

# ULTRASONOGRAPHIC ASSESSMENT OF NECK MUSCULAR SIZE AND RANGE OF MOTION IN RUGBY PLAYERS

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## ABSTRACT

**Background:** World Rugby Union laws are constantly evolving towards stringent injury-prevention, particularly for contested scrums, since front row players are most at risk of cervical spine injuries. Recently, some countries have also introduced tailored training programs and minimum performance requirements for playing in the front row. Nevertheless, these approaches lack an objective assessment of each cervical muscle that would provide protective support.

**Objective:** Since front row players are the most at risk for cervical spine injuries due to the specific type of contact during scrums, the purpose of this study was to ascertain whether significant differences exist in neck muscle size and range of motion between front row players and players of other positions, across playing categories.

**Study Design:** Cross-sectional controlled laboratory study

**Methods:** 129 sub-elite male subjects from various first-team squads of Belgian Rugby clubs were recruited. Subjects were grouped according to age: Junior (J) < 19 years old, Senior (S) 19 to 35 years old and Veteran (V) > 35 years old; as well as playing position: Front row players (J = 10, S = 12, V = 11 subjects), (Rest of the) pack (J = 12, S = 12, V = 10), backs (J = 10, S = 11, V = 11). An age-matched control group of non-rugby players was also recruited (J = 10, S = 10, V = 10).

For each subject, the total neck circumference (NC) and the cervical range of motion (CROM) were measured. In addition, the thickness of the trapezius (T), splenius capitis (SCa), semispinalis capitis (SCb), semispinalis cervicis (SPC), sternocleidomastoid muscles (SCOM), and the total thickness of all four structures (TT), were measured using ultrasonography.

**Results:** In each age category, compared to controls, rugby players were found to have decreased CROM, an increase in neck circumference (NC), and increased total thickness (TT), trapezius (T), semispinalis capitis (SCb) and sternocleidomastoid muscles (SCOM) sizes. For junior players, the thickness of the semispinalis cervicis (SPC) was also increased compared to controls. The CROM was decreased in front row players compared to pack and back players for all age categories; Front row seniors also showed an increase in trapezius (T), splenius capitis (SCa), semispinalis capitis (SCb) and total thickness (TT), compared to back players.

**Conclusion:** In regard of the differences in cervical values found between player positions, the implementation of both range of motion and echography muscle thickness assessments could serve to create an additional measurement for all front row players, that could complement current pre-participation screening used by rugby federations by objectively monitoring muscular size and motion amplitude around the cervical spine.

**Keywords:** Ultrasonography, musculoskeletal ultrasound, rugby scrum, neck

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## Ethics approval

Academic Ethical Committee of Brussels (Ethic committee B 200-2013-081)

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The authors affirm that they have no financial affiliation (including research funding) or involvement with any commercial organization that has a direct financial interest in any matter included in this manuscript. There are also no other conflicts of interest (ie, personal associations or involvement as director, officer, or expert witness).