NORTHOPEDICS

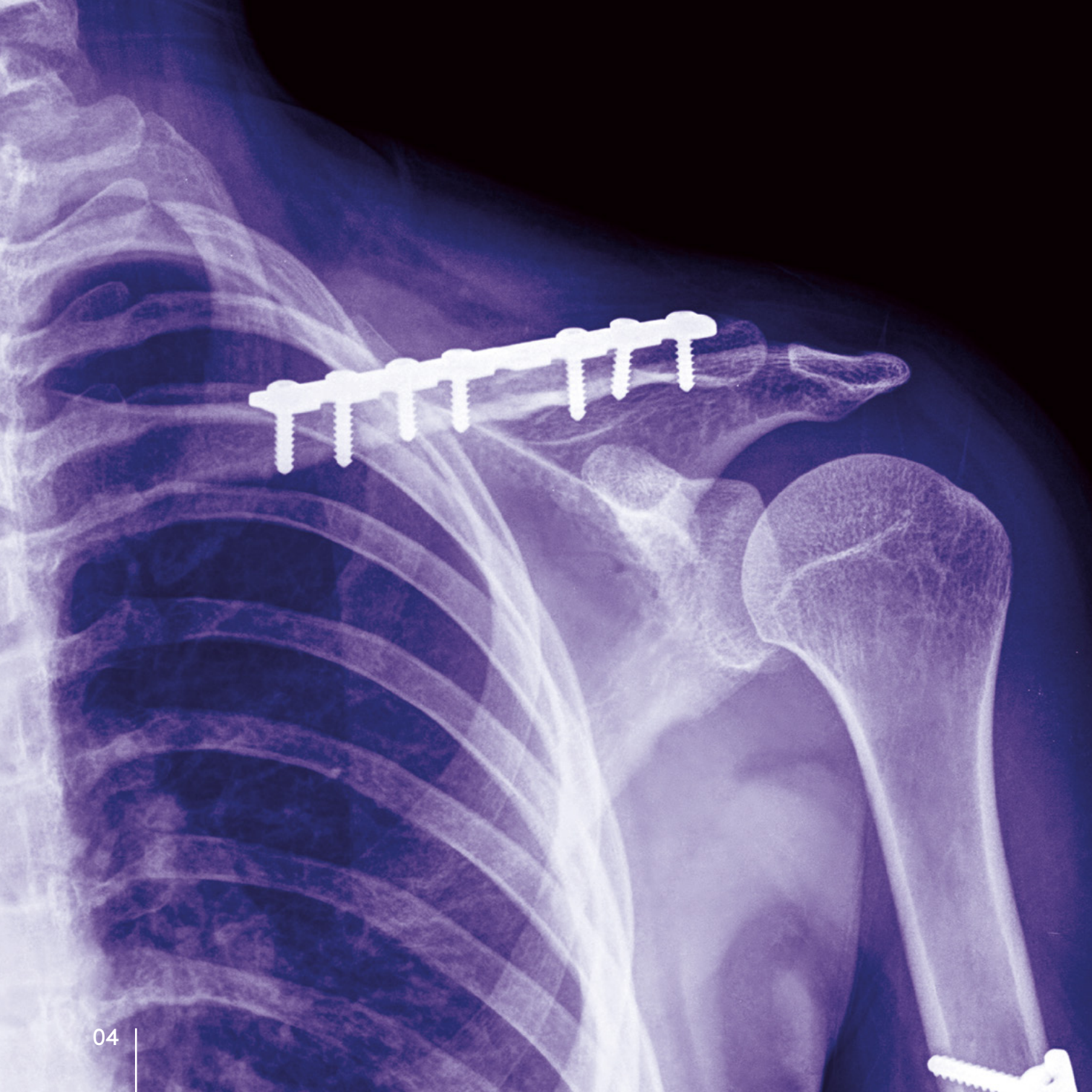
INNOVATION NETWORK FOR BONE HEALING

LIFE SCIENCE NORD

NETWORK GUIDE

Funding

The NORTHOPEDICS project is financed for a three-year period (June 21, 2016 to June 30, 2019) by the European Regional Development Fund (ERDF) and the federal state of Schleswig-Holstein within the framework of the Schleswig-Holstein's Regional Economic Programme.



Dear Readers,

It is forecast that about 34 percent of the population in Germany will be 65 or older* in 2060. This also means that the frequency of musculoskeletal diseases, most of which are more prevalent in elderly people, such as osteoporosis and arthritis, will increase. At the same time, the costs of treatment and the need to remain active and mobile in old age will both rise. These trends show the need to develop innovative bone healing solutions.

There are excellent skills in hospitals, the scientific community and industry in the Life Science Nord region. The NORTHOPEDICS project, launched in 2016, has led to the establishment of an innovation network for bone healing in which regional expertise is pooled and interdisciplinary and intersectoral cooperation is promoted. The aim is to step up research and development efforts to come up with new ideas, approaches, products, methods and services in the field of bone healing.

In this Network Guide, we present the players in the NORTHOPEDICS network and their areas of expertise. If you wish to learn more about NORTHOPEDICS, please contact us!

Dr. Hinrich Habeck
Managing Director

Marion Zenthoefer
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NORTHOPEDICS

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* Source: https://de.statista.com/themen/653/demografischer-wandel/

LIFE SCIENCE NORD
INNOVATION FOR YOUR HEALTH

Introduction

Life Science Nord is the regional network for medical technology, biotechnology and pharma in Hamburg and Schleswig-Holstein. About 500 companies are located in the region. In 2016, they generated a gross value added of € 4.3 billion. Some 49,900 employees work in the industrial health economy in Northern Germany.*

The business landscape and valuation creation in the life sciences

The business landscape in the North is broadly based on and includes both large groups and many small and mid-sized businesses. A further notable feature of the cluster is the existence of a complete value chain in the region: from basic and applied research to clinical trials and the final marketable product. The region thus has one of the most extensive clusters of the industrial health industry in Europe. In addition, there is a diverse research landscape in Schleswig-Holstein and Hamburg – besides the University Medical Centers (Schleswig-Holstein (UKSH), Hamburg-Eppendorf (UKE)) numerous renowned research institutes, such as the Helmholtz-Zentrum Geesthacht, Kiel University, TU HH and DESY, are located in the region.

The network as an innovation engine

The life sciences are a dynamic sector in Northern Germany in which new products and solutions are regularly developed. In Northern Germany, there are traditional established areas of expertise in which innovations are developed. In medical technology, the focus is mainly on imaging technologies, precision surgery and implantology. Companies in the biotechnology and pharmaceuticals sectors concentrate above all on drug research, molecular diagnostics, platform technologies as well as laboratory equipment and supplies.

Networking among the sector forms an important basis for the region's innovative strength. Moreover, the cluster helps bringing together the interests and needs of the sector to promote and develop the region further.

Cluster Management and the Association

In 2004, Hamburg and Schleswig-Holstein decided to provide targeted support to the life science industry in Northern Germany by establishing Life Science Nord, a cluster management agency that operates across both states. Since then, the cluster has been known as Life Science Nord. Moreover, over 240 companies are organized in the similarly named Life Science Nord e.V. (up to 2013 Bay to Bio e.V.), a registered association that represents the interests of the sector. The association and the Management GmbH work together to promote life sciences in the region and create one of the leading life science clusters in Europe. As the central point of contact for the sector, the Life Science Nord Management GmbH also initiates and advises on international and regional projects that sharpen the region's profile.

* Source: WifOR-Study for 2016

4.3 bn gross value added of the cluster in 2016

49,900 persons in employment in the cluster in 2016

4.2 bn cluster's exports in 2016

NORTHOPEDICS

THE NORTH'S INNOVATION NETWORK FOR BONE HEALING

Building on current expertise in hospitals, the scientific community and industry, NORTHOPEDICS is established as an area of focus in the Life Science Nord region. NORTHOPEDICS takes a cooperative approach to determine clinical needs, pool expertise and drive research into, and the development of solutions, products, processes and services in the field of bone healing.

Advisory Board

The network is supported by renowned experts from regional hospitals, research institutes and industry. The following persons are members of the NORTHOPEDICS advisory board and assist the innovation network with their strategic expertise:

- Dr. Eleonore Behrens, UKSH Kiel, Department of Dental, Oral and Maxillofacial Surgery and Plastic Surgery, Dental Implantology
- Prof. Dr. Claus-C. Glüer, UKSH Kiel, Kiel University, Department of Radiology and Neuroradiology, Section Biomedical Imaging, Molecular Imaging North Competence Center (MOIN CC)
- Prof. Dr. Christian Jürgens, BG Klinikum Hamburg & UKSH Lübeck, Department of Orthopaedics and Trauma Surgery
- Prof. Dr. Michael M. Morlock, TUHH, Institute of Biomechanics
- Prof. Dr. Eckhard Quandt, Kiel University, Institute for Materials Science, Inorganic Functional Materials
- Dr. Bernd Robioneck, Stryker Trauma GmbH, Global Research and Development
- Prof. Dr. Johannes M. Rueger, formerly UKE, Department of Trauma, Hand and Reconstructive Surgery (retired)
- Prof. Dr. Carsten Schultz, Kiel University, Institute for Innovation Research, Chair of Technology Management
- Prof. Dr. Andreas Seekamp, UKSH Kiel, Department of Orthopaedics and Trauma Surgery
- Prof. Dr. Dr. Ralf Smeets, UKE, Department of Oral and Maxillofacial Surgery
- Prof. Dr. Regine Willumeit-Römer, Helmholtz-Zentrum Geesthacht & Kiel University, Institute of Materials Research, Metallic Biomaterials

Through NORTHOPEDICS, we can support you by

- highlighting your expertise and transferring your project results through the information channels of LSN
- arranging thematic networking events, working groups and project meetings in the region
- finding cooperation partners on a regional, national and international level to initiate collaborative projects
- advising on appropriate public funding and related contacts
- integrating complementary sectors into the innovation process

Working Group: Implant-associated Infections

The working group IAI is a group of experts from clinical, industrial and research backgrounds in Hamburg and Schleswig-Holstein. The working group meets at regular intervals to discuss current clinical requirements and develop innovative ideas in the field of implant-associated infections. The purpose of these activities is to identify and initiate R&D projects with the long-term goal of improving the situation of patients. The working group is open for cooperation partners.

