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European core curriculum “Manual Medicine”

Methodical recommendations and contents for the European postgraduate training and qualification for the additional competence Manual Medicine for European specialists

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I. Introduction

Subject of manual medicine

Manual Medicine is the medical discipline of enhanced knowledge and skills that by the use of theoretical basis, knowledge and conventional medical techniques of further medical specialities, carries out the manual diagnostic

examination of the locomotor system, the head and connective tissue structures. It also adds manual techniques to the treatment of functionally reversible disorders aiming at the prevention, curing and rehabilitation of the latter. Diagnostic and therapeutic procedures are based on scientific neurophysiological and biomechanical principles.

Manual Medicine in Europe is an interdisciplinary additional competence for European medical specialists. Within the framework of a multimodal therapeutic concept, Manual Medicine encompasses the interdisciplinary application of its diagnostic and therapeutic techniques for reversible dysfunctions of the locomotor system and the resulting ailments. Additionally, systemic chain reactions, vertebro-visceral, viscero-vertebral and viscero-cutaneous, within the locomotor system as well as psychosomatic influences are also adequately considered (“chain” means interlinked functional symptoms in the locomotor system).

Prerequisites for learning and doing manual medicine

Prerequisites for the acquirement of the post-specialist qualification in man-

ual medicine is the licence to practice medicine (physician, medical doctor) and being at least on the path for a European specialist. The primary goal of this training is the acquisition of additional competence and skills in manual medicine by way of the completion of the time and contents as well as the courses prescribed for the professional training module.

The professional training courses in “Manual Medicine” should be designed to provide doctors in private practice and in hospitals who are concerned with the diagnosis and treatment of reversible dysfunctions of the locomotor system, with the best tools to enhance their diagnostic and therapeutic skills with the possibilities offered by the discipline of Manual Medicine.

Manual medicine—its relations to osteopathy and chiropractic

The European Scientific Society of Manual Medicine (ESSOMM) considers appointed osteopathic and chiropractic techniques as elements and enhancement of Manual Medicine. Manual Medicine, as it has been used in Europe since the second half of the twentieth century, is based on ancient roots as well as on osteopathy and chiropractic.

Final version accepted by ESSOMM Executive Board 2017-05-27; European Scientific Society of Manual Medicine (ESSOMM); President: Prof. Dr. Hermann Locher, MD, (D)

Editorial team extended 2nd version 2017

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The aims of a scientific manual physician, an osteopathic physician and a non-medical chiropractor are identical. All three tend to use their hands to diminish pain, to improve function and to contribute finally to heal the patient's body. The origins of Manual Medicine can be traced back about 5000 years, while osteopaths and chiropractors in the nineteenth and twentieth centuries contributed important anatomical and systemic considerations on functional disorders of the body. The founders were osteopath A.T. Still (from 1874) and chiropractor D.D. Palmer (from 1897) who introduced their approaches in the USA.

In the course of the time, various models and techniques were included and different schools developed outside the USA, for example in France, Great Britain, Belgium, The Netherlands, Switzerland, Austria, Germany, Scandinavia, Czech Republic and Australia. Many of the osteopathic or chiropractic techniques can be effectively applied by physicians and are based on theoretical models derived from anatomy, biomechanics and neurophysiology. These techniques have been widely incorporated in the European Manual Medicine. Therefore, the ESSOMM appreciates substantial and safe components of osteopathic and chiropractic techniques as an integral part of Manual Medicine and therewith of medical sciences. Some of these empirically founded and practically safe techniques are part of this European core curriculum of Manual Medicine.

Principle structure of the professional postgraduate apprenticeship in manual medicine

The practice of manual medicine requires theoretical knowledge, competencies and enhanced manual skills, which are taught in structured courses by specially qualified teachers. A confirmation of the recognition/acceptance of the course as well as its teacher is obtained from the responsible national authority of physicians prior to taking the course. The course sequence should be obligatory.

Following the Bologna process in Europe, this higher medical training

in Manual Medicine requires a total volume of 30 European credit transfer system (ECTS). The professional training module should be therefore divided into:

1. *Basic courses (10 ECTS)*: 1 ECTS = 10 lecture hours a 45–50 min and 10 min intermission, plus 25 h self-studies) in which the basic knowledge and the basic skills of manual medicine are taught and
2. *Advanced courses (20 ECTS)* that provide the advanced competencies and skills of Manual Medicine.

In total 30 ECTS = 300 lecture hours plus 750 h self-studying, totalling 1050 h.

II. Implementation of the course

The professional training facilities for this course have to provide appropriate rooms for the theoretical lectures as well as exercise rooms with height-adjustable treatment tables. A maximum of three students should be planned per treatment table.

