



Research Annual Report 2009



Musculoskeletal Science Center (MUSC)

Immunological mechanisms and clinical epidemiology of early inflammatory arthritis and osteoarthritis

Measurement (of the results of intervention) in rehabilitation medicine

Efficiency and efficacy of trauma care

Regenerative medicine of the musculoskeletal system

EMC MUSC-01-31-01 - Immunological mechanisms and clinical epidemiology of early inflammatory arthritis and osteoarthritis

Programme design in brief

The programme investigates immunological mechanisms and the clinical epidemiology regarding onset, course and outcomes of early (rheumatoid) arthritis and inflammatory osteoarthritis (OA). It aims to find determinants for disease onset and severity and subsequently to develop predictive algorithms for diagnosis and prognosis. In the scope of the disease course the effect of various medical and non-medical interventions are studied.

The molecular immunopathobiological mechanisms of onset, severity and modulation of chronic inflammatory destructive arthritis are studied with focus on the role of the IL-23/Th17 immune pathway, aging, osteoimmunology and hormones

Key figures

EMC MUSC-01-31-01

Department	SP1	SP2	SP3	SP4	SPtot	T1	T2	T3	Ttot	IS	FS	OP	Ptot
radiology	0	0	0,89	0	0,89								
rheumatology	5,3	0	0,6	2,05	7,95								
Total	5,3	0	1,49	2,05	8,84	3	0	0	3	8	5	0	16

Thesis

Geijn, F.E. van de (2009, december 17). Mannose-binding lectin in pregnancy course and outcome. Studies in healthy women and rheumatoid arthritis patients. EUR. Prom./coprom.: Prof.Dr. J.M.W. Hazes, Prof.Dr. J.D. Laman & R.J.E.M. Dolhain.

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Article/Letter to the editor

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Kooij, SM van der, Cessie, S. le, Goekoop-Ruiterman, YPM, Vries-Bouwstra, JK de, Zeven, D van, Kerstens, PJSM, Hazes, J.M.W., Schaardenburg, D. van, Breedveld, F.C., Dijkmans, B.A.C. & Allaart, CF (2009). Clinical and radiological efficacy of initial vs delayed treatment with infliximab plus methotrexate in patients with early rheumatoid arthritis. Annals of the Rheumatic Diseases, 68(7), 1153-1158.

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Visser, H, Hazes, J.M.W. & Luime, J. (2009). The clinical relevance of a prediction rule for disease outcome in patients with undifferentiated arthritis: comment on the article by van der Helm-van Mil et al. *Arthritis & Rheumatism*, 60(7), 2208-2209.

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EMC MUSC-01-46-01 - Measurement (of the results of intervention) in rehabilitation medicine

Programme design in brief

Rehabilitation medicine is the medical specialism which concerns the diagnostic procedures and treatment of permanent, imminent and complex consequences of diseases, trauma and congenital deformities.

Research and development in rehabilitation medicine is to a large extent interdisciplinary and aims at research questions in the field of medicine, technology, psychology, physiotherapy, occupational therapy, sociology, etc. As a result the objective, reliable and valid measurement of impairment, disability and handicap has been developed insufficiently and existing methods are not appropriate for implementation in patient related research. The main points of the programme are:

1. The development, validation and application of new diagnostic instruments for the purpose of low back and pelvic complaints and for the purpose of pathology of the hand and wrist area.
2. The development, validation and application of long term ambulant registration of posture, movement, activity and cardiac stress for the purpose of patients with amputation, chronic pain, cardiac failure and the elderly.
3. The study of functional prognosis and outcome in patients with traumatic brain and spinal cord injury.
4. The study of physical, social and psychological impairment and disability in adolescents and adults with (congenital) disorders in childhood

Key figures

Department	SP1	SP2	SP3	SP4	SPtot	T1	T2	T3	Ttot	IS	FS	OP	Ptot
plastic and reconstructive surgery	0,1	0	0	0,05	0,15								
rehabilitation	1,98	2,4	4	3,1	11,48								
Total	2,08	2,4	4	3,15	11,63	3	0	0	3	35	2	0	40

Thesis

GINNEKEN, B.T.J. van (2009, juli 01). Fatigue after liver transplantation. EUR. Prom./coprom.: Prof.Dr. H.J. Stam.