Initiators: Prof. Dr. Holger Rohde (UKE HH), Dr. Ulf-Joachim Gerlach (BG Klinikum Hamburg), Prof. Dr. Arndt-Peter Schulz (UKSH Lübeck & BG Klinikum HH), Prof. Dr. Wolfgang Streit (University HH), Altona Diagnostics GmbH (HH), Prof. Dr. Mohammed Es-Souni (UAS Kiel), Prof. Dr. Regine Willumeit-Römer (HZG), Stryker Trauma GmbH (Schönkirchen near Kiel)

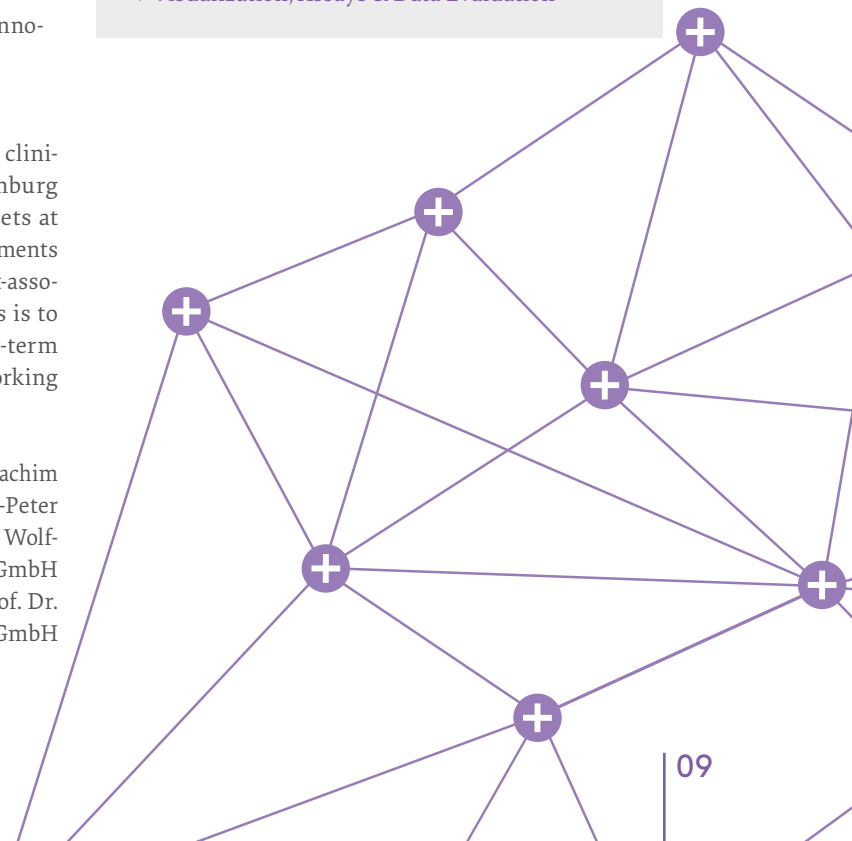
Particular Areas of Focus

Clinical needs

→ Diagnostics, Therapy & Prognosis of Bone Healing
→ Implant-associated Infections
→ Osteoporosis
→ Bone Tumors & Inflammations

Technical solutions

→ Implants & Functionalization
→ Materials & Production Technologies
→ New Forms of Therapy & Prevention
→ Visualization, Assays & Data Evaluation



TRAUMA & ORTHOPAEDICS

AWISO e.V. – ARBEITS-GEMEINSCHAFT WINKELSTABILE OSTEOSYNTHESE

A group of orthopaedic surgeons, engineers and other scientists have established the organization named awiso®, a working group on locked osteosynthesis.

Angular stable – or locked – fittings of osteosynthesis implants (plates and nails) and the anchoring of endoprosthesis are gained by means of form, force and material. The construction principle of a locked osteosynthesis can often be found in nature and gains its advantages by the broad transmission of forces. Force overload – as it is often found in the punctual force transmission of regular implants – can be minimized.

awiso® is active in the research of locked implants, biomechanics, development of test methods and is regularly holding seminars and courses for physicians and engineers active in the field of bone and joint surgery.

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 5
FOUNDING YEAR: 2005

KEYWORDS

Bone
Locked plate
Biomechanics
Osteosynthesis
Fracture
Angular stability

BG KLINIKUM HAMBURG

The BG Klinikum Hamburg (BGKH), located in the city's Lohbrügge district, is a high-performance hospital with a reputation that extends far beyond the city limits of Hamburg. In line with its motto of "top-class medicine with a human face", around 10,000 inpatients and 25,000 outpatients are provided with professional medical treatment each year. A staff of some 2,200 employees provide the complex range of interdisciplinary services every day. The BGKH is one of nine Employers' Liability Insurance Association emergency hospitals ("berufsgenossenschaftliche Unfallkliniken" or "BG Kliniken") nationwide under the aegis of the Hospital Group of Statutory Accident Insurance ("Klinikverbund der gesetzlichen Unfallversicherung"). Our key focus lies on providing medical care and rehabilitation to patients who have experienced work or commuting accidents or suffer from occupational diseases. As a supra-regional trauma center we offer acute care and initial rehabilitation with quality treatment for severely injured patients and outpatient treatment, helping patients return to work and resume a normal everyday life.

Special Departments

- Trauma surgery, orthopaedics and sports traumatology
- Septic trauma surgery and orthopaedics
- Hand surgery, plastic surgery and microsurgery
- Serious burn injury center
- Quadriplegic center
- Neurourology
- Neurotraumatology
- Neurology
- Neurosurgery
- Psychotraumatology
- Rehabilitation medicine center
- Interdisciplinary early rehabilitation
- Anaesthesia, intensive care, emergency medicine and pain therapy
- Dermatology (iDerm)
- Radiology
- Sports medicine
- Hamburg trauma network
- Expert report center

Facilities

- BG Klinikum Hamburg / City Rehabilitation Center
- BG Klinikum Hamburg / City Medical Care Center
- BG Klinikum Hamburg / Outpatient Surgery Center
- BG Nordsee Reha-Klinik

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NUMBER OF EMPLOYEES: 2,200
FOUNDING YEAR: 1959

KEYWORDS

Septic trauma surgery
Quadriplegic center
Sports injuries
Orthopaedics
Hand surgery
Plastic surgery

BLUEWATER MEDICAL GMBH

Bluewater Medical is a German-Swedish international acting medical device company. We are specialized in product development for trauma, spine and orthopaedic applications. We assist to develop ideas and products for future growth. Our customers are coming from a wide range: Surgeon inventors who would like to see their idea turning into an innovative device. Start-ups that are in the process of creating their own R&D and portfolio. Companies looking for the in-sight and know how to enter the orthopaedic market. Multi-national organizations that require additional expertise and resources to support their growth objectives.

Bluewater Medical uses latest technologies in design, simulation and rapid prototyping to cover the entire spectrum of product development from feasibility studies to design transfer.

CONTACT

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 7
FOUNDING YEAR: 2014

KEYWORDS

- Biomechanics
- Locking plates
- Intramedullary nails
- Development of implants & instruments
- Formulation of customer needs
- Design verification

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: ~5,300
FOUNDING YEAR: 2001

KEYWORDS

- Casting & splinting
- Conservative therapy
- Braces & supports
- Physiotherapy
- Rehabilitation
- Immobilization

BSN MEDICAL GMBH

About BSN medical – An Essity company

BSN medical is a global leader in wound care & related vascular diseases, lymphology and non-invasive orthopaedic products. BSN aims to provide an integrated therapy-driven approach – grounded in a broad portfolio of products, enhanced by insights into current therapeutic areas and complemented by a progressive approach to partnerships.

Its well-known brands such as Leukoplast®, Cutimed®, JOBST®, Delta Cast®, Delta Lite® and Actimove® are among the most trusted in healthcare. With its comprehensive product portfolio, BSN medical addresses patients' needs in the most prevalent conditions in wound care and vascular diseases and orthopaedic treatments.

BSN medical has been acquired by Essity AB (former SCA) in April 2017.

About Essity

Essity is a leading global hygiene and health company dedicated to improving well-being through our products and solutions, essentials for everyday life. The name Essity stems from the words essentials and necessities. Our sustainable business model creates value for people and nature. Sales are conducted in approximately 150 countries under the leading global brands TENA and Tork, and other strong brands, such as Jobst, Leukoplast, Libero, Libresse, Lotus, Nosotras, Saba, Tempo, Vinda and Zewa. Essity has about 48,000 employees and net sales in 2017 amounted to approximately SEK 109 bn (EUR 11.3 bn). The headquarters is located in Stockholm, Sweden, and the company is listed on Nasdaq Stockholm.

More information at www.bsnmedical.com and www.essity.com

UNIVERSITÄTSKLINIKUM
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NUMBER OF EMPLOYEES: 60
FOUNDING YEAR: 2003

KEYWORDS

- Osteoporosis
- Geriatric trauma
- Foot and ankle surgery
- Minimally invasive surgery (MIS)
- Joint reconstruction
- Osteosynthesis

DEPARTMENT OF ORTHOPAEDICS AND TRAUMA SURGERY, UKSH, CAMPUS LÜBECK

The Department of Orthopaedics and Trauma Surgery of the University Medical Centre Schleswig-Holstein (UKSH), Campus Lübeck, is a maximum care provider and covers the entire spectrum of modern orthopaedics and trauma surgery. By the implementation of subspecialised teams, including departments of joint replacement surgery, foot and ankle surgery, arthroscopy and sports medicine, emergency and trauma medicine, we offer the highest standard in each field of orthopaedics and trauma surgery. High standards and performance exceeding standard hospital medical services are furthermore a result of the close connection between medical research and the health care provided. Patients benefit from the highly advanced surgical technologies combined with multi-disciplinary research, the results of which are immediately translated into clinical practice.