The instruction consists of:

1. Theoretical lectures
2. Practical demonstrations
3. Exercise sessions.

Following the theoretical introduction and the clarification of indications and contraindications which set off each section, special emphasis is placed on the practical instructions of the previously taught manual examination and treatment techniques. Before the students begin to practice these techniques, they are demonstrated by the course manager or the teacher who will then also supervise them during the exercises. The course contents should lead from the simplest to the most complicated subject matter.

No more than 15 course participants per teacher should be placed in a course, and, as a matter of principle, each course should be evaluated by its participants. The course manager and the teacher must have advanced experience in manual medicine practices. They are obliged to regularly participate in especially designated continuing education courses for teachers. If available, corresponding recommendations for the continuing

medical education of physicians by the local or national authorities have to be respected.

III. Main emphasis of the course contents

Levels of competence in knowledge (cognition): “K”

1. Basic knowledge
2. Reproducible knowledge
3. Applied knowledge in relation to manual medicine
4. Active teaching manual medicine knowledge

Levels of competence in skills: “S”

1. Functional tests, palpation
2. Applying manual medicine techniques under supervision
3. Applying manual medicine techniques without supervision
4. Active teaching manual medicine skills

Levels of competence in attitude: “A”

1. History taking
2. Inform about therapeutic options/contraindications
3. Patient education

1. Basic knowledge

Our knowledge is an ongoing process, requiring constant effort, vigilance and updating. Anatomy, biomechanics, physiology and pathophysiology as basics in manual medicine are oriented towards the actual status of developing science. New results and knowledge are gathered and discussed by the ESSOMM and are regularly made available. The exact theoretical content of the curriculum is not included in the curriculum.

1.1 Essential knowledge

- functional anatomy and biomechanics of the locomotor system (K3)
- physiology and pathophysiology of the locomotor system (K2)
- functional analysis of the locomotor system (K3)
- principles of manual medicine and major postulated mechanisms of action (K3)

- anatomy, physiology and pathophysiology of the nervous system in relation to pain and dysfunction (K2)
- function and interlinked function (chain reactions) as well as the dysfunction within and between the organs of the locomotor system (spine, extremity joints, muscles, ligaments, fascia) (K2)
- primary and secondary somatic dysfunctions, simple and complex dysfunctions in the locomotor system (K3)
- specific postulated mechanisms of diagnostic and therapeutic techniques (K3)
- clinical syndromes and differential diagnostics of the locomotor system (K2)
- relevant ancillary diagnostics (e.g. laboratory, imaging, electro-diagnostics) to manual medicine (K2)
- risks and benefits of other relevant therapeutic modalities compared to or in conjunction with manual medicine (K3)
- indications and contraindications for different therapeutic options (K3)

1.2 Essential skills

- informing the patient adequately about their condition in order to obtain informed consent (A2)
- effectively inform the patient about anticipated benefits and outcomes, potential risks and complications of manual medicine treatments (A2)
- to conduct effective history taking (A2)
- to conduct physical examination (S3)
- to perform effective, accurate palpatory diagnostics (S3)
- competence to deliver safe, effective manual medicine treatment in a general population (S2)
- competence to deliver safe, effective manual medicine treatment in complex morbidity or special musculoskeletal complaints (S2)

2. Anatomical objectives

2.1. General anatomical objectives

- to comprehend and to describe the normal functions of the muscles and joints of the axial and appendicular

skeleton, and the function of the nervous system (K2)

- to understand the anatomical basis of techniques used to investigate and manage complaints of the locomotor system (K3)

2.2. Specific anatomical objectives

- to describe macrostructure, anatomical relations and surface anatomy of the elements of the locomotor system (K2)
- to describe the course and relation of the peripheral arteries (especially the vertebral arteries) and the effects on these vessels of movements of the associated skeletal structures (K1)
- to describe and demonstrate the course and distribution of the peripheral and autonomic nerves (K2)
- to explain the motor and sensory mechanisms involved in movements and musculoskeletal complaints (K2)
- to recognize anatomical variants in neural and musculoskeletal structures (K1)

3. Physiological objectives

3.1. General physiological objectives

- to understand the physiological basis of the functions and disorders of the locomotor system (K1)

3.2 Specific physiological objectives

- to describe different types of muscular fibres (K1)
- to describe muscle adaptability (K1)
- to describe the effects of rest, exercise and ageing on skeletal muscle, in terms of histochemistry and molecular structure (K1)
- to describe the neurophysiology, activity and function of reflexes involving the locomotor system including somatovisceral, viscerosomatic, and somatosomatic relationships (K1)
- to describe the basic metabolic principles and physiology of bone, muscle, connective tissue and nerves pertaining to the locomotor system (K1)

