



Game demands and fatigue profiles in elite football – an individual approach

-Implications for training and recovery strategies



Main aims with physical training in elite football



1. Keep the players on the pitch (free from injury)
2. Prepare every individual player for their individual physical game demands

Which variables to measure to reduce risk of injury?



GPS/Accelerometer (external load)

Session Rate of Percived exertion (sRPE) (Internal load)

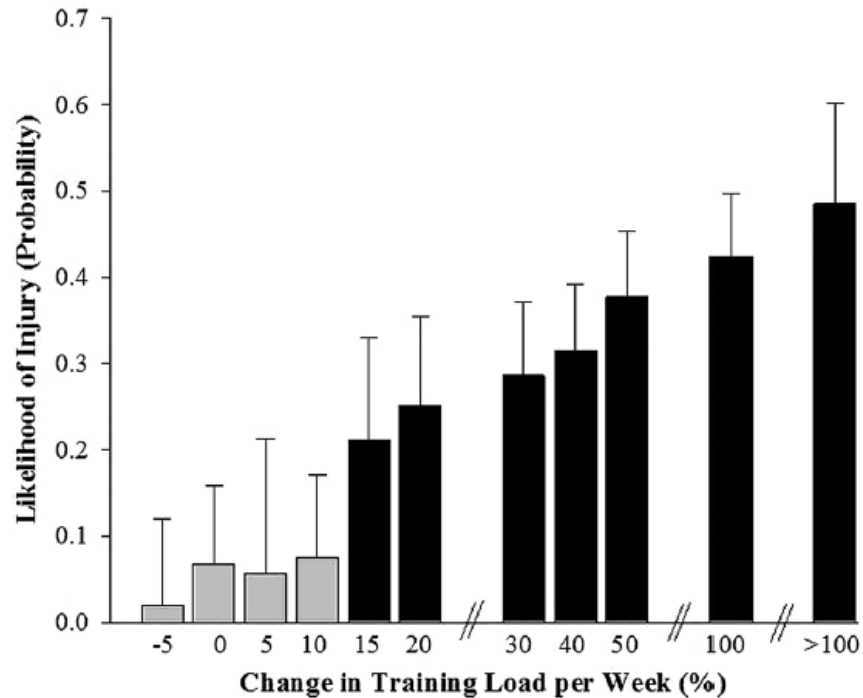
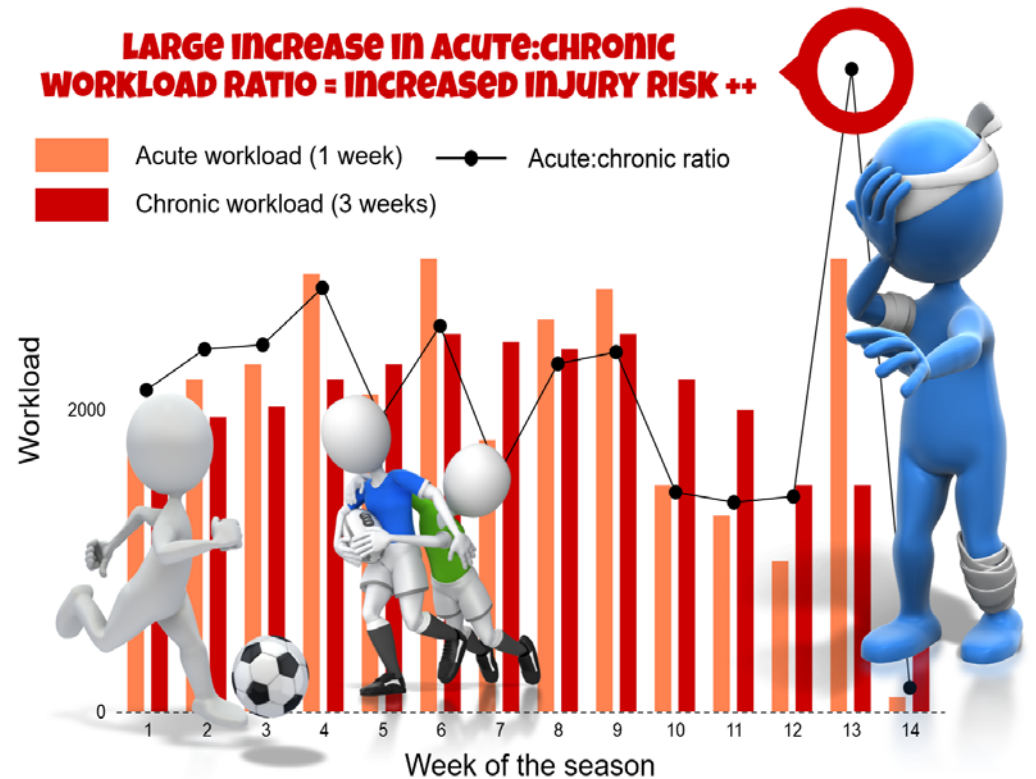