With our Lab of biomechanical research, we conduct a wide variety of clinical and preclinical studies in the field of musculoskeletal disorders, deformities and injuries. Therefore, we are cooperating with various international and regional partners including Sanofi, GSK, Stryker and BSN medical. We place special emphasis on the development and implementation of minimally invasive techniques as well as on the particular challenges of geriatric trauma, but also on the treatment of injuries, disorders and deformities of foot and ankle in children and adults. Further topics include cartilage repair and osteology. For optimized diagnostics and therapy of osteoporosis we maintain a regional osteoporosis network. We also take part in the German-Danish BONEBANK project.

DEPARTMENT OF TRAUMA, HAND AND RECONSTRUCTIVE SURGERY, UNIVERSITY MEDICAL CENTER HAMBURG-EPPENDORF, UKE

As a major trauma centre, the Department of Trauma, Hand and Reconstructive Surgery takes care of the conservation and restoration of bones, organs and tissues that have been injured in an accident. We provide special expertise in the treatment of life-threatening multiple injuries, treatment of fractures in elderly, severe pelvic and spinal injuries and musculoskeletal tumors. There is also a long lasting experience in the treatment of knee and shoulder injuries. Our emergency department ensures a 24-hour emergency care of injured patients or those who are suffering from acute orthopedic diseases.

The main research interest of the Heisenberg Group for Experimental Trauma Surgery focuses on bone biology. We study molecular mechanisms underlying skeletal disorders including osteoporosis, compromised fracture healing, and bone metastases. Since these diseases constitute a major socio-economic problem of aging societies due to the lack of appropriate therapeutic options, we aim to better understand the physiological and pathological mechanisms contributing to these disorders. Thus, our research aims at developing new and innovative strategies to improve treatment of patients with skeletal diseases.

Furthermore, with Prof. Frosch as the new clinical director, an intense translational research is focused on the improvement of existing and the development of new surgery methods of serious knee injuries, whereby different biomechanical and clinical studies as well as molecular biological analysis are performed. The aim is to establish an interdisciplinary center of excellence for all injuries and diseases of the knee.

CONTACT

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KEYWORDS

Trauma surgery
Severe pelvic and spinal injuries
Knee surgery
Sports traumatology
Geriatric traumatology
Osteoporosis

EKSO BIONICS EUROPE GMBH

Our wearable exoskeletons are changing the world

Today, Ekso Bionics® (EKSO) is a worldwide pioneer in the field of robotic exoskeletons. For over 10 years we have been committed to developing the latest technology and engineering to help people rethink current physical limitations and achieve the remarkable. Our products unlock human strength, endurance, and mobility potential, with broad applications across medical and industrial markets. In 2016, Ekso Bionics received the first FDA clearance exoskeleton for use with stroke and spinal cord injury levels to C7. We have yet to imagine all human robotics applications and remain committed to forming strategic partnerships for cutting-edge innovation. Ekso Bionics is headquartered in Northern California and listed on the NASDAQ under the symbol EKSO. The EMEA office is located in Hamburg, Germany.

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www.eksobionics.com

SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 90+
FOUNDING YEAR: 2005

KEYWORDS

- Exoskeleton
- Ekso Health
- Neurological rehabilitation
- Ekso Therapy
- Ekso Works
- Pioneer

STRYKER TRAUMA GMBH

Stryker is one of the world's leading medical technology companies and, together with our customers, is driven to make healthcare better. We offer innovative products and services in Orthopaedics, Medical and Surgical, and Neurotechnology and Spine that help improve patient and hospital outcomes.

Stryker - Kiel

Today, Stryker Trauma GmbH is the market leader in intramedullary devices for the fixation of fractures for all extremities. At our Kiel location, we develop and produce medical nail implants, screws and instruments, mainly for the care of broken bones. We have now achieved a leading global position in this field: Every 2.1 minutes, a patient is currently being implanted with one of our products from Kiel.

CONTACT

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NUMBER OF EMPLOYEES: > 660 (Kiel), ~33,000 (globally)
FOUNDING YEAR: 1904

KEYWORDS

Intramedullary nails
Medical technology
Traumatology
Orthopaedics
Medical imaging
Osteosynthesis

WALDEMAR LINK GMBH & CO. KG

Waldemar Link GmbH & Co. KG has been developing and producing joint implants in Germany for more than 50 years. As a result, LINK sets standards in the field of knee and hip arthroplasty. In close collaboration with orthopaedic specialists, LINK is continuously improving its products in order to deliver superior quality and reliability for patients and surgeons.

The Hamburg-based firm has a worldwide distribution network, and in China, LINK's implants make it the market leader in the premium segment. Manufactured using state-of-the-art technology, LINK joint prostheses are developed and produced in Germany. LINK monitors the entire production process, from selecting the raw materials and the liquefied metal – at VACUCAST, a subsidiary of the LINK Group and one of Europe's leading precision foundries – through to the sterile joint prosthesis. A workforce of some 800 is employed at the head office and production plant. Helmut D. Link is the second generation running the family-owned business.

For more information go to www.linkorthopaedics.com.

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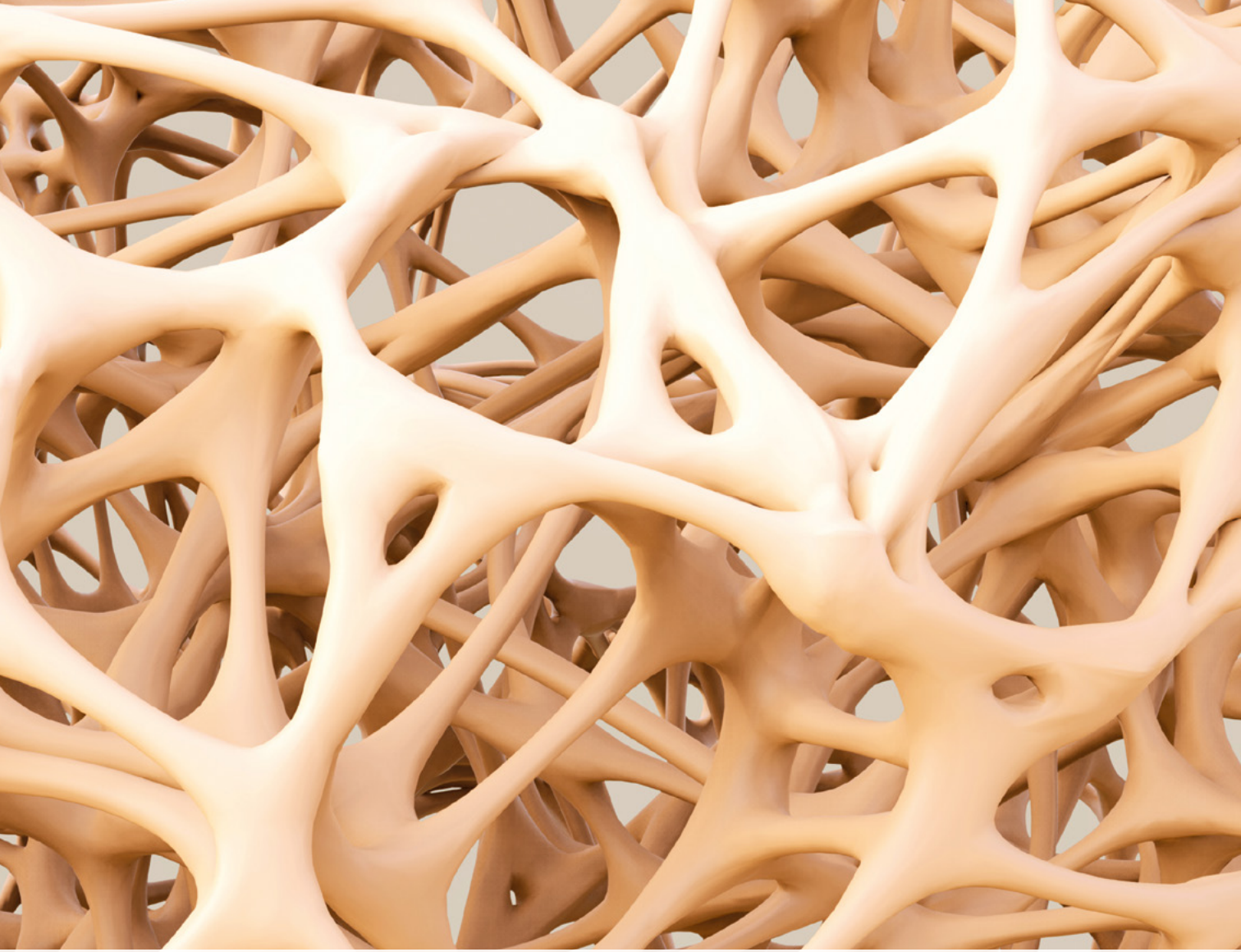
SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 800
FOUNDING YEAR: 1948

KEYWORDS

Orthopaedics
Arthroplasty
Research and technology
Custom made implants
Surgical instruments
Endoprostheses

MATERIALS & BONE REGENERATION



ACQUANDAS GMBH

ACQUANDAS is an OEM supplier (original equipment manufacturer) and global technology partner for medical technology companies. ACQUANDAS GmbH offers innovative manufacturing processes, which in the future will be a key technology of important medical treatment methods. In particular, this technology enables the development and production of minimally invasive medical devices using microsystem technology and, for the first time, the monolithic integration of electrodes, sensors, actuators, bioactive surfaces or other functionalities. This involves many possibilities of cost-effective mass production and miniaturization. ACQUANDAS serves and supports its customers from the first technological implementation of a premium product idea with biomedical added value to an optimized, manufacturable solution and offers prototype and serial production.