- to describe the molecular and cellular processes implicated in mechanisms of muscle contraction (K1)
- to describe the molecular and cellular processes involved in the generation and propagation of action potentials in nerve, muscles, and excitatory and inhibitory synapses (K1)
- to describe the effects of rest, exercise and ageing on fascia, in terms of histochemistry and molecular structure (K1)
- to describe the motor and sensory neurophysiological mechanisms to explain the symptoms of disorders of the locomotor system (K2)

4. Biomechanical objectives

4.1. General biomechanical objectives

- to understand certain precepts of biomechanics and apply them to the locomotor system (K2)
- to recognize and describe the aberrations of function of the locomotor system (K2)

4.2. Specific biomechanical objectives

- to define, in biomechanical terms, the following terms as they are applied to joints: hypomobility, hypermobility, and instability (K3)
- to describe biomechanical differences between somatic dysfunction and capsular patterns (K3)
- to demonstrate an ability to apply and interpret the following terms with respect to any of the tissues of the locomotor system: stress, strain, stiffness (K3)
- to describe the movement of any joint in terms of translation and rotation about biomechanical axes (K3)

5. Pain objectives

5.1. General pain objective

- to understand the physiology of pain and the pathophysiological and biopsychosocial implications of pain (K2)
- to understand the somatic and visceral structures which contain receptors capable of creating pain (K3)

- to understand the relationship between pain and function, i. e. pain as a consequence and as a cause of dysfunction (K2)

5.2. Specific pain objectives

- to describe, at an appropriate level, the classification of pain (K2)
- to differentiate acute and chronic pain and their proposed mechanisms (K2)
- to describe the anatomy, physiology, pathophysiology, and currently understood mechanisms of pain (K2)
- to describe the understood patterns of referred pain to and from the locomotor system (K2)
- to describe the relationship between psychosocial factors and chronic pain (K2)
- to describe the role of the autonomic nervous system in relation to pain (K2)

6. Diagnostic examination

6.1. Conventional medical examination

- to perform a conventional medical examination to understand the condition of the patient with respect to indications, contraindications and therapeutic options (S3)
- to perform history taking and examination with emphasis on orthopedic, neurological, occupational biopsychosocial factors (S3)
- to perform systemic and ancillary tests where indicated (S3)
- to prioritize diagnostic tests based on sensitivity and specificity (S3)

6.2. Examination using manual medicine techniques

- to perform examination to identify normal locomotor functions and their disturbance (S3)
- to perform manual techniques for the diagnosis of the locomotor system and other tissues involved in the patient's pathology:
 - joint play examination (S3)
 - examination of muscular tension (S3)
 - evaluation of the connective tissue tension (S3)

- evaluation of visceral-vertebral chain reaction (S3)
- to follow a holistic approach in the framework of medical diagnostic methods (S3)
- to perform screening examination to identify if there is a problem in the locomotor system that deserves additional evaluation (S3)
- to perform a complete examination from a global orientation through a regional orientation to a locally concentrated, specialized manual examination (S3)
- to perform a scanning examination to identify which regions and tissues within the region are dysfunctional and of relevance at a level appropriate to the treatment skills (S3)
- to conduct regional palpatory examinations of the tissues of the locomotor system to identify dysfunctions (S3)
- to perform manual and functional diagnostics of the locomotor system with special consideration of pain reactive signs (S3)
- to conduct palpatory examinations of local tissues to determine the specific dysfunctions considered for manual medicine treatment and the characteristics important in the selection of the treatment modality including indications and contraindications (S3)
- to conduct different palpatory examinations in order to look at and record elements of pain provocation, sensory changes, tissue texture changes, examination of range of motion, and characteristics of the end-feel barrier (S3)
- to conduct re-evaluation of diagnostic findings (S3)

6.3. Recording diagnostic findings

- to record the patient evaluation and patient progress by using various methods of measurement, e. g. visual analogue scale (VAS), dolorimeter, impairment scales, general health scales
- to record relevant specific findings in terms of manual medicine
- to maintain quality management