Figure 5 Likelihood of injury with different changes in training load.

HIGH TRAINING WORKLOADS ALONE DO NOT CAUSE SPORTS INJURIES: HOW YOU GET THERE IS THE REAL ISSUE

LARGE INCREASE IN ACUTE:CHRONIC WORKLOAD RATIO = INCREASED INJURY RISK ++



Which variables to measure for Performance?

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ORIGINAL ARTICLE

Muscle variables of importance for physiological performance in competitive football

Magni Mohr^{1,2} · Martin Thomassen³ · Olivier Girard^{4,5} · Sebastien Racinais⁴ · Lars Nybo³

Aerobic performance

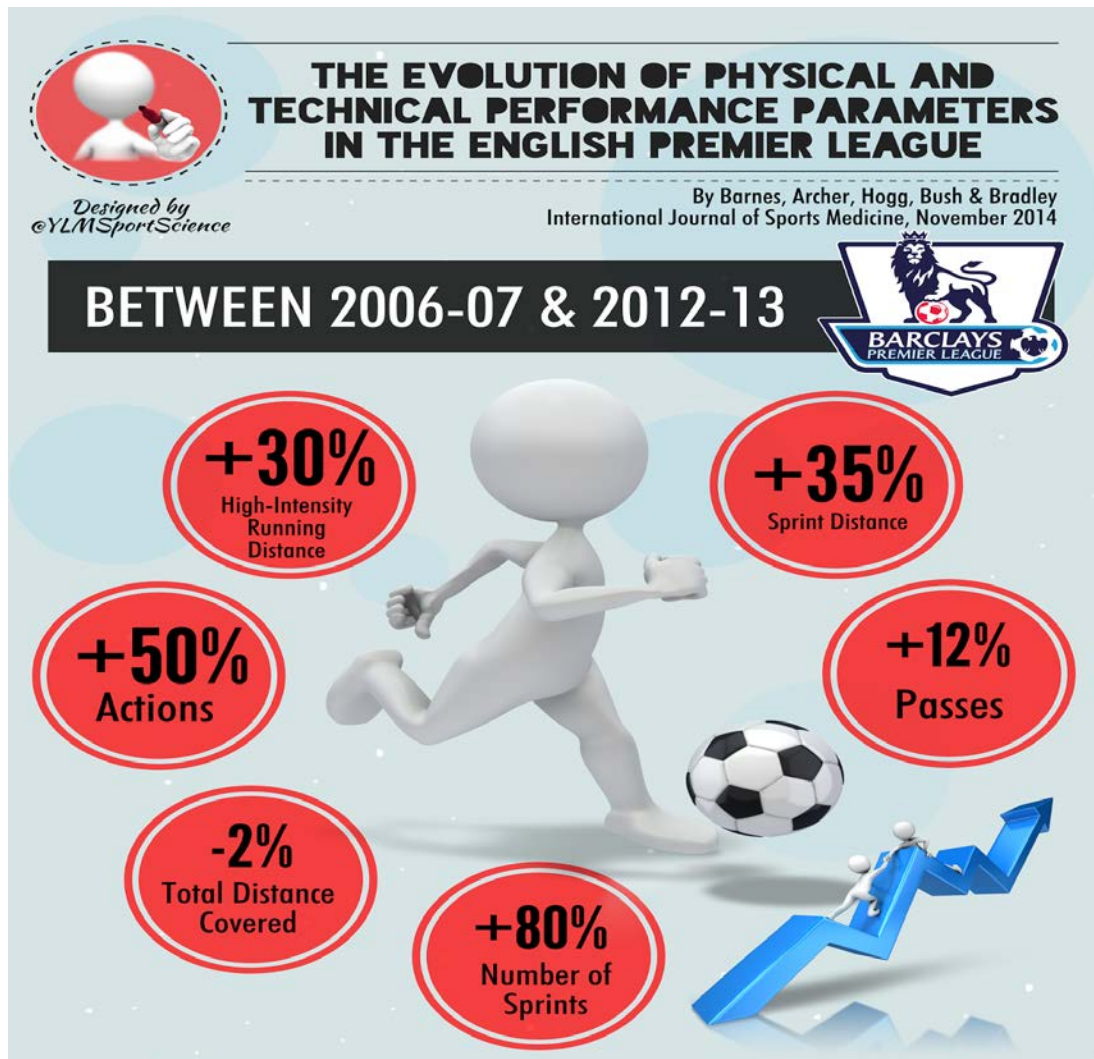
Total distance covered and HAD activity	$r = 0.66; P < 0.05$
Total distance covered and Yo-Yo IR1	$r = 0.76; P < 0.05$