Examples are modern therapies with, e.g., electronic micro-implants ("bioelectronics"), in which intelligent implants replace drugs or interfacing via the peripheral nervous system. In the same way microtechnological implants, sensors or micro components ("microtechnology") can be realized. The production-ready process enables the micro-technical integration of different (for example, mechanical, physicochemical, biochemical, bio-degradation and electrical) functional materials in a very small space on a highly flexible shape memory carrier material (Nitinol, a Nickel-Titanium alloy).

Application fields for ACQUANDAS technology cover several strong growth markets of modern medical technology and life sciences. Examples for such devices are: micro-implants for revascularization, local drug delivery and patient monitoring; devices for neuro-stimulation and neuro-prosthetics; devices with micro-sensors and micro-actuators (e.g., for diabetes, high blood pressure) or micromechanical medical systems (surgical instruments, electroporation).

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NUMBER OF EMPLOYEES: 6
FOUNDING YEAR: 2012

KEYWORDS

- Microsystem technology
- New materials
- OEM manufacturing
- Bioelectronic
- Bioactive surfaces
- Smart materials

BIONIC PRODUCTION AG

Bionic Production AG is established and managed by alumni researchers of Laser Zentrum Nord GmbH in Hamburg, Germany. Based on experiences of numerous projects in industry and research Bionic Production is now taking the next step by offering a comprehensive part factory for industrial 3D-Printed parts. A main focus for bionic production is on process and quality assurance since this is considered to be the key to a successful serial production of 3D-Printed parts.

Competencies and Technologies:

- Comprehensive Know-how in Topology Optimization, Strategy and Business Development as well as: the real production of additive manufacturing of high quality parts
- Independent Expert-, Product- and Market Know-how of all cost drivers in Additive Manufacturing of Metal and Polymers
- Extensive experience in various projects in Aerospace, Medical, Automotive, Ships & Rail, Tooling & Logistics and Products and Services
- Consulting, training, design and development of parts and solutions, parts optimization (Parts-/Tools Screening)
- Review and development of business models, strategy development
- Research and development towards industrial maturity
- Additive Manufacturing, Parts on Demand of tools and serial parts

Bionic Production offers 3D-Printing of parts and the development of serial-production. We deliver on time at lowest lead-times at specified quality standards.

Materials:

- Titanium (TiAl6V4)
- Nickel Alloys (ln718)
- Stainless-steels (1.4404)

CONTACT

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 13
FOUNDING YEAR: 2016

KEYWORDS

3D printing
Additive manufacturing
lmplants
Medical devices

Kiel University
Christian-Albrechts-Universität zu Kiel

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NUMBER OF EMPLOYEES: 10
FOUNDING YEAR: 2010

KEYWORDS

- Biomaterials
- Cell-material interactions
- Micro- and nanostructures
- Biofunctionalization
- Bioinspired materials
- Mechanosensing

CHAIR FOR BIOCOMPATIBLE NANOMATERIALS, INSTITUTE FOR MATERIALS SCIENCE, KIEL UNIVERSITY

Our research focus is the investigation of cell-material interactions. We mainly use biophysical methods to quantify these interactions, for example atomic force microscopy, single-cell force microscopy, optical tweezers and spinning disc confocal microscopy. In addition, we investigate functional interfaces (e.g., responsive interfaces, structured interfaces, biofunctional hydrogels, porous materials) to control cells in biomaterials. Particularly porous materials can find application as bone implants. Furthermore, we are mimicking the mechanosensory properties of cells in strain-stiffening polymer materials to provide novel functionalities and comfort in orthoses and prostheses.

Further information: http://www.tf.uni-kiel.de/matwis/bnano/

Relevant publications:

C. Lamprecht, M. Taale, I. Paulowicz, H. Westerhaus, C. Grabosch, A. Schuchardt, M. Mecklenburg, M. Böttner, R. Lucius, K. Schulte, R. Adelung, C. Selhuber-Unkel (2016): A tunable scaffold of microtubular graphite for 3D cell growth. ACS Applied Materials & Interfaces, 8: 14980-14985.

C. Herranz-Diez, Q. Li, C. Lamprecht, C. Mas-Moruno, S. Neubauer, H. Kessler, J. M. Manero, J. Guillem-Marti, C. Selhuber-Unkel (2015): Bioactive compounds immobilized on Ti and TiNbHf: AFM-based investigations of biofunctionalization efficiency and cell adhesion. Colloids and Surfaces B: Biointerfaces, 136: 704-711.

C. Mehl, M. Kern, A.-M. Schütte, L. F. Kadem, C. Selhuber-Unkel (2016): Adhesion of living cells to abutment materials, dentin, and adhesive luting cement with different surface qualities Dental Materials. Dental Materials, 32(12):1524-1535.

CHAIR FOR MULTICOMPONENT MATERIALS, INSTITUTE FOR MATERIALS SCIENCE, KIEL UNIVERSITY

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NUMBER OF EMPLOYEES: 30
FOUNDING YEAR: 1994

The Chair for Multicomponent Materials is hold by Prof. Dr. Franz Faupel at the Christian Albrechts-Universität zu Kiel. The group has nearly 30 members including 12 PhD students and 4 senior scientists. The main research topics include:

- functional nanocomposites
- magnetoelectric sensors
- plasma nanoscience
- surface functionalization
- metal-polymer interfaces
- metallic glasses

The group, i.a., participates in the Collaborative Research Units SFB 677 “Function by switching” and SFB 1261 “Biomagnetic sensing”, the Research Unit For 2093 “Memristive devices for neuromorphic circuits”, and the Research Training Group GRK 2154 “Materials for brain”. Moreover, Prof. Faupel is the Chairman of the North German Initiative Nanotechnology (NINa SH e.V.).

In connection with the Northopedics Network, the expertise in antibacterial coatings, barrier coatings for controlled release, surface functionalization, and surface analysis could be of particular interest.

KEYWORDS

Antibacterial coatings
Surface functionalization
Controlled release
Surface analysis

DENTSPLY SIRONA IMPLANTS

About Dentsply Sirona Implants

Dentsply Sirona Implants offers comprehensive solutions for all phases of implant therapy, including Ankylos, Astra Tech Implant System and Xive implant lines, digital technologies, such as Atlantis patient-specific solutions and Simplant guided surgery, Symbios regenerative solutions, and professional and business development programs, such as STEPPS. Dentsply Sirona Implants creates value for dental professionals and allows for predictable and lasting implant treatment outcomes, resulting in enhanced quality of life for patients.

About Dentsply Sirona

Dentsply Sirona is the world's largest manufacturer of professional dental products and technologies, with a 130-year history of innovation and service to the dental industry and patients worldwide. Dentsply Sirona develops, manufactures, and markets a comprehensive solutions offering including dental and oral health products as well as other consumable medical devices under a strong portfolio of world class brands. As The Dental Solutions Company™, Dentsply Sirona's products provide innovative, high-quality and effective solutions to advance patient care and deliver better, safer and faster dentistry. Dentsply Sirona's global headquarters is located in York, Pennsylvania, and the international headquarters is based in Salzburg, Austria. The company's shares are listed in the United States on NASDAQ under the symbol XRAY.

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 15,000
FOUNDING YEAR: 2016 (Merger of Dentsply and Sirona)

KEYWORDS

- 30 years experience with Algipore
- Autogenous solutions
- Bone graft material, membranes, instruments
- Algipore = phycogenic origin
- Solutions for all your regenerative needs
- Studies available

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

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NUMBER OF EMPLOYEES: ~ 900
FOUNDING YEAR: 1956

KEYWORDS

- Biomaterials
- Cell culture
- Gene & protein levels
- Magnesium
- Human osteoblast-osteoclast coculture
- Inflammation

DEPARTMENT FOR BIOLOGICAL CHARACTERISATION, HELMHOLTZ-ZENTRUM GEESTHACHT

Helmholtz-Zentrum Geesthacht is a public research centre located close to Hamburg and active in the field of materials and coastal research. The aim of the division "Metallic Biomaterials" of the Institute of Materials Research is to develop tailored degradable and permanent implant materials based on Mg and Ti, respectively. Roughly, the working topics are subdivided into materials development, biological response and imaging. In all cases, fundamental scientific understanding of processes and interactions to enable targeted development is the essential goal of the research work.

The core interest of the department “Biological Characterisation” is the investigation of biomaterial cytocompatibility in order to give a feed-back on material development (Mg and Ti). We develop in vitro human-based cell culture models (mono- and coculture) to mimic in vivo as close as possible the successive steps of bone healing (e.g., inflammation, neovascularisation, and bone remodelling). We use these models to examine the cell behaviour under the impact of (degrading) material with a special attention to musculoskeletal applications.

Further special focuses are the identification of key parameters indicating sensitive cellular processes and the description of cell responses at the interface of cells and biomaterials. To do so, various techniques and instrumentation are available, ranging from cell culture (bioreactors and sensors), microbiology (to test, e.g., potential antimicrobial materials), multi-parameter analysis of selected proteins (cytokines/enzymes), gene expression, to microscopy (e.g., laser scanning confocal & fluorescence microscopy).

We are happy to contribute with our expertise and technical possibilities.

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

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NUMBER OF EMPLOYEES: ~ 900
FOUNDING YEAR: 1956

KEYWORDS

- Degradable implants
- Titanium
- Degradation tests
- Magnesium
- Powder metallurgy
- Materials characterisation

DEPARTMENT MATERIALS DESIGN AND CHARACTERISATION, HELMHOLTZ-ZENTRUM GEESTHACHT

Within this frame, we as the department Materials Design and Characterisation are addressing the development of dedicated Mg- and Ti-alloys adapted and specialized to the demands from the application. In the case of degradable Mg-alloys this means in particular controlling of the degradation behaviour of an implant, while for Ti-alloys tailored and optimized mechanical properties in combination with usage of non-toxic alloying elements is the common aim.