7. Treatment modalities

7.1. General treatment

- to perform manual techniques for the treatment of the locomotor system and other tissues involved in the patient's pathology such as:
 - positioning techniques (S3)
 - exercises for stabilization, muscle strain and muscle training (S3)
- to perform mobilization techniques including specific techniques for muscle inhibition or muscle relaxation (techniques based on post-isometric relaxation and on reciprocal inhibition, and positioning techniques (S3)
- to perform segmental manipulation techniques of the spine and manipulation techniques of the peripheral joints (S3)
- to supervise physiotherapy of the locomotor system and training for rehabilitation (K2)
- to perform myofascial and related soft tissue techniques (S3)
- to perform trigger-point therapy (S3)
- to apply treatment strategies for interlinked functional (chain reaction) syndromes (S3)
- to integrate the principles of treatment of manual medicine into multimodal treatment concepts (K3)

7.2. Disease prevention and health promotion

- to use all treatment modalities to prevent recurrence of presenting problems (A3)
- to recommend exercise and sound ergonomic behavior for rehabilitation and prevention (A3)
- to instruct in self-exercises (A3)

8. Clinical pictures

8.1. Clinical pictures in manual medicine

- to know and identify disorders or dysfunctions of axial and appendicular structures:
 - cranium (K3)
 - craniocervical junction (K3)
 - cervical spine (K3)
 - cervicothoracic junction (K3)
 - thoracic spine (K3)

- thoracolumbar junction (K3)
- lumbar spine (K3)
- lumbosacral junction (K3)
- sacroiliac joints, pelvic girdle (K3)
- peripheral joints (K3)
- to know and identify viscerosomatic, somatovisceral, psychosomatic and somatosomatic reflexes (K3)
- to incorporate manual medicine disorders or dysfunctions into rehabilitative concepts, including the International Classification of Function (ICF) model (K2)
- to know and identify the disorders and dysfunctions with the appropriate International Statistical Classification of Diseases and Related Health Problems (ICD) code (K3)

8.2. Diseases, disorders and conditions

- to understand the differential diagnosis, relevance and interrelationship to manual medicine of the following conditions:
 - general neurological semiology (signs and symptoms) (K3)
 - neurological disorders (K3)
 - non-cervicogenic headache (K3)
 - orthopedic disorders (K3)
 - rheumatologic disorders (K3)
 - spinal affections (K3)
 - vascular abnormalities (K3)
 - pediatric disorders (K3)
 - trauma of the spine (K3)
 - tumors of the spine (K3)
- to understand special consideration with respect to gender, age and development (especially pediatrics and geriatrics) (K3)

IV. Structure of the course

Both the basic and the advanced course are administered in blocks. The block contents and order are to be determined by the institution/society/association offering the training. The length of the individual blocks may be between 24 and 60 lecture hours. For didactic reasons, no more than 10 teaching units (of 45–50 min each) should be conducted per day.

The emphasis is on the teaching of practical competencies, skills and knowledge. The theoretical course units can be

integrated into the practical instruction. The individual blocks should be scheduled at least 3 months apart so that the time between the blocks can be used to exercise, perform self-studies and solidify the learned competencies and skills.

10 ECTS or 100 lecture hours of the basic course should be organized in:

- 30 h theory
- 70 h practical experience

20 ECTS or 200 lecture hours of the advanced course are organized in:

- 40 h theory
- 160 h practical experience.

This professional training course is completed with a final examination at the providing medical association, certified by the national authority.

V. Contents of the course

The term “hour” designates a course unit of 45–50 min.

Basic course (10 ECTS, 100 lecture hours)

Acquisition of basic knowledge and basic skills (30 lecture hours)

- 7 h.** Theoretical principles of the
 - Functionality, neuronal control and functional pathology of the locomotor system
 - Vertebro-visceral interactions
 - Nociception, pain and nociception
 - Biomechanical principles of the locomotor system as well as of dysfunction of the locomotor system
 - General effects of the different manual medicine techniques, also regarding vertebrovisceral and viscerovertebral interactions and functional chain reactions

5 h. Functional anatomy of the peripheral joints, the spine and the joints of the head

5 h. Structure of fascia, physiological and neurophysiological features of the connective tissue

5 h. Fundamental knowledge of imaging diagnostics and lab findings in special consideration of manual medicine

2 h. Pain in the locomotor system

1 h. Psyche and locomotor system

1 h. Phenomenology of muscle tension and its significance in manual medicine

1 h. Specific manual medicine anamnesis

1 h. Clinical signs that can be influenced by manual medicine

1 h. Indications and contraindications for manual medicine treatment

1 h. Guidelines for documentation and patient's information

Practical experience (70 lecture hours)

- 30 h.** Examination in manual medicine
 - of the peripheral joints
 - scanning examination of the spine
 - of the articular connections of the head
 - of the muscles of the extremities, the torso, the spine and the head
 - of the connective tissue

