

ABSTRACT

CONTRIBUTIONS TO STUDY THE ROLE OF PHYSICAL EXERCISE IN NEUROMOTOR REHABILITATION AND SPORT PERFORMANCE

1. INTRODUCTION

Habilitation thesis is based on general recommendation of National Council for Academic Titles, Diploms and Certificates (C.N.A.T.D.C.U.), in respect of actual laws.

The thesis has three parts that content the results of research activity, professional activity results, and academic results, after ph.d. graduate and present the evolution in these three fields. Also are presented the projects for the future activity in the global context of scientific development and in according with my professional area of sport medicine and rehabilitation.

First section presents the research activities after my ph.d. graduate, focused on the role of physical exercise like way for sport training, physical therapy and prevention of chronic diseases.

The results are oriented to development of new algorithms for evaluation and creating the rehabilitation program based on physical exercise. In this context my research activity includes analysis of neuromuscular aspects, analysis of muscle balance, muscle tone, posture and gait.

I am concerned with the using of new technologies for muscle and neuromuscular assessment in neurology and sport activity, like tensiomyography(TMg), which has been introduced in Romania, by me in our research laboratory.

The fields of my research activity are:

- **research about evaluation and using of physical therapy in neuromuscular diseases** –which starts from clinical, functional, neuromuscular and biomechanic evaluation and help us to create the rehabilitation program (improvement of muscle function, decrease the weakness, apply the submaximal effort, improvement of aerob capacity, increase the flexibility). The conclusions of this research propose the importance of use the evaluation scale for spasticity, effort capacity, cardiovascular reactivity, movement analysis, fatigue index assessment, EMG parameters assessment, correlation between muscle force and VO₂max.

-research about the role of physical exercise for restore the motor performance after stroke is based on common element for sport and motor rehabilitation, which is proprioception. The persons with stroke disability have severe motor disorders of body segments alignment and sometimes impossibility to recognize the body segments. For this reason a complex assessment and start the early rehabilitation program based on physical exercise, is the key for restore the motor function.

-research about the muscle performance in relation with sport performance and motor rehabilitation

The aim of these research is to use the effect of physical exercise as path for sport rehabilitation, in muscle injuries and also in neuromuscular diseases rehabilitation

The research activity is an interdisciplinary research includes the : therapeutic physical exercise, indentification of muscle pattern performance in different situations, assessment and understanding the mechanisms for movement pattern, monitoring the rehabilitation program, the training and sport activity.

The second part of the thesis includes the professional and academic development, based on my medical experience in field of sports medicine, sports traumatology, musculoskeletal ultrasound. Also my academic activity during 20years allows me to develop the research and to disseminate my experience from the position of scientific coordinator and head of sports medicine department.

Third part of the thesis presents the plan of academic and research activity development and is based carrying out the activity in INCESA and also start the doctoral studies like coordinator .

The last part contents the selective references.

2. SCIENTIFIC, PROFESSIONAL AND ACADEMIC ACHIEVEMENTS

2.1. Scientific achievements

a. Doctoral thesis

In 2002 I present the doctoral thesis titled ***Contribution to study the reports between osteo and bone marrow***, confirmation by MEC-3896/24.04.2003, University of Medicine and Pharmacy Craiova, and obtain the title phd in medicine.

b. Postdoctoral research activity

Since 2006 I start my research activity at ***Research Center for Study the Human Body Motricity***, , University of Craiova. My research activity starts with studies regarding physical exercise application in neurology diseases, muscle injuries, prevention of chronic disorders and improvement of sports performance, based on neuromuscular and biomechanic assessment.

In 2009 I start to work to an important research project means to achieve the new research infrastructure named Research Infrastructure in Applied Sciences (INCESA), and I am the director of Laboratory of Innovative Techniques and Processes in Bioengineering.

c. Publications –books and articles

I publish 12 articles in ISI Thomson journals, 14 articles in conferences proceedings index in ISI Thomson, 35 articles in BDI journals. I coordinate 3 national research projects and international projects. I publish 3 books like unique author, 3 books like first author and 4 books in collaboration. Also I have more then 20 studies and papers presented to conferences in postdoctoral period.