For our work we operate a variety of manufacturing and characterisation facilities. For production of specimens and prototypes from Mg-alloys we use mainly casting of the base material, followed by extrusion, wire drawing and possible further machining. As an interesting alternative we are able to apply powder metallurgy technologies based on consolidation by sintering like Metal Injection Moulding (MIM) as well as 3D-printing by Fused Filament Fabrication (FFF). These flexible technologies are also applied for the development of Ti-alloys.

For the characterisation of materials and their properties, we apply material and surface characterisation techniques from optical and electron microscopy, X-ray fluorescense spectroscopy and profilometry (interferometer) for computer tomography. For degradation tests we developed a bioreactor setup to simulate the biological environment. We are happy to contribute with our expertise and technical possibilities.

DEPARTMENT OF ORAL & MAXILLO-FACIAL SURGERY, UKE HAMBURG

The University Medical Center Hamburg-Eppendorf is one of the largest and most modern clinics in Germany treating nearly 500,000 patients per year. Interdisciplinary education, treatment and research are special features among its scientific as well as medical and dental faculties. Moreover, a large number of post-graduate programs in the field of medicine, biology and bio-engineering are offered by the clinic.

The unique division for Regenerative Orofacial Medicine at the Department for Oral & Maxillofacial Surgery deals with tissue engineering, biomaterials and, inter alia, advanced materials, e.g., magnesium as a resorbable material for surgical applications. Modern resorbable membrane systems built out of silk by caterpillars enable gene transfers amongst others with various biofactors. In order to improve guided regeneration surfaces of diverse medical applications, such as dental implants, are coated in collaboration with other institutes. Beyond other research fields the aid of extraoral and intraoral woundhealing by administration of biological materials is a further research area of the division. The section consists of various scientists from different fields of medicine and biology to ensure the translational transfer of basic scientific results to clinical practice.

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KEYWORDS

Biomaterials
Magnesium
In vitro
Tissue engineering
Bone substitute materials
In vivo

UK SH UNIVERSITÄTSKLINIKUM Schleswig-Holstein

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KEYWORDS

- Vascularization
- Biofunctionality of biomaterials
- Tissue engineering and regenerative medicine
- Adult stem cells
- Small animal models
- Biological barriers and infection

EXPERIMENTAL TRAUMATOLOGY AND ORTHOPAEDICS, DEPARTMENT OF TRAUMATOLOGY AND ORTHOPAEDICS, UKSH KIEL

The Experimental Traumatology and Orthopaedics as part of the Department of Traumatology and Orthopaedics conducts research and offers expertise in the following fields:

- Polytrauma and inflammatory processes
- Bone regeneration and vascularization
  - › Adult human mesenchymal stem cells from different tissue sources
- Human blood derived outgrowth endothelial cells
- Bone vascularization strategies
- Assessment of biomaterial design and biofunctionality (Hydrogels, 3D scaffolds)
- Advanced human co-culture systems for bone and biological barriers
- Molecular guidance of bone regeneration by bioactive compounds
- Role of myeloid cells in bone repair
- Fucoidans in bone regeneration and musculoskeletal health
- Ex vivo bone defect model
- Impact of inflammation on bone healing
- Effects of polytrauma and infection on biological barriers (alveolar-capillary barrier in the lung)

- In vitro and in vivo
  - › CLSM, EVOS life cell imgaging system, real time PCR, protein analysis, adult human stem cells, cytokines, ECIS online monitoring of cell growth
  - › Small animal models to assess vascularization by adult stem cells

Links for further info:
www.researchgate.net/profile/Sabine_Fuchs6
www.kinsis.uni-kiel.de/de/mitglieder/mitglieder/prof-dr-rer-nat-sabine-fuchs
www.fucosan.eu/partner/
www.inflammation-at-interfaces.de/en/profile/members/members/sabine-fuchs

Fraunhofer IFAM

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NUMBER OF EMPLOYEES: 668
FOUNDING YEAR: 1968

KEYWORDS

Adhesive bonding
Antimicrobial coating
Functional materials
Implant surface design
Quality control
Production technologies

FRAUNHOFER INSTITUTE FOR MANUFACTURING TECHNOLOGY AND ADVANCED MATERIALS IFAM

The Fraunhofer IFAM is one of the most important research institutions in Europe for adhesive bonding technology, surfaces, shaping and functional materials. Our more than 650 employees combine their broad technological and scientific expertise into seven core competencies: Powder Technology; Sintered, Composite, and Cellular Metallic Materials; Adhesive Bonding Technology; Surface Technology; Casting Technology; Electrical Components and Systems; and Fiber Reinforced Plastics.
In the medical technology sector, the focus of Fraunhofer IFAM activities is related to implants, instruments, adhesives and functional surface coatings. Following selected competencies and technologies are in the focus of Northopedics:

- Powder injection molding enables components to be produced from almost all metals, as well as from many ceramics and composite materials of both material classes. Through the use of temporary place holders porous components can be selectively produced.

- Additive manufacturing encompasses a variety of processes requiring no mold for the production of components, building them instead layer-wise directly from digital data. At the institute, LBM (laser beam melting) and EBM (electron beam melting) processes are used for direct part manufacture, binder jetting and FFF (fused filament fabrication) of powder-filled materials make use of sintering for densification.

- A surface applied during manufacture can be used to control or manage the growth behavior of bone to an implant. Porous areas in components enable, for example, the vascularization of implants, which benefits new tissue growth. In addition biofunctional surfaces can control cell adhesion or prevent any unspecified adsorption of biomolecules such as proteins. Furthermore the Fraunhofer IFAM has extensive experience in the field of antimicrobial, biocompatible and non-cytotoxic surface coatings to prevent bacterial colonization or even infections.

IMPREGLON MATERIAL TECHNOLOGY GMBH

Impreglon Material Technology GmbH in Lübeck is part of Aalbert Industries n.v. which operates in over 50 countries with over 16.000 employees. Since over 25 years we coat medical products like endoprothesis or medical screws and plates.

We use biocompatible coatings that we develop together with our customers to meet the requirements of their products according to antibacterial characteristics, corrosion protection, wear protection or biological interaction. We are certified according to ISO 13485 and know the regulatory background for medical products. We can support you from development to certification.

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NUMBER OF EMPLOYEES: 60
FOUNDING YEAR: 1987

KEYWORDS

Biocompatible coating
PVD coating
Reduction of metal sensitivity
Corrosion protection
Implant coating

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NUMBER OF EMPLOYEES: 10
FOUNDING YEAR: 1993

KEYWORDS

Functional coatings
Biocompatible surfaces
Anti-adhesive coatings
Electrochemical nanostructuring
Polymer films
Corrosion protection

INSTITUTE FOR MATERIALS & SURFACE TECHNOLOGY, KIEL UNIVERSITY OF APPLIED SCIENCES

Emphasis of our R&D activities is placed on functionalizing materials surfaces, conferring to them better biocompatibility, higher wettability and other customized properties such as antiadhesive and bactericidal properties. Desirable functionalities are achieved via a proper choice of materials and the tailoring of chemistry and topology (ordered porosity, control of structure dimensions, ...). The coatings are mainly processed using environmentally friendly and sustainable deposition methods such as electrochemical and solution deposition methods, but we also have expertise in physical deposition methods (PVD methods). These activities are bundled in the framework of the Competence Center "Functional Surfaces" where specific R&D solutions can be worked out for industrial partners.

Currently we are working on the following projects with high relevance to medical technology:

- Electrochemical nanostructuring of metal surfaces, including all metals and alloys used in traumatology, stents and many more
- Development of 3D, scratch resistant anti-adhesive, antibacterial coatings based on biocompatible functional polymers
- Development of functional coatings on silicone and acrylate appliances to improve wettability
- Development of corrosion protection coatings with anti-fouling functionality (non-leaching)

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NUMBER OF EMPLOYEES: 185
FOUNDING YEAR: 1952

KEYWORDS

- CNC turning
- CNC milling
- EN ISO 13485
- Bone screws
- Bone nails
- Plastic injection moulding

KREYENBERG GMBH

Kreyenberg GmbH is a very modern company with more than 65 years of experience in precision turning and milling and in the production of custom-made products.

Our family-run business in Norderstedt with approximately 185 employees offers complete service in the field of CNC turning, CNC milling, construction, toolmaking, injection moulding, sheet metal processing and assembly - from the first idea to the finished product. There are 78 CNC machining centres for the production of quality products in our three halls with a production area of 8,000 m^2.

In addition to the high quality of our products, our customers benefit from short-term and flexible delivery dates with absolute delivery reliability. A qualified and dedicated team, as well as compliance quality standards such as the EN ISO 13485 standard for medical devices are essential to our firm.

Over and above, we offer expertise and a range of machines second to none and are specialists in all areas. Whether development, procurement, production, assembly or shipping, we offer you 100% vertical integration and support where possible. We are particularly proud of our medical and high-tech products. At Kreyenberg sophisticated materials and the highest precision merge. Through constantly improving our processes and applications based on the latest technology, we make it economical to produce high quality on time.

MEDICAL SENSORS AND DEVICES LAB, TECHNICAL UNIVERSITY LÜBECK

TECHNISCHE HOCHSCHULE LÜBECK

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NUMBER OF EMPLOYEES: 13
FOUNDING YEAR: 2004

KEYWORDS

- Medical devices
- Low flows in medical technology
- Blood analysis
- Medical sensors
- Drug delivery of coated implants

The Medical Sensors and Devices Lab covers in total about 25 people, four of them with tenure positions, and currently 7 PhD-students. Most of the group's budget is funded by external sources and covered by local as well as federal or European public institutions usually including co-financing from partners from the industry. The group is a member of Lübeck's competence center "TANDEM - Technology and Engineering in Medicine", containing about 20 institutes and groups.

Activities related to the Northopedics network cover the investigation of drug delivery processes from coated implants. This comprises experimental investigations as well as computer simulations. Currently, two PhD-projects are investigating the drug-delivery of coated implants. The diffusion process of drugs through the implants/tissue zone is looked at in detail.