10 h. Evaluation of the results of examination

- 30 h.** Basic mobilization, soft tissue and neuromuscular techniques in manual medicine for the treatment of dysfunctions of the joints, the muscles and of other tissues
 - of the spine
 - of the head
 - of the extremities
 - of the connective tissue

Advanced course (20 ECTS, 200 lecture hours)

Acquisition of specific competencies and skills:

Theory (40 lecture hours)

- 20 h.** Differential diagnosis
 - of dysfunctions and diseases (locomotor system/internal disease) (4 h)
 - of radicular und pseudoradicular pain syndromes (4 h)
 - of lumbar and pelvic-leg pain (4 h)

- of cervicocranial and cervicobrachial pain, headache included (4h)
- of balance dysfunctions and vertigo (4h)

4h. Evaluation of examinations with imaging techniques, especially functional radiology

6h. Functional control of the locomotor system: motor patterns, their composition and plasticity

10h. Interlinked dysfunctions (chain reactions) in the locomotor system

Practical experience (160 lecture hours)

45h. Segmental specific manipulation techniques of the spine and the joints of the extremities

50h. Enhancement of mobilization techniques in consideration of specific techniques for muscle inhibition or muscle relaxation (muscle energy techniques, techniques based on post-isometric relaxation and on reciprocal inhibition, positioning techniques)

30h. Fundamentals of myofascial techniques

10h. Treatment strategies for interlinked functional (chain reaction) syndromes

10h. Differential diagnosis and treatment of dysfunctions of motor pattern at different control levels

5h. Indications for physiotherapy and training for rehabilitation

10h. Integration of the manual medical treatment into a multimodal treatment concept

VI. Certification

The ESOMM accepts national certificates in manual medicine for accreditation of a European diploma. Prerequisite is the structured curriculum of manual medicine as mentioned above. For acceptance of a national curriculum, the Executive Board of ESOMM is authorized

to precise examination of the national curricula and, if appropriate, to refuse the European certification (diploma).

VII. Sources

This general curriculum containing all items of the education and training as well as the respective degrees of competence was partially developed from the following: FIMM Core Curriculum for Manual Medicine 2005, European Core Curriculum "Manual Medicine" ESSOMM 2006, FIMM Guidelines for Basic Training and Safety 2015.

ESSOMM consensus curriculum basic course manual medicine

- Schedule for a basic course: 100 educational units/EU
- According to the European training requirements for additional competence "Manual Medicine"
- Certificate of Advanced Studies according to the Bologna Concept (CAS)
- The precondition is to be a European Medical Specialist (including specialists for general practitioners with at least 5 years specialization) according to the UEMS standards (participation is accepted, even if the specialization is not yet completed)

Topics:

- Anatomy/biomechanics
- Examination: spine
 - global
 - regional
 - segmental
 - provocation
- Examination: pelvic girdle and peripheral joints
- Indications/contraindications
- Treatment
- Case reports
- Patient education and exercises
- Basics in imaging
- Neurophysiology:
 - neuronal network
 - convergence
 - peripheral and central sensitization
 - chronification
 - inhibition, inhibitory systems
 - therapeutic approach

- Relationship between clinical findings and neurophysiology
- Relationship between clinical findings and anatomy
- Relationship between clinical findings and imaging

Concerning all regions:

- Cervical spine
- Thoracic spine
- Lumbar spine
- Pelvic girdle
- Peripheral joints upper and lower limbs

Modules 1 and 2: Introduction and mobilization vertebral spine (2 × 25 EU)

Scientific basis of explanation

1. The locomotor system and the autonomic nervous system react to afferent input of any origin.
2. Segmental functional testing may increase or decrease a nociceptive motor reaction in a manner of changes of tension of muscle and fascia.
3. Afferent input may also initiate reflex changes of tissues innervated by the autonomic nervous system.
4. Increased tension results in the reduction of passive range of motion.
5. Segmental dysfunction can be identified by palpation.
6. Clinical functional examinations attempt to identify altered movement patterns that can demonstrate both restriction and free direction of motion.
7. Acknowledgement that vertebral dysfunction may be caused by pathology outside the locomotor system (convergence in neurophysiological sense).

Manual medicine (provided by physicians) uses all medical skills and knowledge, such as anatomy, biomechanics, physiology, biochemistry and imaging at the respective actual state of the art.

