Orthopedic Surgery

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Our department was formally founded at 1947. From the new millennium, the present Professor and Chairman Akio Minami brought up a new research of tissue engineering and applied some of the new technologies developed in our department to human musculoskeletal diseases and injuries. Other recent advances in our department are minimally invasive surgery and high-tech surgery under navigation in both joint surgery and spine surgery.
Our mission is to provide undergraduate and postgraduate education and training to an international standard, offer a first-class orthopaedic service to the people of our community, enhance basic and clinical research, promote strong links with domestic and international orthopedic centers, and maintain the international character of the department.(Manabu Ito,MD,PhD)

◆ Research

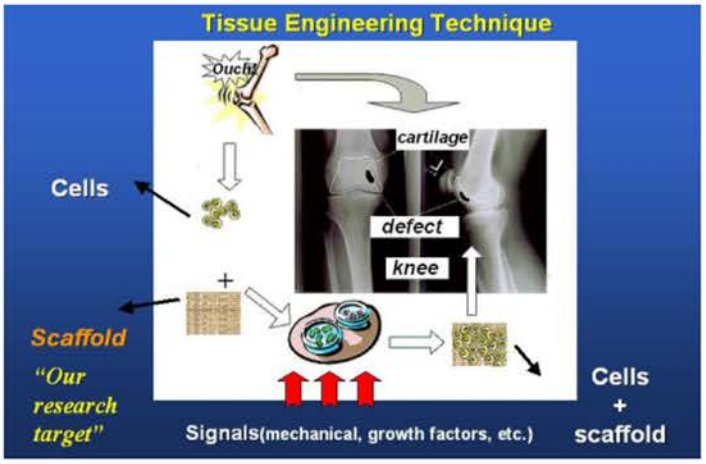
Since 2000, we have mainly focused on the following research projects.

1) Musculoskeletal tissue engineering:
Our main targets are cartilage, rotator cuff, nerve and bone tissue engineering. We have developed novel and unique 3-D scaffolds to enhance tissue regeneration from culture cells. The goal of our project is to clinically apply our developed scaffold for the treatment of musculoskeletal diseases.
2) Pathogenesis of osteoarthritis (OA):
We have used 2 different approaches, genetic and glycobiological approach, to elucidate OA pathogenesis. Glycobiological approach must be unique and potent one to detect crucial molecules related to OA pathogenesis. We expect this approach will be a main stream in the field of musculoskeletal research.
3) Bone metabolism and osteoporosis:
Glycobiological analysis has also been applied to these fields. We have clarified the functional roles of glycans or glycoproteins in osteoclast differentiation.

These projects are performed in Frontier Research Center for Post-genome Science and Technology, Hokkaido University. To progress our projects, we have actively collaborated with other departments, including chemistry, genetic science, pharmacology, and engineering laboratories. So, our department is opening research positions for young researchers (not only in medical field, but also in other fields) , who are interested in musculoskeletal research. We can accept such researcher as a PhD or MS candidate. Please, join to our research laboratory. In addition, we can also work with company or industrial researchers to develop novel biomedical products or therapeutic agents. Please, contact with us. (Noriwasa Iwasaki, MD, PhD)

◆ Education

Faculty members in this section give classes of orthopaedic surgery including trauma, degenerative disease, deformity, tumor, and spine and spinal cord surgery. We also take part in the courses of orthopedic surgery for post graduate students. Besides the young Japanese medical doctors, we now accept applications of two oversea researchers (from China and Russia) who take doctor courses in our laboratory. As clinical department, we provide residency program for young department members. Morning breakfast lectures (every Thursday and Friday) are also opened to anyone in the university in ordered to give general and specials topics of orthopaedic surgery. (Hideki Sudo,MD,PhD)



Tissue engineering technique requires 3 important factors, including cells, scaffold, and signals. Among these factors, we have developed novel and unique 3-D scaffolds to enhance tissue regeneration from culture cells.

◆ International Activities

Recent invited talks in international conferences

Akio Minami (2008) 5th World Congress of Sports Trauma &
6th Asia-pacific Orthopaedic Society for Sports Medicine Meeting, Hong Kong.
Akio Minami (2008) Hong Kong Society for Surgery of the Hand,Hong Kong.
Manabu Ito (2008) SICOT/SIROT 2008XXIV Trennial World Congress, Hong Kong.
Manabu Ito (2007) AO Spine Master Course. Davos, Switzerland.
Yoshihisa Kotani (2006) Hon Kong orthopaedic association annual congress, Hong Kong.

On going international collaborations

Professor Akio Minami,MD,PhD and Yoshihisa Kotani,MD,PhD are collaborating with Medtronic Sofamor Danek (Memphis, USA) for the world-wide clinical trials of artificial intervertebral disc prosthesis. This research has been continuously conducted since 1998 with Takiron, Co. LTD (Osaka, Japan).

◆ Selected Publications

1. Matsuhashi T, Iwasaki N, Nakagawa H, Hato M, Kurogochi M, Majima T, Minami A, Nishimura SI.Alteration of N-glycans related to articular cartilage deterioration after anterior cruciate ligament transection in rabbits.
Osteoarthritis Cartilage. 2008 Jan 15.
2. Sasaki T, Iwasaki N, Kohno K, Kishimoto M, Majima T, Nishimura SI, Minami A.
Magnetic nanoparticles for improving cell invasion in tissue engineering.
J Biomed Mater Res A. 2007 Dec 7.
3. Takahata M, Ito M, Abumi K, Kotani Y, Sudo H, Ohshima S, Minami A.
Comparison of novel ultra-high molecular weight polyethylene tape versus conventional metal wire for sublaminar segmental fixation in the treatment of adolescent idiopathic scoliosis.
J Spinal Disord Tech. 2007 Aug;20(6):449-55.
4. Kasahara Y, Iwasaki N, Yamane S, Igarashi T, Majima T, Nonaka S, Harada K, Nishimura SI, Minami A.
Development of mature cartilage constructs using novel three-dimensional porous scaffolds for enhanced repair of osteochondral defects.
J Biomed Mater Res A. 2007 Oct 23.
5. Iwasaki N, Ishikawa J, Kato H, Minami M, Minami A.
Factors affecting results of ulnar shortening for ulnar impaction syndrome.
Clin Orthop Relat Res. 2007 Dec;465:215-9.
6. Motomiya M, Ito M, Takahata M, Kadoya K, Irie K, Abumi K, Minami A.
Effect of Hydroxyapatite porous characteristics on healing outcomes in rabbit posterolateral spinal fusion model.
Eur Spine J. 2007 Dec;16(12):2215-24.
7. Majima T, Irie T, Sawaguchi N, Funakoshi T, Iwasaki N, Harada K, Minami A, Nishimura SI.
Chitosan-based hyaluronan hybrid polymer fibre scaffold for ligament and tendon tissue engineering.
Proc Inst Mech Eng [H]. 2007 Jul;221(5):537-46.