevance, were introduced into selected cell populations of fractured bones to enhance BMP production in the injured area. Preliminary results have demonstrated that this novel treatment protocol can boost bone regeneration after fractures. Experimental successes of non-viral somatic gene therapy warrant further in-depth investigation, given that this approach may also serve as a launching pad for analogous attempts in other areas such as soft tissue wound healing and nerve regeneration.

"Apart from bone and soft tissue injuries, organs and tissues such as heart, nerves, ligaments as well as a variety of illnesses are within the scope of shock wave research."

Dr. Rainer Mittermayr

This observation has culminated in a clinical application of shock waves for the treatment of slow healing bone fractures with a healing rate of up to 90%. The underlying mechanisms that lead to these remarkable and beneficial outcomes produced by shockwaves are the central point of our ongoing research activities.

Extracorporeal Shock Wave

Clinical application of non-invasive shock waves originates from the early 1980s, when it was first introduced as a very effective method for the fragmentation of kidney stones (lithotripsy). After several years of use, it was unexpectedly discovered that acoustic shock waves can also exert a biological effect on bone tissue.

The focal point of our work lies in the isolation of stem cells, either from donated tissues or any suitable biological waste material. In the experimental setting, these isolated stem cells demonstrated highly anti-fibrotic properties and promoted restitution of scars into the original and functional tissue in organs such as liver and lungs. As another example, human stem cells isolated from adipose tissue can effectively stimulate and support the regeneration of nerve fibers.

Stemcells & Regeneration

"The discovery of stem cells has stirred high hopes in medical professionals and patients alike. The premise that stem cells can differentiate into any given cell of the human body, has awaken the idea of living, fully functional replacement parts for organs and tissues."

Dr. Susanne Wolbank

In our most recent studies, we have concentrated on applying non-viral gene therapy for bone repair. Coding sequences of several Bone Morphogenetic Proteins (BMPs), growth factors with an already recognized clinical relevance, were introduced into selected cell populations of fractured bones to enhance BMP production in the injured area. Preliminary results have demonstrated that this novel treatment protocol can boost bone regeneration after fractures. Experimental successes of non-viral somatic gene therapy warrant further in-depth investigation, given that this approach may also serve as a launching pad for analogous attempts in other areas such as soft tissue wound healing and nerve regeneration.

"Apart from bone and soft tissue injuries, organs and tissues such as heart, nerves, ligaments as well as a variety of illnesses are within the scope of shock wave research."

Dr. Rainer Mittermayr

This observation has culminated in a clinical application of shock waves for the treatment of slow healing bone fractures with a healing rate of up to 90%. The underlying mechanisms that lead to these remarkable and beneficial outcomes produced by shockwaves are the central point of our ongoing research activities.