The unique property of manual medicine amongst other medical specialties is the possibility of entering into the system of diagnosis by identifying the motor and other reactions by pal-

Fig. 1 ▲ Model of the neurophysiology of segmental dysfunction. Comment: The terms “muscle for lordosis” and “muscle for kyphosis” in the figure are used as a highly simplified model of three dimensional complex innervation patterns of spinal muscles as a neurophysiological reaction of body protection. CNS central nervous system, SC spinal cord, WDR wide dynamic range neuron, with kind permission © H. Locher, all rights reserved, this content is not part of the Open Access license.)

pation (i.e. by the reproducible finding of functional induced changes of tissue tension; ■ Figs. 1 and 2).

Manual examination is always preceded by standard orthopedic and neurologic examination

Principles of manual diagnostics.

- Global range of motion (ROM) – asymmetry?
- Segmental or regional range of motion (*mobility* = *M*)
- Segmental irritation = *I* (activation of afferent neurons followed by nocireaction)
- Provocation to identify painful direction(s) = *P*
- MIP-diagnostic system is essential to identify the reversibility of any dysfunction of the spine
- To plan any manual treatment the MIP test must reveal at least one pain-free or unrestricted direction per plane

Principles of manual therapy.

- Generally four possibilities “hands-on”
 - Manual mobilization—no thrust
 - Manual manipulation—with thrust

- Neuromuscular techniques
- Soft tissue techniques
- Before the decision about the therapeutic manual approach be aware of possible contraindications
- No increase of nociception, no increase of pain and nocireaction during therapy
- Achieving long-term decrease of nociceptive activity of multireceptive dorsal horn neurons

Diagnostics of spinal dysfunction: cervical spine.

- global range of motion (ROM)
- segmental ROM (end feeling)
- segmental Irritation
- combined functional testing
- Provocation: for the preparation of a thrust treatment it is necessary to distinguish the directions of increase or decrease of nocireaction (see advanced courses)
- MIP (Mobility—Irritation—Provocation)

Therapeutic techniques: cervical spine.

- global
 - neuroinhibitory techniques
 - global mobilization

- regional or segmental
 - neuromuscular techniques
 - segmental soft tissue techniques
 - segmental mobilization (direct/indirect) in addition to facilitation with respiration and eye movement
- Basic techniques on symptomatic tender/trigger points
- Automobilization techniques, self-exercises, patient education

Diagnostics of spinal dysfunction: thoracic spine.

- Posture
- Global mobility
 - bending forward/backward/side bending
 - rotation in sitting position
- Information about the segmental irritation
 - segmental *mobility*
 - muscular hypertonicity, nocireactive motor patterns
 - symptoms of autonomous regulation (skin rolling test, dermatographism, skin temperature)
- Segmental provocation by functional movements searching for functional asymmetries
- MIP (Mobility—Irritation—Provocation)

Therapeutic techniques: thoracic spine.

- global
 - soft tissue techniques
 - axial traction technique (in upright position)
 - tangential push-traction
- regional or segmental
 - crossed hand technique (prone)
 - supine thenar technique
 - techniques on symptomatic tender points
 - neuromuscular inhibition techniques

Diagnostics of rib dysfunction.

- Mobility: costal/intercostal motion during respiration
- Irritation: area of insertion of m. levator costae
- Provocation (inspiration/expiration under irritation checking)

Fig. 2 ◀ Some known contents of the simplified “black box” in Fig. 1. (From [1], with kind permission Thieme-Verlag, Stuttgart, this content is not part of the Open Access license.)

Therapeutic techniques: ribs.

- mobilization in prone position
- crossed hand technique (prone)
- mobilization in lateral position
- traction on the arm in lateral position
- supine thenar technique

Diagnostics of spinal dysfunction: lumbar spine.

- Posture
- testing of regional or segmental mobility
 - side bending, flexion, extension
 - rotation in sitting position
- irritation: paraspinal segmental muscles
- provocation (check for painful/pain-free motion directions)
- MIP (Mobility—Irritation—Provocation)

Therapeutic techniques: lumbar spine.

- Soft tissue techniques
- Neuromuscular techniques
- Regional or segmental mobilization (e.g. rotation traction in lateral recumbent or in prone position)

Diagnostics of joint dysfunction: sacroiliac joint (SIJ) and pelvic girdle. Preliminary remarks:

All movements of SIJ components are defined by the anatomic form of the joint surfaces of the ilium and the sacrum and are physiologically possible only in a minimal range of a few degrees (2–4°). In contrast to all other joints according to the definition of a true diarthrosis, actively intentioned movements within the SIJ in a functional direction are not possible. Therefore, movements of the SIJ are not comparable with the function pattern of other joints.