Groot, I.B. de (2009, februari 18). Functioning before and after total hip or knee arthroplasty. EUR. Prom./coprom.: Prof.Dr. J.A.N. Verhaar, Prof.Dr. H.J. Stam & Dr. J.B.J. Bussmann.

Willemsse - van Son, A.H.P. (2009, januari 28). Functional prognosis of long-term outcome after traumatic brain injury. A prospective follow-up study. EUR. Prom./coprom.: Prof.Dr. H.J. Stam.

Article/Letter to the editor

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Buffart, L.M., Westendorp, T., Berg-Emons, H.J.G. van den, Stam, H.J. & Roebroek, M.E. (2009). Perceived barriers to and facilitators of physical activity in young adults with childhood-onset physical disabilities. *Journal of Rehabilitation Medicine*, 41(11), 881-885.

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Groot, S.A. de, Haisma, J.A., Post, MWM, Asbeck, F.W.A. van & Woude, L.H.V. van der (2009). Investigation of bias due to loss of participants in a Dutch multicentre prospective spinal cord injury cohort study. *Journal of Rehabilitation Medicine*, 41(5), 382-389.

Hurkmans, H.L.P., Bussmann, J.B. & Benda, E. (2009). Validity and Interobserver Reliability of Visual Observation to Assess Partial Weight-Bearing. *Archives of Physical Medicine and Rehabilitation*, 90(2), 309-313.

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Wichers, M.J., Hilberink, S., Roebroek, M.E., Nieuwenhuizen, O. van & Stam, H.J. (2009). Motor impairments and activity limitations in children with spastic cerebral palsy: a Dutch population-based study. Journal of Rehabilitation Medicine, 41(5), 367-374.

Willemse - van Son, A.H.P., Ribbers, G.M., Stam, H.J. & Bos, GAM van den (2009). Is there equity in long-term-healthcare utilization after traumatic brain injury? Journal of Rehabilitation Medicine, 41(1), 59-65.

EMC MUSC-01-47-01 - Efficiency and efficacy of trauma care

Programme design in brief

The main objective of this programme is to investigate the efficiency and efficacy of management and treatment approaches for trauma patients.

The basic research projects aim at getting insight into fracture healing.

Fractures that do not heal uncomplicated often require bone grafting. Literature data of bone substitute materials available in the Netherlands will be collected. The biomechanical and biological characteristics in vivo will be determined. Finally, a clinical guideline for surgical use of these products will be made.

Literature data imply that Pulsed ElectroMagnetic Fields (PEMF) induce osteosynthesis. The effect of PEMF on osteoinduction will be studied in chondrocytes and in patients who sustained a tibia fracture.

Advanced trauma life support (ATLS) propagates the use of pelvic circumferential compression devices (PCCDs) for reducing and stabilizing pelvic fractures, however their clinical benefits and risks are largely unknown. The mechanical effects, the quality of pelvic reduction and the decubitus risk of PCCDs will be determined.

The aim of the clinical research projects is to compare management approaches for several fracture types using prospective multi-centre randomized controlled trials (RCT).

The following multicenter RCTs are ongoing: (1) Clinical- and cost-effectiveness of internal fixation (cancellous screws versus sliding hip screw) of femoral neck fractures; (2) Clinical- and cost-effectiveness of hemiarthroplasty versus total hip arthroplasty of femoral neck fractures; (3) Clinical- and cost-effectiveness of hemiarthroplasty versus conservative treatment of comminuted humeral fractures; (4) Functional after-treatment versus cast-immobilization of simple elbow dislocations; (5) Outcome after open reduction and internal fixation versus percutaneous surgery versus conservative treatment of displaced intra-articular calcaneal fractures.

