

ABSTRACT OF PHD THESIS

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**Thesis Title: Optimization of kinetic techniques to reorganize the proprioception in the
knee with anterior cruciate ligament lesions**

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***Key words:** physical therapy, anterior cruciate ligament, proprioception*

The premises of our research are gathered around the idea that proprioceptive deterioration consecutive to post-lesional suppression of proprioceptive feedback provided by the anterior cruciate ligament (ACL) mechanoreceptors is the main cause of the functional imbalance in the knee with important implications regarding the quality of life of people with an ACL deficient knee.

In this research we established the following hypotheses:

- ⇒ proprioceptive physiotherapy, neuro-proprioceptive taping and hydrophysiotherapy form a trident of high efficiency techniques to stimulate the reorganization of proprioception in the ACL deficient knee;
- ⇒ the evolution of functional parameters will be different depending on the type of autograft (patellar tendon or hamstrings fascia) used for anterior cruciate ligament reconstruction.

The main criteria in selecting the subjects who participated in this research is an ACL deficient knee after a partial or complete tear of the ACL, along with damage to other joint structures (menisci, ligaments, etc.), pathology resolved by arthroscopic ligament reconstruction. Were excluded subjects with severe complex meniscal lesions, total rupture of the collateral ligament, extensive cartilage damage, symptoms in the other knee or hips, ankles or feet, individuals who practice high-performance sports and subjects with ACL lesion that occurred more than nine weeks before participation in the study and also subjects with a history of psychiatric or neurological diseases.

The functional assessment protocol of subjects included: assessment of quality of life using the Quality of Life Outcome Measure for Chronic Anterior Cruciate Ligament Deficiency – ACL-QOL, pain assessment using Visual-Analogue Scale (VAS), range of

motion (ROM) testing by goniometry, manual muscle testing and functional assessment by the Modified Cincinnati Knee Rating System (MCKRS).

Analysis of the research results was performed using SPSS programme in four stages:

⇒ During the first stage we verified the existence of significant differences between the initial and final assessment and we established if those differences (increases or decreases of measured parameters) are beneficial or not for the subjects. After statistical processing of the scores achieved by the four groups (research A and B; control A and B) in each of the five components of the functional assessment protocol (quality of life, pain intensity, ROM, strength, functional level), we conclude that between the values obtained at initial and final assessment by each group there is a significant difference, at a significance level of less than 0.05.

⇒ In phase II, we calculated values of the differences between initial and final assessment recorded by each group and then we compared the recorded progress following the next scheme: progress of the research group A with progress of the control group A, respectively progress of the research group B with progress of control group B. In assessing the progress made by the four groups in each of the five components of the functional assessment protocol, after statistical processing of the values of progress, we reached the following conclusion: in most of the cases between the progress of the research groups (A and B) and those of the control groups (A and B) there are significant differences at a significance level of 0.05 except the strength of the knee extensors.

⇒ During the third stage we compared the progress achieved by the research groups (A and B) and control groups (A and B) at each component of the functional assessment protocol, to determine which group made the greatest progress, namely which group made a higher progress at a significant difference than the other groups. After comparing progress made by the subjects, we came to the conclusion that the progresses of research group A were significantly higher in most cases relative to the progresses of the others groups (research B, control A or control B), so statistically speaking subjects of the research group A progressed the most during the study.

⇒ In stage IV we analyzed the progresses of research groups A and B divided by autograft origin (patellar tendon group and hamstring group) to verify which group made a higher progress at a significant difference than the other group. Based on the results obtained by comparing the progress values for each of the five components of the functional assessment protocol obtained by the subjects with patellar tendon autograft and those with hamstring autograft, we can say that there are no significant differences between the progresses of the two groups at a significance level of 0,05. In other words the subjects

progressed almost identical, with a higher rate for the hamstring group subjects, but statistically equal regardless of the autograft type.

Conclusions

Based on the approach of this research and the results we reached the following conclusions:

✎ Superior results obtained by the subjects of research groups and in particular the subjects of the research group A allowed us to issue the conclusion which confirms the research hypothesis that the proprioceptive physiotherapy, hydrophysiotherapy and neuro-proprioceptive taping techniques is a trident with high efficiency in the functional rehabilitation of the knee following the arthroscopic reconstruction of the ACL, efficiency manifested by a significant reduction in pain intensity, increased mobility in the knee joint, improvement of muscle strength, increase of the functional score and not least by improving the quality of life for people with an arthroscopically reconstructed ACL.

✎ Given the results obtained at the end of the study regarding the efficiency of proprioceptive methods and techniques, depending on autograft type, we cannot say that there are significant differences in the functional evolution of subjects with ACL tears, so the research hypothesis which says that functional parameters will be different for subjects depending on the type of autograft used for ACL reconstruction is not confirmed, in other words subjects progressed about the same, statistically equal irrespective of autograft type, which emphasizes that proprioceptive physiotherapy program proposed in this research provides an effective functional recovery, without any significant difference between subjects with patellar tendon autograft and those with hamstrings autograft, functional recovery which is significantly better for subjects who performed a proprioceptive physiotherapy program.

The main novelty brought by this research is the establishment of a trident of proprioceptive techniques (proprioceptive exercises, neuro-proprioceptive taping and hydrophysiotherapy) that has proven effective in recovering the knee with ACL tears by stimulating the reorganization of proprioception with direct effects on the functional level and the quality of life of the subjects.

Concerns about the problematic knee with ACL tears, the experience gained during the implementation of the research and the literature review prior to completion of this research have resulted in publications in ISI journals, BDI indexed journals, journals recognized by CNCS in B+ category and a chapter in a book published by a publishing house with recognized prestige in the social sciences (List A2 - Panel 4).