Didactically motivated orientation on functional three-dimensional axes have no basis on functional biomechanical evidence and should not be considered further. In the basic course, we only teach techniques that involve unspecific forces to the SIJ components. The selection of techniques depends on the results of some functional examinations and more important the pain-provocation tests. The aim is to influence the dysfunction based on reactive processes in order to induce a reduction of tension and pain. There is a wide variation in the accepted practise of SIJ testing. A general consensus has not been achieved.

Forward bending/spine test: even though clinical mobility exists, diagnostically conclusions are uncertain.

Mobility tests have not been proven sufficiently reliable.

Instead of using mobility tests, it seems to be advisable to use pain provocation tests:

- Compression test
- Distraction test
- Thigh thrust (“4P”-test = “posterior pelvic pain provocation”)
- Sacral springing test
- Pelvic torsion test (Gaenslen test)
- Flexion-Abduction-External-Rotation test (FABER test, Patrick-test, “sign of 4”)

Additional remarks:

Signs of irritation in SIJ-related tissues may give information on SIJ dysfunction acknowledging the fact that projections on S1 and S2 are also derived from different lumbar segments.

No other dysfunction deserves more consideration of differential diagnoses than the SIJ. The initial diagnostic procedure should exclude other (such as lumbar or higher convergence) dysfunctions before identifying a SIJ dysfunction.

Fig. 3 ▲ Diagram on distance/force adapted to movements of joints (and segments), concerning the degree of mobility (NZ neutral zone, EZ elastic zone, PZ plastic zone, Th therapeutic range). (From [2], with kind permission Thieme-Verlag, Stuttgart, this content is not part of the Open Access license.)

Depending on the results of functional and/or pain-provocation tests as well as other clinical findings concerning the SIJ, the decision about appropriate therapeutic techniques can be made.

Therapeutic techniques: SIJ:

Not yet any conclusion in respect to therapy of SIJ dysfunction.

Proposals for therapeutic techniques:

- Non-specific mobilization in nutation or counternutation direction
- Traction mobilization (by vibration)
- Adduction mobilization in prone position
- Ilium rotation to induce sacrum nutation (no impulse)

Modules 3 and 4: peripheral joints (2 × 25 EU)

Module 3: Introduction and upper limbs

Introductory remarks. In order to define the appropriate technique for manual treatment of peripheral joints, a concise basic examination of the respective joint is necessary. This examination comprises investigating the functional movement, the range of motion in all planes, the joint play and the palpation of the different tissue levels in order to differentiate structural lesions from functional

disorders. This is a precondition before starting with any manual treatment.

Generally, manual techniques in peripheral joints are indicated in the following conditions:

- Reduction of functional mobility and joint play
- Painful functional disorders
- Post-traumatic, post-inflammatory, post-operative, post-immobilization, and degenerative stiffness
- Certain cases of neuropathology (e.g. spastic paralytic contractions)

- Post-complex regional pain syndrome (CRPS) stiffness or contraction

General considerations. Concerning peripheral joints, we talk specifically about joint play (see glossary). These movements are related to some considerations involving general biomechanical rules of joint mobility (■ Figs. 3 and 4):

In this sense, we follow the model of dysfunction as a reduction of the total joint play:

Fig. 4 ▲ Diagram distance-force-(tension) of one degree of free mobility (e.g. flexion/extension or gliding ap/pa) Above: normal findings; Below: restriction to the right side, actual neutral position moved to left side (grey ordinate). (From [2], with kind permission Thieme-Verlag, Stuttgart, this content is not part of the Open Access license.)

Fig. 5 ▲ Diagram of the convex-concave rule for peripheral joints: in case the peripheral convex partner is mobilized, points on the cartilage surface will move in opposite direction in relation to the rest of the bone; in case the peripheral concave partner is mobilized, points on the cartilage surface will move in the same direction in relation to the rest of the bone. (From [3], with kind permission Spitta-Verlag, Balingen, this content is not part of the Open Access license.)

The following movements in a joint can be differentiated and should be taken into consideration before planning any kind of diagnostic or therapeutic approach:

- Rolling = wheel runs on a road
- Gliding = wheel turns on the spot
- Roll-gliding = wheel runs and glides at same time
- Translation = wheel glides without rotation
- Axial forces: compression (coaptation) and separation (decoaptation)

Although the exact role of compression to a joint during a manual procedure has not been completely defined, it has been shown that the improvement of joint play movements will have a positive influence on the nutrition and regeneration of joint cartilage. The repetitive change of compression and separation acts as a pump of synovial fluid in and out of the cartilage. This way compression may have a positive therapeutic influence on joint cartilage. Also, it may improve proprioception and reduce nociception as well as having positive effects on the capsule.

In order to improve any functional movement of a peripheral joint, the re-

duced joint play capacity of the respective joint must be increased.