High intensity performance

Peak 5-min distance at fast running and Na ⁺ -K ⁺ -ATPase β_1 protein	$r = 0.59; P < 0.05$
Yo-Yo IR2 performance and very peak 5-min distance at very fast running	$r = 0.56; P < 0.05$

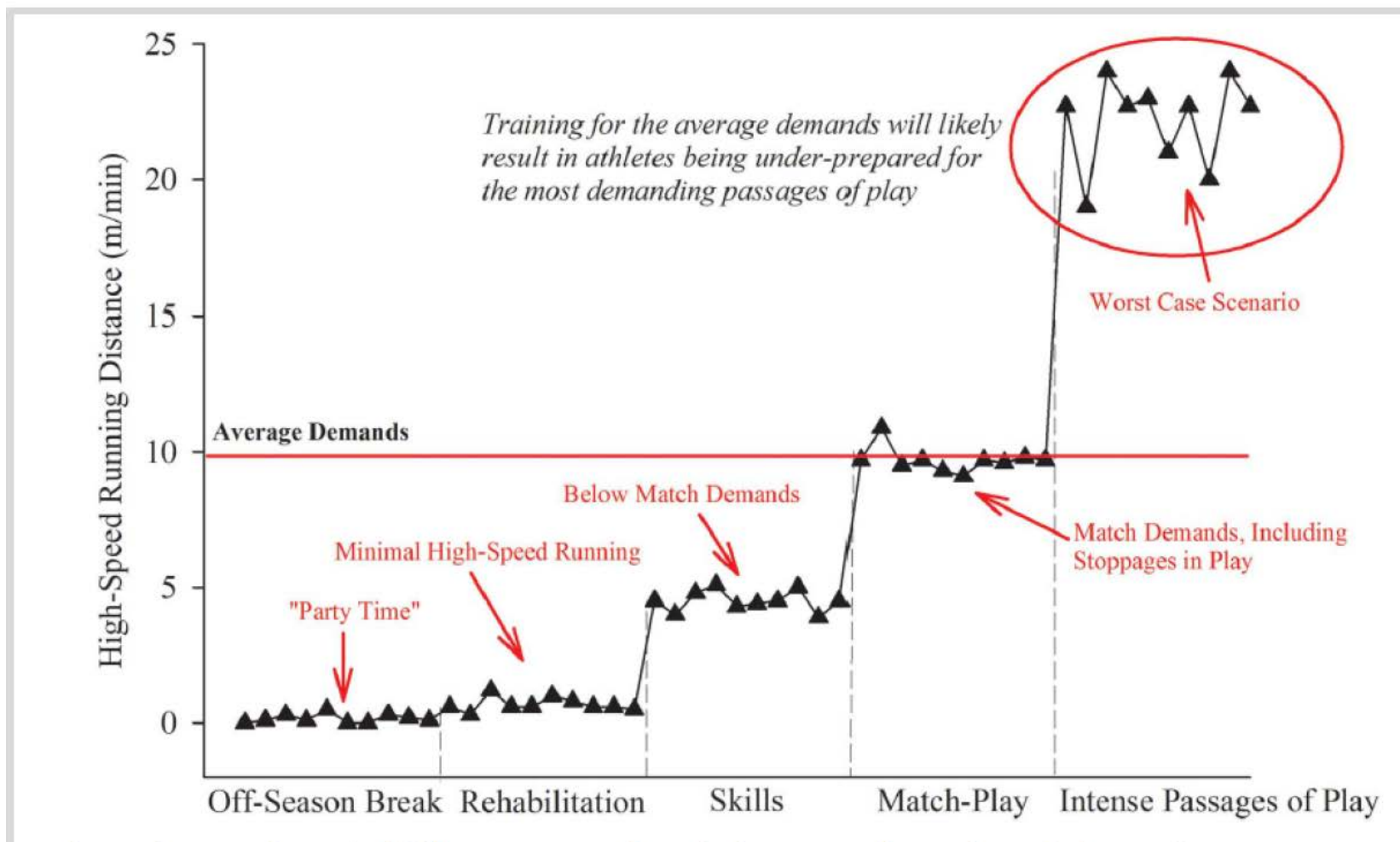


Volume of intensity has increased





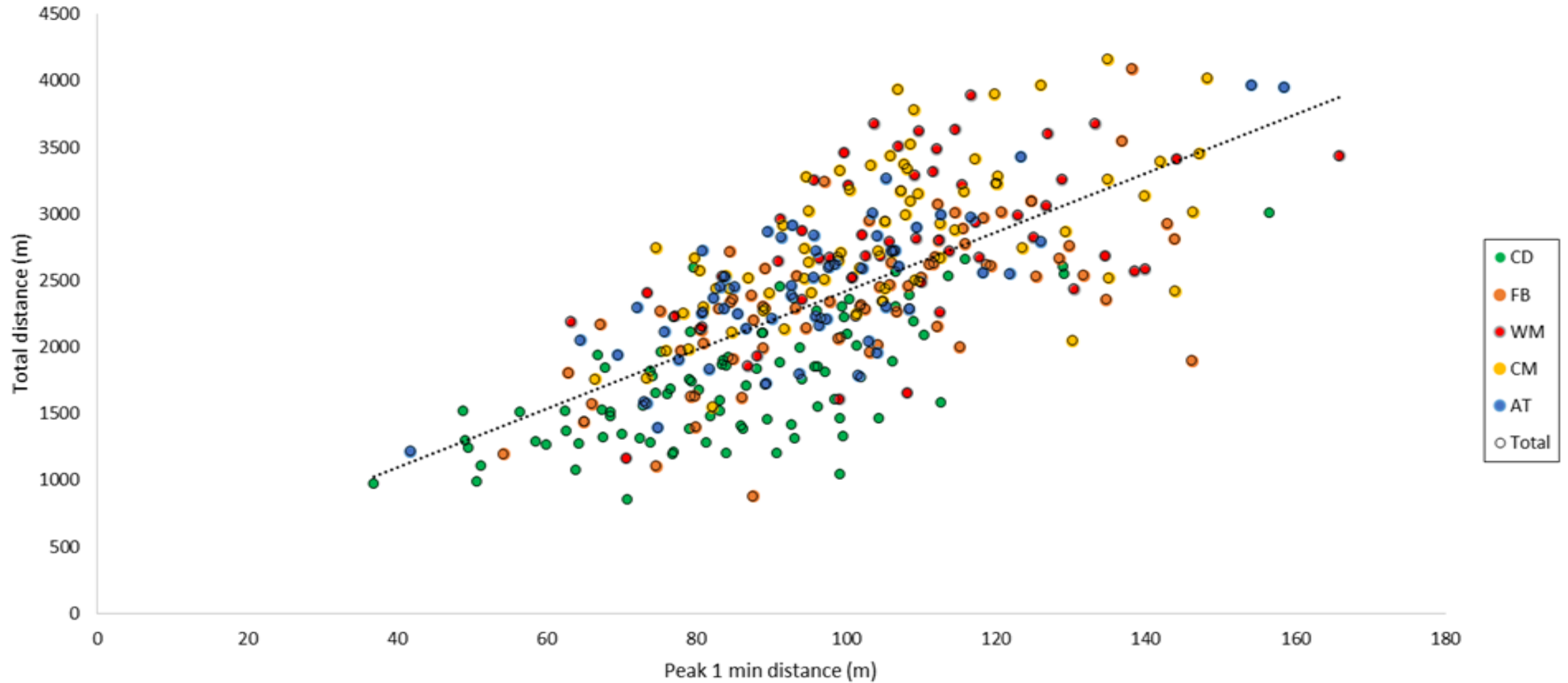
Intense periods during a football game



Large individual differences in game demands



Distance covered >14 km/h



Peak 30 s period Wide midfielder



Velocity based peak period

Turdus Tech

?

		Drop from peak to min [%]	Cursors
<input checked="" type="checkbox"/>	Jocke	64,8372	
<input checked="" type="checkbox"/>	Strand	64,8372	
<input checked="" type="checkbox"/>	Strand	64,8372	
<input checked="" type="checkbox"/>	Strand	64,8372	
<input checked="" type="checkbox"/>	Strand	64,8372	
