

## Evaluation of the Doctoral Thesis

„The Biomechanical Reflexion of Moderate Idiopathic Scoliosis in Gait Cycle of Young Adults

By Mgr. Christos Polyzos

The thesis consist from 70 pages of the own text plus summary, list of abbreviations, appendix and supplements. The aim of this work is formulated only in the fourth chapter on page 43:

*„To detect the biomechanical reflexion of moderate idiopathic scoliosis upon the major joints of the lower extremities and the center of gravity during gait cycle of young adults as well as the correspondence of these anatomical points due to an abnormal movement created always in comparison with the gait cycle of healthy people“.*

The previous chapters are devoted to the description of the basic terms corresponding with the gait cycle together with the some pathologies and gait deviations (chapter 1.)

Chapter 2. deals with the scoliosis from theoretical point of view together with its classification. Both these chapters contain also the sufficient research of literature.

Chapter 3. is devoted to the kinematics and measurement of the kinematic variables. It corresponds with the main goal of the thesis. At first the rigid body approach of the kinematics of the human body is introduced. The used coordinate systems are defined: absolute, local, segmental and joint reference systems.

Relatively a lot of attention is devoted to the general description of the transformation between the coordinate systems and to the definition of the kinematic variables (here and also in the appendix!). **The question is why** – was the software for the processing of the measured data worked up by the author or was used some commercial product ? On page 46. some commercial softwares are mentioned.

Chapter four is actually the introduction and may be it should be included at the very beginning. Here is formulated above mentioned aim of the thesis.

The own measurement and its analysis is shortly described in the chapter 5. The group of measured 35 adults in age between 18 and 50 years is defined. It consists from 20 patients with the moderate scoliosis and 15 healthy people.

The results are introduced in the chapter 6. For each type of scoliosis (thoracolumbar and lumbar) are shown the displacement, velocity and acceleration of the hip joint, knee joint, ankle joint, center of gravity and typical angle of the knee joint during the gait cycle. Also the body-weight distribution between both extremities was measured.

The results are detailed discussed in the chapter 7. and then summarized in chapter 8. These results can create a basis for the treatment of the gait cycle and possible intervention (page 72).

From the mechanical point of view I have the following remarks:

- What is mentioned by “linear” displacement and velocity? They are some “non-linear” displacements and velocities?
- On the page 45 should be mentioned the units – probably meters.
- On the page 55 is mentioned the Cobb’s angle – how is defined? Between measured results is mentioned “typical” knee angle – how is exactly defined?

Possible questions for the thesis defense are

1. How can be explained the discrepancies between measured asymmetries and the asymmetries published in other publications (page 72)?
2. How is factually used the joint coordinate system?
3. Could you explain on a practical example how the results of the thesis can be used in the clinical practice?

Evaluation:

The doctoral thesis of Mgr. Polyzos deals with actual and important topic. He has used the adequate experimental and statistical methods. The form of thesis is good and understandable. It shows the good knowledge of the author about the studied topic and its ability for the research work.

Therefore I recommend the thesis for defense.

Plzeň, 15.4.2012

Prof. Ing. Josef Rosenberg, DrSc