In a multicenter cohort study, outcome of treatment of persistently unstable complex elbow dislocations using a hinged elbow fixator is studied.

Repair of an acute Achilles tendon rupture with a Mesh Achilles Tenoplasty versus minimally invasive tenodesis using Mitek anchors will be studied in retrospective cohorts.

Two projects aim at identifying patients at risk. Literature data indicate that patients with low Mannose Binding Lectin (MBL) levels due to single nucleotide polymorphisms in the MBL-2 gene are at risk of developing serious infectious complication after transplantation or ICU admission. This association will be investigated in polytraumatized patients. The second project deals with elderly patients reporting to the emergency department for medical assessment after they fell. As these patients may be at risk for falling again, the effects of withdrawal of fall-inducing drugs will be investigated.

In preclinical research projects the added value of assistance by Helicopter Emergency Medical Services (HEMS) on outcome and quality of life will be studied in polytraumatized patients. Effects, costs and benefits will be investigated.

Key figures

Department	SP1	SP2	SP3	SP4	SPtot	T1	T2	T3	Ttot	IS	FS	OP	Ptot
surgery	1,7	1,1	0,6	1,3	4,7								
Total	1,7	1,1	0,6	1,3	4,7	2	0	0	2	8	16	9	35

Thesis

Ringburg, A.N. (2009, juni 10). Helicopter Emergency Medical Services ; Effects, Costs and Benefits. EUR (212 pag.). Prom./coprom.: Prof.Dr. P. Patka.

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Article/Letter to the editor

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Farrell, E.J., Jagt, O.P. van der, Koevoet, J.L.M., Kops, N., Manen, C.J. van, Hellingman, C.A., Jahr, H., O'Brien, FJ, Verhaar, J.A.N., Weinans, H. & Osch, G.J.V.M. van (2009). Chondrogenic Priming of Human Bone Marrow Stromal Cells: A Better Route to Bone Repair? *Tissue Engineering part C-Methods*, 15(2), 285-295.

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EMC MUSC-01-51-01 - Regenerative medicine of the musculoskeletal system

Programme design in brief

The main purpose of this program is to study the basic principles of growth, healing, ageing and degeneration of bone, cartilage and tendon tissue. Critical stages in growth are dictated by molecular and mechanical stimuli. In adult stages and particularly during healing the same stimuli are still active, albeit their influence is usually less strong than during development. Surgery on bone and cartilage for reconstructions in the head and neck region, in joints due to osteoarthritis or osteoporosis and after fractures or injuries is partly based on the self-healing regenerative capacity of these tissues. The research in this programme involves a fundamental approach, using cell and molecular biology techniques, computer models and imaging techniques and aims to find the essential physical and molecular stimuli to (re)generate cartilage, bone and tendon. Cell differentiation stages and appropriate matrix development from precursor (adult stem) cells is examined and its critical stimuli are influenced. In particular the effects of mechanical forces is studied in cell cultures and computational biology models. The general aim in the cartilage research is to develop an optimal cartilage repair method, either from a biomaterial, a cultured autograft, bone marrow derived stem cells or a combination. Bioengineering methods are used to stimulate bone and cartilage cells and effects are studied by molecular techniques. Bone tissue from various clinical and animal experimental sources is evaluated using micro-CT scanning and computer models to study bone strength and turnover.

Clinical studies focus on improved evaluation of reconstruction techniques (e.g. x-ray stereophotogrammetry) and the incorporation of more subtle interventions (e.g. growth factors, cell therapy, computer aided surgery). Further work concerns clinical outcome studies with respect to implant surgery, sport injuries, knee trauma and pediatric orthopaedics.

Key figures

Department	SP1	SP2	SP3	SP4	SPtot	T1	T2	T3	Ttot	IS	FS	OP	Ptot
orthopaedics	2,45	3,52	2,01	3,1	11,08								
Total	2,45	3,52	2,01	3,1	11,08	5	0	0	5	21	4	0	30

Thesis

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