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<input checked="" type="checkbox"/>	Yngve	64,8372	
<input checked="" type="checkbox"/>	Klas	64,8372	
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<input checked="" type="checkbox"/>	Strand	64,8372	
<input type="checkbox"/>	Not used 15	0	
<input type="checkbox"/>	Not used 16	0	
<input type="checkbox"/>	Not used 17	0	
<input type="checkbox"/>	Not used 18	0	
<input type="checkbox"/>	Not used 19	0	

Cursors	X	Y
<input type="checkbox"/> Strand Peak 0		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Jocke Min 0		
<input type="checkbox"/> Jocke	01:33:50	4,48608
<input type="checkbox"/> Strand Peak 1		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Strand Min 1		
<input type="checkbox"/> Jocke	01:33:50	4,48608
<input type="checkbox"/> Strand Peak 2		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Strand Min 2		
<input type="checkbox"/> Jocke	01:33:50	4,48608
<input type="checkbox"/> Strand Peak 3		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Strand Min 3		
<input type="checkbox"/> Jocke	01:33:50	4,48608
<input type="checkbox"/> Strand Peak 4		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Strand Min 4		
<input type="checkbox"/> Jocke	01:33:50	4,48608
<input type="checkbox"/> Strand Peak 5		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Strand Min 5		
<input type="checkbox"/> Jocke	01:33:50	4,48608
<input type="checkbox"/> Strand Peak 6		
<input type="checkbox"/> Jocke	01:32:30	12,758
<input type="checkbox"/> Strand Min 6		

Load Map

Load File

Settings

Moving Average [s]

System Frequency [Hz]

Length of period for min [s]

Variable [Speed/Work]

