University of Worcester
Motion & Performance Centre

HUMAC Report Summary

Subject:
Date:
Test: Knee extension/flexion seated
History: Left flexor (hamstring) injury

Ranges of motion

Concentric

	L	R
Extension	0	1
Flexion	82	82
Total	82	81

Eccentric

	L	R
Flexion	1	1
Extension	70	86
Total	69	85

Mean peak torques with comparison to normative values

(Nm)	**Concentric**		**Eccentric**	
(60 °s^{-1})	Extensors	Flexors	Extensors	Flexors
Left	281	108	273	125
Right	270	129	299	150
Normative	230	130	250	160

(Based on data from Highgenboten et al (1988), Ghena et al (1991), Dvir (1990) and Biodex)

Angles at peak torque

°	**Concentric**		**Eccentric**	
(60 °s^{-1})	Extensors	Flexors	Extensors	Flexors
Left	56	28	53	22
Right	56	34	65	8

Ratios

Hamstring concentric / quadriceps concentric (Hc/Qc) – normative value ~0.6

Speed (°s^{-1})	**L**	**R**
60	0.38	0.48

Hamstring eccentric / quadriceps concentric (He/Qc) – normative value ~0.6 to 1
(a more functional ratio representing the agonistic/antagonistic nature of the muscles)

Speed (°s^{-1})	**L**	**R**
60	0.44	0.55

Note: H/Q ratios are a topic of ongoing interest. Dvir (2004) (citing Kannus 1988) notes that what matters is the extent to which the muscles of an involved knee approximate that of the uninvolved knee. Rather than relying on literature norms of H/Q ratios, a suitable ratio to aim for may be that of the uninvolved knee.

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Discussion

A reduced range of motion was observed on the left side for the eccentric tests. This may be due to the operator machine configuration since equal range was seen on both sides for the concentric tests.
Peak torque values for extensors (quadriceps) are higher than normative values and reasonably well balanced left to right side.
Flexors (hamstrings) are weak both concentrically and eccentrically on both sides, more so with the injured left. This is further reinforced by the H/Q ratios.
Angles for peak torque are well balanced and normal apart from a difference in eccentric flexors.
Examination of the torque-position charts shows that the left flexors fall off in strength near full extension.