The first project is using a self-developed set-up to investigate the drug diffusion through a phantom. The project aims to diminish the gap between the established in-vitro test methods and the real in-vivo conditions of drug eluting implants. Therefore an improved version of the well known flow-through-cell which is capable to hold a thin membrane between the implant dummy and the solvent is developed. The membrane is meant to mimic the tissue aside of the implant and affects the characteristics of the drug release processes. By changing the formulation of the membrane or parameters like flow velocity and pH-value, different in-vivo situations can be imitated. This can be used, e.g., to test the performance of a new coating at certain phases of the healing process.

The second project applies finite element simulations and CT-imaging methods to develop a verified simulation model of drug transport in porous compounds such as bone. The goal is to form a closed framework consisting of experiments, finite element simulations of the tracer diffusion and X-ray emission simulations of the utilized micro-CT-system, enabling a verified drug eluting model.

MOLL ENGINEERING GMBH

Individual solutions are what we practise

Following this motto Moll Engineering is producing precision instruments for trauma surgery since 1996. These so-called target devices enable complicated bone fractures to be screwed accurately and securely in position. The use of CFRP (Carbon Fiber Reinforced Plastic) achieves easy handling as well as compliance with all clinical requirements. At the same time x-ray transparency of the material allows the exact position monitoring of the bone nails during the operation. The combination of metal and CFRP enables a wide range of properties. The high abrasion resistance and small possible tolerances of stainless steel can be combined with the flexible shaping, low weight and high stiffness of CFRP.

Other medical instruments are retractors made out of CFRP. Beside attractive light weight design the x-ray transparency helps here to shorten operation time.

Since 2013 Moll Engineering even provides milling of titanium bone plates according to customer specification and wishes on cooling lubricant as well as raw material choice.

For production of those parts we use milling, turning, prepreg pressing, waterjet cutting and grinding. Moulding mass forming and thermo forming of so-called organo sheets will be introduced in time.

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NUMBER OF EMPLOYEES: 40
FOUNDING YEAR: 1996

KEYWORDS

- Carbonfiber reinforced plastic CFRP
- Target device
- Retractor
- Trauma surgery
- Bone plates
- Titanium

NORTH GERMAN INITIATIVE NANO-TECHNOLOGY SH e.V.

The North German Initiative Nanotechnology Schleswig-Holstein e.V., short NINa SH e.V., is a registered society aiming at the advancement of science and research in the field of nanotechnology in Schleswig-Holstein (Germany). NINa's mission is to interlink parties from Schleswig-Holstein involved in nanotechnology with relevant stakeholders from all across northern Germany and the Baltic region states.

NINa SH e.V. provides the framework for the frequent exchange of up-to-date knowledge and experience between researchers, companies, political institutions and other organizations. Thereby new contacts are made and innovative ideas and strategies in the field of nanotechnology are cooperatively developed.

Furthermore, the society establishes a supra-regional nanotechnology competence network between all involved stakeholders from northern Germany and the Baltic Sea states.

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NUMBER OF EMPLOYEES: 1
FOUNDING YEAR: 2013

KEYWORDS

Nanotechnology
Networking

SACHTLEBEN GMBH

The interaction of electromagnetic fields (EMF) with biological systems poses therapeutic chances, which have not been fully explored yet. In an interdisciplinary effort we are investigating cellular effects as well as clinical benefits of certain low-frequency EMF, called Cell Information Therapy (CIT) fields. Our vison is to make this therapy available to as many people as possible to improve their quality of life.

Competence in the fields of physics and biology as well as electrical and medical technology is necessary to realise our projects. Investigating mechanisms of action or effects of EMF requires equipment and cell handling procedures under highly controlled conditions. In our cell laboratory we establish and carry out such procedures for in vitro cell-experiments. Our team develops and builds the required technical equipment and systems. We cooperate with research partners when specific competence is needed, e.g., regarding analytical methods, disease specific cell models or clinical study capabilities.

Bone healing and associated cellular processes have been researched in collaboration with partners since 2011. Preliminary data suggest that age, inflammatory status and comorbidities have a significant impact on bone healing as well as on the susceptibility to the EMF treatment and hence its efficacy. We are optimistic in gaining a better understanding of the influence of these factors in the healing process in the near future. Our R&D activities aim at improving therapy efficacy, maximizing ease of use and consequently patient compliance through suitable application design.

Our research and empirical data indicate that EMF-applications have the potential to be beneficial for orthopaedic indications such as bone healing, nonunion fractures, arthrosis and spinal diseases.

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NUMBER OF EMPLOYEES: 14
FOUNDING YEAR: 1994

KEYWORDS

- PEMF - Pulsed Electromagnetic Fields
- Accelleration of bone healing esp. with comorbidity
- Nonunion fractures
- Non-invasive
- Matrix mineralization
- Aseptic implant loosening

DIAGNOSTICS & INFECTIONS

DEPARTMENT OF MICROBIOLOGY AND BIOTECHNOLOGY, UNIVERSITY OF HAMBURG

The University of Hamburg is the largest University in Northern Germany with 40,000 students. In the Department of Microbiology and Biotechnology, we are interested in the analysis of microbial biofilm formation on implants and other devices. The team of Prof. Dr. Wolfgang Streit has a long-standing expertise in the analysis of complex and mixed species microbial biofilms on biotic and abiotic surfaces. Biofilms are three-dimensional structures of bacteria associated with surfaces. The majority of all bacteria lives in structured biofilms on surfaces. The main problem linked to implants is, however, that bacteria forming biofilms on implants are highly resistant against antibiotic treatment. Consequently, treatment of implant-associated infections is very difficult. To address this urgent problem, we follow two lines of research:

First, we focus on the analyses of complex microbial biofilms using metagenome-related technologies. Most biofilms in nature are made of many different bacteria including uncultivated or difficult to cultivate bacterial species. Thus, to include the uncultivated bacteria in our research pipeline we apply modern omics and metagenomics technologies. We analyze the makeup of complex microbial communities and assess the importance of each individual species within the community with respect to the film formation and resistance towards antibiotics.

In a second focus we analyze the processes that lead to the formation of complex and multi-species biofilms. We work with typical biofilm forming bacteria such as the emerging pathogen *Stenotrophomonas maltophilia* or the opportunistic pathogen *Pseudomonas aeruginosa*. Using confocal microscopy, transcriptomics, proteomics and other sophisticated technologies we establish a link between traits that lead to biofilm formation and resistance mechanisms against antibiotics in complex and mixed biofilms. Furthermore, together with our colleagues from the Leibniz Institute in Borstel, we are establishing a large collection of *S. maltophilia* isolates that are the basis of this research. A detailed analysis of the genomes of these organisms, their physiology and their behavior in mixed-species biofilms will ultimately allow us to identify novel target molecules for a better treatment or a prevention of these biofilms.

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KEYWORDS

Biofilm research
Prevention of biofilms
Uncultivated bacteria in biofilms and infections
Stenotrophomonas maltophilia
Cell-Cell communication, quorum sensing
Microbiology and bacterial genetics

DEPARTMENT OF SEPTIC TRAUMA SURGERY AND ORTHOPAEDICS, BG KLINIKUM HAMBURG

The BG Klinikum Hamburg (BGKH), located in the city's Lohbrügge district, is a high-performance hospital with a reputation that extends far beyond the city limits of Hamburg.

The Department of Septic Trauma Surgery and Orthopaedics is the largest in Germany for the therapy of bone, joint and soft tissue infections, infantile osteomyelitis and infection of joint replacements. This includes the reconstruction of bone defects, the therapy of limb shortening, malpositions and reduction of joint range of motions. For over 25 years, patients with septic infections have been receiving in-patient care.

For the benefit of the patient, moreover, the department is conducting a variety of scientific research projects, e.g.:

- MISSinG sub-project: Individual diagnostics and therapy monitoring in case of osteomyelitis by protein analysis in tissue and serum (BIPROM-P)
- MISSinG sub-project: Biological reconstruction of large bone defects via electronic controlled segment transport (CONSEG)
- Treatment of bone defects by mesenchymal stem cells
- Long-term results of chronical knee joint empyema
- Long-term results of chronical elbow joint empyema
- Chronic calcaneal osteitis
- Necrotising fasciitis
- Infection of sural nerve strippers

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NUMBER OF EMPLOYEES: 2,200
FOUNDING YEAR: 1959

KEYWORDS

Septic trauma surgery
Bone, joint and soft tissue infections
Infantile osteomyelitis
Orthopaedics
BIPROM-P
MISSinG

DR. BRILL + DR. STEINMANN
INSTITUTE FOR HYGIENE AND MICROBIOLOGY

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 59
FOUNDING YEAR: 1995

KEYWORDS

- Activity testing
- In-vitro toxicity
- Microbiology
- Biofilms
- Medical devices
- Reprocessing

DR. BRILL + PARTNER GMBH INSTITUTE FOR HYGIENE AND MICROBIOLOGY

Dr. Brill + Partner GmbH Institute for Hygiene and Microbiology is a leading service provider with regard to applied hygiene, microbiology and virology in Europe. The services of the German-based family company include consulting, training and laboratory services. More than 50 experts provide their expertise in the fields of service of disinfectants, cosmetics, medical devices, pharmaceutical products, water, antifouling and bio-corrosion as well as human and veterinary hygiene.

The Dr. Brill Group serves its international customers from three different locations. The laboratories that are accredited according to EN ISO / IEC 17025 and recognized by the ZLG are located in Hamburg and Bremen.

We provide support during the development, registration and launch of products as well as in the scientific marketing with specialized lectures and publications. In addition, we consult and train in the field of hygiene within the healthcare, industry and microbial material degradation and material protection.

The strong scientific focus with our more than 25 scientists enables us to closely cooperate with partners and clients all over the world. Our goal is to understand our clients' needs in detail in order to provide tailor-made services. This strategy is in our hearts and minds. As a family company we are interested in long-term successful relationships.

