

## PHYSIOLOGICAL DEMANDS OF WOMEN'S RUGBY UNION: TIME MOTION ANALYSIS AND HEART RATE RESPONSE.

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### Introduction

Women's rugby is continually growing in popularity and gaining participants every year. There are currently women competing at the national, provincial, university, club, high school and mini levels across Canada. In the summer of 2005 there were 630 female athletes registered throughout the province (Rugby Canada, 2005). This is a 7% increase from the previous year. Even with this increasing interest there are only a few scientific studies that have used female rugby players as the target population.

A rugby team consists of 15 players each with varying roles and responsibilities. These positions are divided into two major groups, which have very different physiological requirements, forwards and backs (Reilly, 1997). Within these two units there are distinct positional roles that make the physiological demands of this territorial game quite complex. The physiological demands of men's rugby union have been analyzed in the literature by Docherty, McLean, Deutsch, Doutreloux and Duthie (1988, 1992, 1998, 2002, 2003). However, of the few studies conducted on female rugby players none that we are aware of have investigated the physiological demands of the game using time motion analysis.

### Objective

The purpose of this study was to use time motion analysis to quantify movement patterns as well as monitor match heart rates of female premier first division club rugby union

athletes (18-40yrs). It is hypothesized that there would be a significant difference between the 2 positional groups of forwards and backs. It was also hypothesis that there would be no significant difference between each half of the game.

### Design

Quasi-experimental design.

### Setting

University of Alberta, Edmonton.

### Subjects

Eight (8) premier and first division club level female rugby players volunteered to participate in this investigation. Four (4) were video taped throughout a complete game Heart rates of all 8 athletes were monitored for the entire game. A University of Alberta Research Ethics Board approved this study.

### Intervention/Main Outcome Measures

Participation in this study included an orientation meeting at a clubhouse, a full rugby game that was video taped and heart rate monitoring as well as one trip to the exercise physiology lab for a max heart rate treadmill test. The videotape was analyzed and coded into 9 different movement categories. Standing, walking and jogging are grouped together as rest activities and striding, sprinting, kicking, static exertion, lifting and jumping are considered work activities. The number of scrums, tackles, lineouts and kicks were also recorded.

Total time, frequency, average duration and percent time of each activity was calculated as well as the work rate. Means are reported with standard deviations (SD).

## Main Results

Table 1. Heart rate measurements. Values are means and SD.

	Squad (n-8)	Backs (n-4)	Forwards (n-4)
Treadmill MHR	197.3 ± 5.5	193.8 ± 1.7	200.8 ± 6
Game MHR	195.4 ± 8.5	190.3 ± 8.1	200.5 ± 5.7
Game Min HR*	111.1 ± 16	100 ± 8.3	122.3 ± 14.2
80%MHR	159 ± 4.1	156.8 ± 2.8	161.2 ± 4.2
Game Ave.*	165 ± 14.9	154.4 ± 8.6	175.6 ± 12.1
% game ≥ 80*	64.9 ± 25	47.1 ± 18.4	82.8 ± 16.1
% game < 80*	36.2 ± 27.4	55.2 ± 23.1	17.2 ± 16.1

\* Significant difference between back and forward results (p<0.05)

Table 2. Whole game movement category durations in seconds and tackle frequency. Values are means and SD.

	Squad (n-4)	Backs (n-2)	Forwards (n-2)
Stand	1220.6 ± 223	1210.5 ± 15.3	1230.8 ± 385.5
Walk	2124.9 ± 518.6	2503.8 ± 13	1745.9 ± 482
Jog	634.5 ± 167.1	559.8 ± 71.8	709.3 ± 237.2
Stride	194.5 ± 129.3	202.4 ± 109.1	186.7 ± 194.9
Sprint	128.3 ± 52.8	153 ± 1.3	103.7 ± 77.1
Static Exertion*	487.8 ± 361	179.8 ± 106.4	795.9 ± 5.4
Lift	19.6 ± 35.1	0	39.3 ± 46.4
Jump	6.9 ± 13.2	0.5 ± 0.7	13.4 ± 18.9
Kick	9.3 ± 17.3	17.7 ± 25	1 ± 1.4
Tackle (#)	11.8 ± 3.7	11.5 ± 6.4	12 ± 0

\* Significant difference between back and forward results (p<0.01)

## Conclusions

Forwards had a significantly higher minimum and average game heart rates. They also spent significantly more game time above 80% of their maximum heart rate when compared to the backs. Forwards were also found

to spend significantly more time in static exertion than their back counterparts. Backs kicked, walked, strided and sprinted more throughout a game than the forwards. Forwards jumped and lifted more due to lineouts. Time spent standing and number of tackles were found to be very similar in both groups.

The outcomes of the time motion analysis corresponds to game requirements as backs do not participate in scrums or lineouts but are responsible for primarily carrying the ball and perform the bulk of the scoring (Duthie 2003, McLean 1992). The major responsibility or the forwards is to gain or maintain possession of the ball (Duthie 2003, McLean 1992, Reilly 1997).

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## Commentary

The growth of women's rugby union has led to an increased competitiveness in the game resulting in a need for the development and implementation of not only sport specific but also position specific conditioning programs and training regiments.

The results from this study will contribute to our understanding of these specific positional demands and allow for progress in women's rugby.