Speed Zones

Total
 Peak period

Total
 Peak period

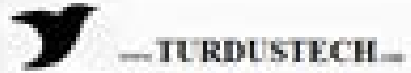
Change name in Speed Zones

Shown name in Speed Zones

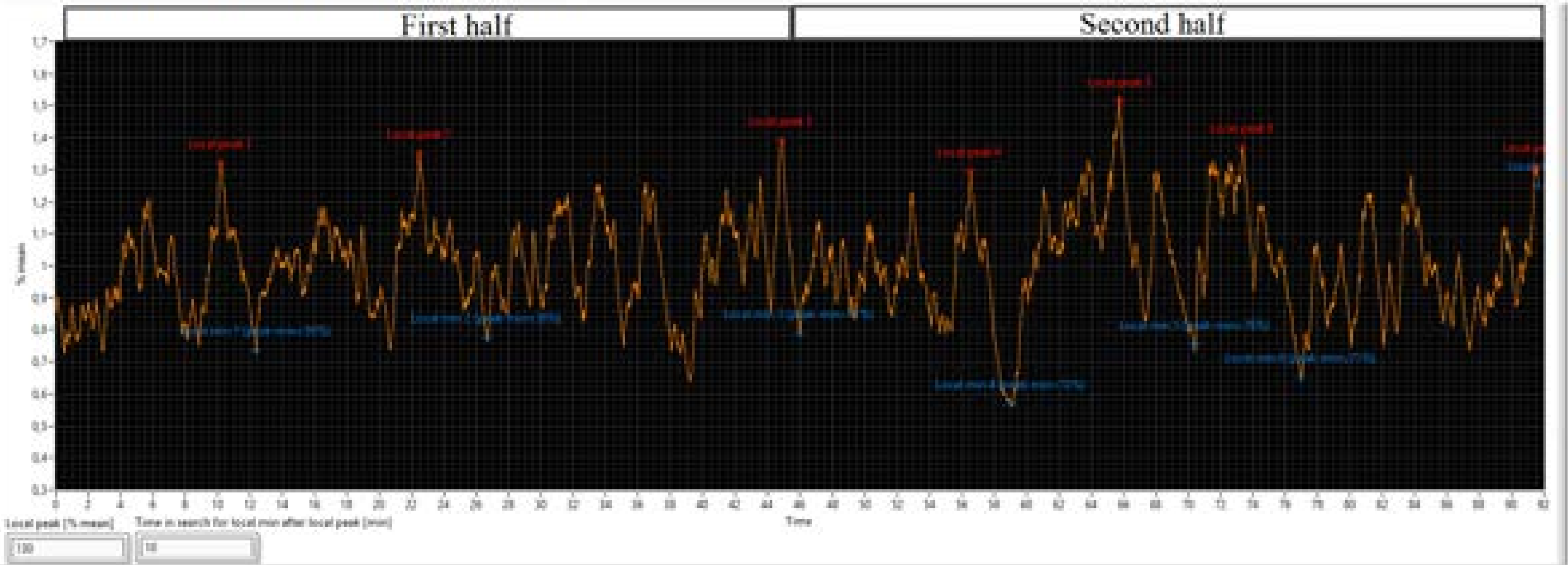
Cursors	X	Y
<input type="checkbox"/> Cursor Total	12	785,18
<input type="checkbox"/> Total		
<input checked="" type="checkbox"/> Cursor Peak	12	14,6763
<input type="checkbox"/> Peak perio		



Acceleration based peak periods



Player Load 1 min moving average [% mean]



Variables of importance to evaluate physical workload

External load:

Volume metrics:

Player load

Hi speed running

Total distance

Total number explosive movements

Sprint distance

Sum of all acceleration and deceleration in 3D

Distance > 21 km/h

Distance > 0 km/h

Number of acc/dec/CoD > 3 m/s²

Distance > 80% of maximum velocity

Intensity metrics

Player load/min

High speed distance/min

Total distance/min

Explosive movements/min

Peak intense periods (30s and 1 min)

Internal load:

sRPE * Training duration (min)

Time > 85% HRmax

A:C ratio and weekly increase (risk of injury)

All players 2,5 X game demands (performance)

Thank you!

