

## SUMMARY

**Objective:** The goal of the thesis was to objectify changes of the diaphragm motion and shape in a different tasks using dynamic MRI in volunteers with pathological structural finding of the spine and the control group.

**Methods:** Two groups of volunteers were made, those without pathological finding (n=16) and with structural pathological finding of the spine (n=17).

We analyzed diaphragm function in three different tasks in all the volunteers during 1) primary breathing, 2) breathing in the course of lower extremities flexion against resistance and 3) holding the breath in the course of lower extremities flexion against resistance.

Diaphragm activity was analyzed using static a dynamic parameters.

For the first time ever was used postural and respiratory trace, which were separated from dynamic MRI recording. The thesis analyses frequency and amplitude of the respiratory and postural activity (independent on breathing) and their relationship. Furthermore the thesis evaluates breathe in and breathe out rotation, diaphragm excursion magnitude, inclination of the diaphragm, its height in thorax and also diaphragm motion within its different portion.

**Results:** Diaphragm respiratory and postural changes are slower, bigger in size and better balanced in volunteers group without pathological spinal finding. Opposite to the other group diaphragm is also more shape-verticalised and its shape almost does not change with increasing postural activity within the group with no spinal pathological finding. Also the movements of the ventral, middle and dorsal diaphragm portion are more balanced in this group and their diaphragm perform almost 50% bigger motion in size and is also in a lower position in chest compared with the group with structural findings.

**Conclusion:** By the objectification of the diaphragm contractility and changes in shape we confirm clinical experience with muscle imbalance symptoms in patients with pathologic spinal findings.

**Key words:** diaphragm, diaphragm activity, stabilization of the spine, MRI, vertebrogenic and spinal disorders