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KEYWORDS

Biofilm formation
Bacterial genetics
Host-pathogen interactions
Staphylococci
Molecular diagnostics
Implant infections

INSTITUTE FOR MEDICAL MICROBIOLOGY, VIROLOGY AND HYGIENE, UKE HAMBURG

The University Hospital Center Hamburg-Eppendorf (UKE) is a large tertiary care health provider. The Institute for Medical Microbiology, Virology and Hygiene is providing diagnostic services primarily for the UKE. Diagnostic approaches include all standard techniques for cultivation and characterization of bacteria, fungi and viruses. In addition, a strong focus lies on the use of modern technologies for detecting and characterizing human pathogens, including mass spectrometry, high-throughput molecular diagnostics, and next generation sequencing. These techniques are also employed in state-of-the-art diagnostics of bone and joint infections.

The research group Staphylococcal infections at the institute (PI Prof. Holger Rohde) has a long-standing interest in device-related infections. Basic research projects aim at elucidating molecular mechanisms promoting device-associated infections by biofilm forming staphylococci. Bacterial genetics, high resolution imaging, infection models and protein chemistry are being used to decipher structure-function relationships and regulation of factors involved in biofilm formation, device colonization and establishment of chronic infections. The group makes use of large collections of bacterial strains to understand the molecular epidemiology of organisms causing implant infections, with a specific emphasis on genetic and phenotypic, inter- and intra-host variability of *S. epidermidis*.

OSTEOLABS GMBH - BIOMARKERS FOR LIFE

Osteolabs is a spin-off company of the GEOMAR Helmholtz Centre for Ocean Research Kiel. It applies new, state-of-the-art diagnostic methods to use trace elements as biomarkers in the human body.

The measurement of the trace element calcium permits conclusions to be drawn on the existence of osteoporosis. The feature that makes the osteolabs diagnostic method unique is that patients have to provide just one or several urine samples. The method is radiation-free and 100 times more sensitive than the traditional DXA method. We analyze urine using mass spectrometers that deliver extremely precise measurements of the ratios of atoms of differing masses. We have at our disposal, among other things, a thermo scientific NEPTUNE Plus mass spectrometer, which is specially tailored to the measurement of calcium, and two cleanroom laboratories in which high-quality, low-contamination analysis of trace elements is possible.

The method's proof-of-concept was provided as long ago as 2007 [Skulan et al. 2007] and later confirmed several times [Heuser and Eisenhauer 2010; Morgan et al. 2012; Channon et al. 2015]. In addition, the University Medical Center Kiel is performing extensive clinical studies to validate the method on a statistically broader basis. As a result of the positive results of the studies, the osteolabs project received funding of 1.8 million euros from the Helmholtz Association. It has now received further funding under two programs of the Helmholtz Association in Berlin and GEOMAR in Kiel ("Helmholtz Enterprise" and "Helmholtz Enterprise Plus") to successfully implement the spin-off.

The medium-term goal is to refine our method to enable other diseases such as cancer, Alzheimer's disease and rheumatoid arthritis to be diagnosed easily and at an early stage. Other trace elements in addition to calcium are available in human urine, blood and saliva.

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NUMBER OF EMPLOYEES: > 5
FOUNDING YEAR: 2018

KEYWORDS

- Radiation-free and early detection
- Osteoporosis
- Mass spectrometry
- Trace elements as biomarkers
- Chronic diseases
- Non-invasive (urine, blood or saliva samples)

IMAGING

APOQLAR GMBH

VSI Surgery - New dimension of surgery

apoQlar revolutionizes surgeries with solution called the Virtual Surgery Intelligence (VSI). It is a mixed reality application that helps surgeons during operations by presenting CT and MRI scans in 3D. The digital images are generated from the original CT or MRI scans and loaded into the mixed reality headset. A comprehensive representation appears, which can be freely and freehand positioned in the user's field of vision. Using anatomical reference points, VSI recognizes the individual patient and immovably fixes the 3D scans to the surgical site. That helps surgeons to orientate better through anatomical structures and reduce intraoperative misjudgments.

VSI Surgery - New dimension of surgery

The VSI Patient Education helps doctors to inform visually their patients about disease and progression, about treatment and also surgical procedures. They can draw and virtually mark important places on original CT and MRI scans in 3D. That helps patients to gain a better understanding and increase their satisfaction.

apoQlar GmbH

apoQlar is a worldwide leader in innovative medical applications. We specialize in the latest technologies, particularly in imaging techniques and data evaluation for quality assurance by artificial intelligence and continuous machine learning. The applications are developed and implemented in close cooperation with research institutes, clinics, hospitals, and doctors. We attach great importance to security, ease of use and fast implementation.

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www.apoqlar.com/

SOCIAL MEDIA:

FOUNDING YEAR: 2017

KEYWORDS

- CT & MRI in 3D
- Mixed & augmented reality
- Patient education
- Imaging techniques
- Virtual surgery intelligence
- Artificial intelligence

DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY, A RESEARCH CENTRE OF THE HELMHOLTZ ASSOCIATION

Our economy depends on innovations. Without fresh ideas and inventions, new and commercially successful products would be inconceivable in our technology-oriented society. DESY contributes to this innovation process in different ways. On one hand, knowledge generated through basic research provides a broad, fertile ground for future innovations. On the other hand, some experiments are directly related to applications – for example, when industrial companies book measurement time with DESY's X-ray sources to conduct advanced product development. Furthermore, there are spin-offs that evolve from research projects, such as accelerator and detector technologies developed at DESY that could also be applied to innovative medical high-tech equipment. These technologies hold the promise of more accurate diagnoses and more readily tolerated therapies, for instance with regard to cancer treatment.

DESY together with partner universities is in the process of developing a whole new generation of clinical and pre-clinical medical imaging methods based upon brilliant X-ray beams and getting them ready-to-market for clinical applications in cooperation with the industry and clinical scientists. These are the next steps in planning:

- Establishing a research hub
- Method improvements for novel medical imaging, based on brilliant X-rays with a dedicated synchrotron beamline
- Translation and application of the developed methods into clinics and industries
- Generating new IP for the MedTech sector and providing services for industrial research and innovation
- Transfer of findings from structural biology towards molecular imaging

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 2,378
FOUNDING YEAR: 1959

KEYWORDS

Synchrotron source
New materials
Collaborations
Patents and licenses
Industry services
Technology transfer

INSTITUTE FOR METALLIC BIOMATERIALS, HELMHOLTZ-ZENTRUM GEESTHACHT

In order to understand the influence of implants on the healing process of bone and the performance of degradable implants the department of "Biological Characterisation" performs imaging experiments utilizing advanced X-ray techniques at large scale facilities. By this we study the influence of degradable implants on the bone healing to elucidate how implant composition and corrosion speed influence the mechanisms. We utilize different techniques ranging from high resolution computed tomography (CT) experiments having micrometre resolution to scattering techniques to elucidate structural changes within the bone and material.

One main focus is the development of sophisticated in-situ sample environment for structural investigation to follow the corrosion in situ or the fatigue during biomechanical testing. This is combined to multi modal analysis to gain a compressive picture of the process to be able to connect this to biological and material information. Further topics include the investigation of proteins and polymers by, e.g., small angle x-ray scattering to study their interaction on a macromolecular level under different conditions like salt, shear and pressure.

We are happy to contribute with our expertise and technical possibilities.

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

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NUMBER OF EMPLOYEES: ~ 900
FOUNDING YEAR: 1956

KEYWORDS

Degradable implants
X-ray scattering
Protein characterisation
Magnesium
Tomography
Materials characterisation

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NUMBER OF EMPLOYEES: 15
FOUNDING YEAR: 1995

KEYWORDS

- Imaging
- Musculoskeletal disorders
- Preclinical studies
- Bone densitometry
- Molecular imaging
- Clinical studies

SECTION BIOMEDICAL IMAGING (MOIN CC), DEPARTMENT OF RADIOLOGY AND NEURORADIOLOGY, UKSH, KIEL UNIVERSITY

The Section Biomedical Imaging is an interdisciplinary team of scientists, engineers, and technicians dedicated to the development of innovative imaging methods for diagnostic and therapeutic applications in medicine and basic biomedical research. Virtually all of these approaches are non-invasive and can be carried out to study temporal developments in vivo.

The research group was founded in 1995 with an initial focus on clinical osteoporosis research with special expertise on diagnostic imaging approaches, including bone densitometry. We have carried out multiple small and large scale research studies involving up to 3,000 patients. We have served as an expert center for drug studies, being responsible for imaging, including quantitative computed tomography as primary endpoint of such investigations. We investigate musculoskeletal, inflammatory, oncologic, and neural disorders.

Our preclinical lab, the Molecular Imaging North Competence Center (MOIN CC) was founded in 2010. MOIN CC is registered at the DFG Research Infrastructure Portal as imaging core facility at the Christian-Albrechts-Universität zu Kiel (http://risources.dfg.de/detail/RI_00066_de.html). We operate small animal imaging devices including a high field 7T magnetic resonance scanner, a micro-CT device, several optical imaging devices for fluorescence and bioluminescence, and high resolution ultrasound and photoacoustic scanners. At the Department of Radiology and Neuroradiology, we have access to a broad range of clinical imaging devices. The laboratory was set up as a core unit for academic users but also to provide imaging services for the private sector, for biomedical companies in the north of Germany and beyond.

Our work focuses on the development of new innovative diagnostic and therapeutic procedures for the detection and treatment of oncological, neurological, and skeletal disorders. The scientific concept is driven by multimodal, multiparametric, molecular, and micromorphological imaging as well as translational research.

BIOMECHANICS

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 25
FOUNDING YEAR: 2006

KEYWORDS

Bone
Osteosynthesis
Locked plate
Fracture
Biomechanics
Angular stability

BIOMECHATRONICS - LABORATORY FOR MUSCULOSKELETAL RESEARCH, UNIVERSITY LÜBECK

The Lab of biomechanical research and research in orthopaedics and traumatology is currently undertaking a variety of tasks within the Departments of Muskuloskeletal Surgery.

This includes not only research in the entire field, but also contract research and development of implant manufacturers for approvals, quality evaluation of care in the field, conducting clinical trials to determine product and method performance, and participation in national and international research collaborations.

