

## ABSTRACT

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**Title of the Thesis:** Immediate Effect of TR-Therapy on Morphological and Functional Parameters of Muscle Tissue

**Annotation:** Targeted radiofrequency therapy (TR-Therapy) is commonly used in physiotherapeutic practice; however, its acute effects on healthy muscle tissue remain insufficiently explored. This thesis evaluates the immediate impact of a single TR-Therapy session on morphological (muscle thickness of the *m. rectus femoris*) and functional (knee joint flexion range) parameters in a healthy population. These findings contribute to a deeper understanding of the physiological mechanisms of TR-Therapy and point to possibilities for its more efficient application in daily physiotherapy practice.

**Objective:** The aim of this study was to assess whether a single application of TR-Therapy can influence the thickness of the *m. rectus femoris* muscle and the range of knee flexion in healthy adults, and whether there is a relationship between these changes and the subjectively set intensity of therapy.

**Methods:** The experiment included 50 healthy volunteers ( $n = 50$ ; age 20–36 years). Prior to and immediately after TR-Therapy, the thickness of the *m. rectus femoris* was measured using ultrasonography (Samsung Medison HS30/XH30), and the range of knee flexion was assessed using the modified Thomas test with a standard goniometer. TR-Therapy was applied to one lower limb (randomized via coin toss) using the BTL-6000 TR-Therapy device for 15 minutes (5 minutes in capacitive mode, 10 minutes in resistive mode). The opposite lower limb served as the control. Intensity was subjectively adjusted by participants to a level of 6–7 out of 10 on a visual analogue scale. Bilateral measurements were performed before and after intervention. Statistical analysis included the Shapiro-Wilk test, paired t-test, and Pearson and Spearman correlation coefficients. The level of significance was set at  $\alpha = 0.05$ .

**Results:** A statistically significant improvement in knee flexion range was found on the treated lower limb compared to the control limb after TR-Therapy (mean change:  $+4,92 \pm 7,88^\circ$  vs.  $-2,54 \pm 7,44^\circ$ ;  $p < 0,0001$ ). A statistically significant increase in muscle thickness of the *m. rectus femoris* was also observed on the treated limb compared

to the control (mean change:  $+0.0202 \pm 0.1041$  cm vs.  $-0.0300 \pm 0.0907$  cm;  $p = 0.0129$ ). No significant correlation was found between the morphological and functional changes (Pearson  $r = 0.1068$ ;  $p = 0.4605$ ), nor between the therapy intensity and outcome measures (Spearman  $\rho = 0.0043$ ;  $p = 0.9762$  for muscle thickness;  $\rho = -0.0524$ ;  $p = 0.7176$  for range of motion). These findings indicate that the effect of TR-Therapy on muscle tissue can be captured not only subjectively, but also through objective measurement methods, confirming its measurable physiological impact. They also suggest that the effect may occur after a single application, both at the morphological and functional level.

**Keywords:** TR therapy; Tecar therapy; radiofrequency therapy; muscle thickness; ultrasonography; range of motion; rectus femoris; physiotherapy