Concerning peripheral joints, the convex-concave rules have to be considered:

- In cases of mobilization of the (peripheral) convex partner: P₁ and P₂ are moving in the opposite direction
- In cases of mobilization of the (peripheral) concave partner: P₁ and P₂ are moving in the same direction (■ Fig. 5)

This means for example: in order to improve the abduction in a shoulder, the humeral head has to be mobilized in a caudal direction, or to improve the flexion of the knee, the tibial head must be mobilized in a dorsal direction.

Therapeutic procedures on limbs are possible applying traction or light compression.

Capsular pattern indicates specific movement restrictions. Each joint has its typical capsular pattern. In a hip joint this is the internal rotation (and extension).

For functional examination, follow the algorithm MANSC-VV:

- Myofascial
- Articular

- Neuromeningeal
- Stabilization tests
- Central disorders
- Visceral and vascular

“Upper limb”. Diagnostics/therapy:

1. Finger joints:
 - Mobilization dorsally and palmar
 - Mobilization laterally to both sides
 - Mobilization rotationally
 - Mobilization three dimensionally
2. Thumb:
 - Speciality: saddle joint (convex-concave in one plane, concave-convex in other planes)
 - Mobilization of the saddle joint
3. Wrist:
 - **Diagnosis:**
Check for function (dorsal extension, palmar flexion, radial and ulnar abduction)
 - Check the mobility of every carpal bone—in two rows (respect the convex-concave rule)
 - **Therapy:**
Traction
Translation of the first or second row in all possible directions
Mobilization of each carpal bone individually
4. Elbow:
 - **Diagnosis:**
Check function humeroulnar, humeroradial and radioulnar joints (range of motion)
Palpation: muscles, ligaments, insertions and nerve passages
 - **Therapy:**
Soft tissue techniques to the elbow
Mobilization of the elbow
5. Shoulder girdle:
 - The shoulder has five different areas of mobility, which all have to function correctly:
Acromioclavicular joint
Sternoclavicular joint
Glenohumeral joint
Scapular-thoracic gliding area
Subacromial gliding space
All areas and related muscles must be tested.
 - Examination directions:
Abduction and elevation
Internal and external rotation
Movements to back and neck

Articular mobility anteriorly and medial clavicular ligaments

■ **Therapy of the shoulder girdle:**

Soft tissue and muscle techniques
Mobilization techniques of: scapular-thoracic gliding area; sub-acromial space; acromioclavicular joint; sternoclavicular joint; glenohumeral joint

Module 4: “Lower limb”

Remember general algorithm of peripheral joint examination.

Foot. Diagnostics:

- Check for function and for joint play mobility

Four functional axes/joint lines of the foot:

1. Upper ankle (tibio-talar): flexion/extension
2. Lower ankle (talo-calcaneal): inversion/eversion
3. Chopart and Lisfranc lines/middle foot: supination/pronation
4. Metatarsal phalangeal I (II–V): extension/flexion

Therapy:

Toes, metatarsal connections, tarsometatarsal, ankle and subtalar joints, distal tibiofibular connection:

- Soft tissue and muscle techniques
- Mobilization with respect to the individual joint play

Knee. Diagnostics:

- functional mobility and joint play

Therapy:

Tibiofibular, femorotibial, patellofemoral joint:

- Soft tissue and muscle techniques
- Mobilization

Hip. Diagnostic:

- Examination of mobility and joint play

Therapy:

- Soft tissue and muscle techniques
- Mobilization

Definitions/Glossary

Convergence:

- In neural system: afferents of different tissues converge to dorsal horn neurons (multi-receptive, WDR) (spinal cord and also medulla oblongata)
- Biomechanics: position within facet joints (convergence/divergence)

Joint play:

- All passive movements of a joint, controlled exclusively by gravity or external forces

Referred pain:

- Convergence, the noci-generator not being in the painful tissue (e.g.: “head”-zone)

Sensitization:

- Receptive fields enlarged, threshold in first (peripheral) or second (central) neuron lowered, and hyperalgesia

Trigger point:

- Structural lesion within myofibers by contraction of a part of the fiber, producing referred pain

Tender point:

- Secondary local hyperalgesia without structural lesions (e.g. widespread pain syndrome with multilocal tender points)

There will be constant upgrade according to scientific development and the actual state of the art.

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Compliance with ethical guidelines

Conflict of interest. H. Locher, B. Terrier, W. von Heymann, M. Habring, L. Beyer and A. Lechner declare that they have no competing interests.

This article does not contain any studies with human participants or animals performed by any of the authors.

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