2.2. Professional achievements

a. *Professional activity* has many courses in field of rehabilitation and sports medicine that help me to improve my knowledges. I participate to 17 courses and training organized by prestigious university and hospitals.

b. *Member in scientific/ editorial board of:* *American Journal of Sports Science and Medicine, World Academy of Science, Engineering and Technology, Medicina Sportiva, BMC Research Notes, Montenegrin Journal of Sports Science and Medicine, Journal of Physical Education and Sport; Timisoara Physical Education and Rehabilitation Journal, Journal of Sport and Kinetic Movement*

Reviewer for journals:

- ✓ *American Journal of Sports Science and Medicine (BDI)*
- ✓ *Montenegrin Journal of Sports Science and Medicine (BDI)*
- ✓ *Journal of Physical Education and Sport(BDI)*
- ✓ *BMC Research Notes(BDI)*
- ✓ *International SportMed Journal(ISI)*
- ✓ *PlosOne(ISI)*
- ✓ *D iabetes Research and Clinical Practice(ISI)*
- ✓ *Journal of Sports Sciences(ISI)*
- ✓ Evaluate the European programs for European Science Foundation.

c. *Member of scientific and professional national and international societies*

Scientific committee of European College of Sports and Exercise Physicians.

Member :

International Federation of Sports Medicine
Romanian Sports Medicine Society
Balkan Sports Medicine Society
Romanian Society of Cardiology
European College of Sport and Exercise Physicians
Sports Science Council

Member malpraxis committess of Medical College Dolj.

Since 2014 I am founder of International Society of Tensiomyography (ISOT).

2.3. Academic achievements

a. *Didactic activity*

I start my didactic activity in 1996, and I was assistant (1998-2000), lecturer (2000-2004) associate professor (2004-2007) and professor from 2007.

Didactic activity includes teaching courses and seminars to : *Anatomy, Rehabilitation in orthopedic pathology, Rehabilitation in neurology, Sports Medicine, Orthosis and prosthesis, Postural mechanisms*. In 2007 I start to coordinate and develop a new master program titled *Physical therapy in neuromotor rehabilitation*.

b.Participation to international conferences

I have a rich activity regarding participation to international congresses and I was invite speaker to some of them:

FIMS Congress-2006; ECSS Congress-2003,2004,EFSMA Congress-2007; WASET Conference 2011, 2012, Balkan Congress of Sports Medicine București 2008; International Conference & Exhibition on Neurology and Therapeutics; 8.3rd ECOSEP Congress, Frankfurt am Main, Aprilie, 2013; Summer Course ISMULT-ECOSEP- Marathons, Greece, 24-29August 2015;World Congress & Expo on Dementia & Neuroscience, Septembrie26-28, 2016, Los Angeles, USA

3. PLAN FOR DEVELOPMENT THE ACADEMIC CAREER

3.1. Professional development

I have very good conditions for development my professional career based on infrastructure , possibility to have a collaboration with personalities form prestigious universities and improve my knowledges in field of neuromotor rehabilitation and sports medicine. Also I propose to participate to courses and to increase the level of languages level knowledges.

3.2. Academic development

For short time I plan to edit some didactic documents like *Principles for assessment and rehabilitation in stroke*.

I want to coordinate a book regarding techniques and methods used in physical therapy, for students form bachelor and master degree. For sports performance I consider that is need to develop the specific guidelines about assessment in sport, injury prevention, principles of rehabilitation in sport traumatology.

3.3. Research development career

Research activity will be in relation with possibility to coordinate doctoral thesis and I try to have a continuous activity connected with previous research activity form postdoctoral period.

The following research directions will be involved: *Study of relation between electrodiagnostic and muscle performance; Algorithms for assessment the soccers based on TMG and body composition; Monitoring the coordinative performance using EEG*.

I propose myself to extend the cooperation with research center from Belgium, Germany and to develop the European projects. Much more I wish to increase the international visibility and increase the

dissemination procedures, like organized the workshops, international conferences and summer schools.