The scientific structure of the Laboratory for Motion Analysis and Performance Diagnostics is increasingly being used by end users to optimize athletic performance and athletic movement, and the department with its diverse marketing activities is also conducting public relations work in the "Health & Sports" area.

The biomechanics laboratory conducts biomechanical tests/ examinations for UKSH internal and external clients. The focus of these tests is in the field of biomechanical research (e.g., material properties of biological materials) as well as in the approval-accompanying testing of osteosynthesis implants and endoprostheses according to relevant standards or biomechanical models. Equipment for these tests includes a quasi-static material testing machine (Zwick 1456) and a pneumatic fatigue test stand. In addition to a comprehensive collection of test setups for a variety of examinations, a variety of additional sensors (torque, micro-displacement, microscope chamber, temperature,...) are available.

Topics overview:

- Carrying out certification-related tests according to standard
- Development support for new implants
- Development of implant-adapted experiments/ biomechanical model experiments
- Development of new test machines for special questions
- Determination of material properties of biological tissue
- Gait and Motion analysis

The field of biomechatronics deals with research in the area of implantable sensors as well as with the development of "intelligent" systems for the restoration of defective functions of the human body (e.g., "intelligent" hexapod fixator - in cooperation with (BGKH) Hamburg). An integral part of this research is also the telemetric (telemedical) data transmission of measurement and control data in order to be able to achieve close control and early intervention options for healing disorders.
The equipment includes development systems for various microcontroller architectures and wireless transmission technologies, electrical measurement technology as well as design software and equipment for the assembly of highly integrated printed circuits.

Topics overview:

- Sensor development
- Development of robot systems
- Development of telemedical transmission systems
- Software development

TUHH
Technische Universität Hamburg

INSTITUTE OF BIOMECHANICS, HAMBURG UNIVERSITY OF TECHNOLOGY

The Institute of Biomechanics (bmh) is embedded within the research group "Regeneration, Implants, Biomedical Engineering FSP RIM" and the "Research Centre for Medical Technology fmthh". The institute combines researchers with distinct expertise as process engineers together with scientists from laser-technology, biomechanics, mechanical engineering, micro- and nano-technology, biotechnologies, ceramics and others.

The main research foci of the institute are in the area of spine degeneration, tissue engineering, endoprosthesis design, pre-clinical testing of medical devices, and analysis of clinical failures, as well as interfaces, especially between bone and implant.

CONTACT

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 24
FOUNDING YEAR: 1988

KEYWORDS

- Pre-clinical testing
- Failure analysis
- Continuing education
- Material testing
- Numerical simulation
- Cell based technologies

DIGITIZATION, DATA & INNOVATION MANAGEMENT


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AMEDON GMBH

AMEDON is a service provider for online communication software in the medical field. AMEDON provides individual software-development and appendant application services. We can realize both your and our ideas and requirements. You receive web-based solutions for acquiring, analysing and providing data and information for use in:

- Clinical research
  - > Data and study management using eCRF / EDC systems
  - > ePRO, eDiary
  - > Safety Database
  - > Registries
  - > Services in clinical trials
  - > CTMS (Clinical Trial Management System)
  - > Data Warehouse solution
- Emergency medical services and emergency admissions department
  - > data capture and analysis during emergency treatment
- Networked competence - Networking medical institutions
- Telemedicine - Diagnostics and patient monitoring, independent of time and location of medical personnel
- Corporate communication - Distribution of information and communication securely via the Internet

AMEDON finds solutions which support workflow, create transparency and achieve enormous time savings.

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NUMBER OF EMPLOYEES: 26
FOUNDING YEAR: 2004

KEYWORDS

eCRF
ePRO
CTMS
EDC solution
eDiary
Study

Christian-Albrechts-Universität zu Kiel
Institut für Innovationsforschung
Lehrstuhl für Technologiemanagement

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NUMBER OF EMPLOYEES: 10
FOUNDING YEAR: 2012

KEYWORDS

Innovation management
Telemedicine and e-health
Network management
User driver innovations
Technology transfer
Empirical research

CHAIR OF TECHNOLOGY MANAGEMENT, INSTITUTE FOR INNOVATION RESEARCH, KIEL UNIVERSITY

The chair of Technology Management at the Institute for Innovation Research (Kiel University) focuses on analyzing the challenges of managing innovation processes, with a specific interest in health care innovations. We are currently leading various research projects addressing the following questions: How can technology transfer and the cooperation between research institutes and industry actively be supported? How can innovative digital services help to overcome coordination problems in integrated healthcare networks? What determines the innovative capacity of actors in the healthcare sector, and how can this capacity be expanded? Which elements of innovation management are particularly conducive to the success of digital service innovations in health care?

With a specific relevance for Northopedics, the research group analyzed the introduction process and acceptance of the German Register of Endoprosthetics (EPRD). The results of these projects are published in various international journals and books, including the Journal of Product Innovation Management, IEEE Transactions on Engineering Management, Research Policy, Health Care Management Review, Health Policy, R&D Management and a widely used textbook on innovation management (Hauschildt et al., 6th ed., 2016).

Prof. Schultz is the member of several advisory committees, including the Supervisory Board of Greifswald University Hospital; the Advisory Committee of the German Foundation of Patients with Chronic Diseases; the Center for Entrepreneurship at Kiel University and the Scientific Commission for Technology, Entrepreneurship and Innovation in the German Academic Association for Business Research (VHB).

Elbpatent
Marschall & Partner

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SOCIAL MEDIA:

NUMBER OF EMPLOYEES: 10
FOUNDING YEAR: 2009

KEYWORDS

Invention
App
3D-print
Patent
Software
Copying

ELBPATENT

IP for Life® - this is our philosophy. Intellectual property rights not to become an end in itself, but for creating strong company values.

Elbpatent is highly specialised in the technical and scientific fields of:

- Medical Technology, in particular
  - › bone anchoring/fusion
  - › implants
  - › imaging methods
  - › laser
  - › optics and
  - › medical software, e.g. apps

- Manufacturing Technology, in particular
  - › additive manufacturing
  - › 3D-print and
  - › processing of composite materials

The law office Elbpatent was founded with its headquarter in Hamburg and a branch in Munich. Our partners have many years of professional experience in internationally active law offices, European multinational corporations, and in the area of technology transfer between advanced education institutions and industry.

With this extensive professional background and a unique combination of perspectives in the field, Elbpatent is your capable partner for all questions relating to intellectual property rights. We translate precisely your technology regarding IP matters to achieve an excellent protection.

EURA AG

EurA is a business consultancy with a high qualified staff with industry experience and is specialized in initiating, accompanying and managing the entire innovation process of small and medium sized enterprises, research organisations and universities from all over Europe. EurA is the market leader in Germany in managing technology networks of different industry sectors like Analytics and Sensors, ICT, Production, Energy and Life Sciences. In the branch of Hamburg EurA is managing 3 innovation clusters, that might be interesting for Northopedics cluster members:

- GRIPS: Interface and surface analysis in industrial production processes for quality assurance, focussed on medical devices (www.grips.tech)
  The network is specialized in innovations with regard to interface and surface analytics as well as precision cleaning issues.

- Alternative methods to animal testing (www.alternativen-zum-tierversuch.de)
  The network aims at the development of integrated approaches to testing and assessment that can reduce or even replace animal tests, with special emphasis on permanent cell cultures, co-cultures of cells ("organ-on-a-chip"), in-silico modelling and different non-invasive imaging techniques.

- Quality control for cell therapy (www.qualitaetskontrolle-zelltherapie.de)
  This Innovation Network is composed of 8 SMEs and 3 R&D institutes. The aim is to develop quality management systems that include process management softwares, QM devices and analytical technologies that can measure and demonstrate the product attributes of cell therapy products.

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NUMBER OF EMPLOYEES: 115
FOUNDING YEAR: 1999

KEYWORDS

Surface analytics
Biocompatibility testing
Cell therapy
Precision cleaning
Bone cell model
Quality control

hülsenbeck hoss
design

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NUMBER OF EMPLOYEES: 4
FOUNDING YEAR: 2013

KEYWORDS

- Industrial design
- Screen design
- 3d printing
- User interface
- Motion graphic
- Interactive sales tools

HÜLSENBECK HOSS GMBH

Our design agency, Hülsenbeck Hoss, was founded in Hamburg in 2013 and specializes in medical technology. Right from the outset, we have focused on the simultaneous development of devices and the associated digital interactions. We are not satisfied with our design process until users, operators and sales staff can work error-free with our user interface. And we do not finish our work until the graphical interface has been adapted to the brand and the interaction is visually appealing.

Thanks to the trust placed in our work by companies such as Dräger Medical, Acelity, Söring, Endochoice and Sierra Sensors, we have been able to gather significant medical experience and deep insights into the life science sector.

Especially in the age of digitization and the increasing number of touch interactions, it is necessary to unite complex applications with a logically understandable usability. For the field of bone healing, we offer the comprehensive development of medical products as well as the development of innovative user interfaces for software and sales applications.

We look forward to meeting you!
The Hülsenbeck Hoss Design team

SOVENTEC GMBH

soventec is a software engineering company with processes certified according to ISO 13485 and more than18 years of experience in the field of research and medical devices automation. GxP (21CFRPart11, 820) compliant processes can be implemented.

The soventec software product Lab OS® - developed and provided by soventec – documents laboratory processes in medical and research application fields (ELN, electronical laboratory notebook), manages samples in biobanks and repositories with high quality documentation and can automate laboratory devices. soventec is also providing software development services in the field of laboratory data management, laboratory device integration, automation and scheduling for companies and institutions in life sciences, biotechnology, pharma and medicine.

More information at http://www.soventec.com

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NUMBER OF EMPLOYEES: 5
FOUNDING YEAR: 1999

KEYWORDS

Software
Automation
BONEBANK
Documentation
Engineering
ISO 13485

REGISTER A - Z

LIFE
SCIENCE
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