Supplemental Text:

Tibial Eminence Morphometry

Human tibial plateaus have an intercondylar eminence that consists of separate medial and lateral tibial spines with a bony ridge spaced between each spine. This has significant functional implications that may be a product of evolution. A study by White et al. investigated the variations in tibial plateau morphology across different primates and found features of the tibial eminence to be characteristically different among primate species based on their movement patterns. A tibial single-spine eminence or a tibial eminence with a decrease medial spine size and a decreased distance between spines were theorized to facilitate a greater degree of internal-external rotation of the proximal tibia relative to the distal femur. These features were more characteristic of vertical clinging and climbing primates who require internal-external rotation of the tibia relative to the femur for increased mobility and precise foot placement. In contrast, a double-spine eminence would act to limit knee rotation and were more indicative of primates with greater use of horizontal locomotion. Likewise, humans have double-spine eminences that, correspondingly, could have evolved to resist internal-external rotation of the knee and support horizontal locomotion. From this perspective, humans with a larger medial spine have better biomechanical function.

Supplemental Table 1: Summary of injured to uninjured side comparisons made within ACL injured subjects and within matched control subjects. Results are presented for males and females as a combined group. Comparisons were made using paired t-tests. Within control subject comparisons were made with the injured and uninjured sides defined to correspond to the legs of their matched ACL-injured subject. Similar findings were obtained when considering females and males as separate groups (Supplemental Tables 2 and 3).

	ACL Injured Subjects			Control Subjects		
	Injured Side	Uninjured Side		Injured Side	Uninjured Side	
Variable	Mean (SD)	Mean (SD)	P-value	Mean (SD)	Mean (SD)	P-value
M_{ed}VOL (mm^3)	297.3 (118.7)	295.8 (136.4)	0.89	330.4 (167.6)	325.9 (170.6)	0.71
M_{ed}Height (mm)	10.2 (1.2)	10.1 (1.2)	0.26	10.1 (1.4)	10.2 (1.5)	0.67
M_{ed}Width (mm)	17.8 (1.9)	17.8 (2.0)	1.00	17.7 (2.1)	17.8 (2.2)	0.67
M_{ed}Length (mm)	34.5 (5.1)	34.1 (5.5)	0.52	34.2 (5.8)	34.6 (6.4)	0.38
M_{ed}CGLoc (mm)	1.0 (2.1)	1.1 (2)	0.56	1.6 (2.3)	1.6 (2.3)	0.69
L_{at}VOL (mm^3)	580.1 (185.7)	587.1 (219.8)	0.72	590.4 (205.3)	576.1 (209.2)	0.40
L_{at}Height (mm)	7.6 (1.2)	7.8 (1.3)	0.18	8.1 (1.4)	8.0 (1.4)	0.67
L_{at}Width (mm)	17.2 (2.3)	17.0 (2.3)	0.43	17.2 (2.6)	17.0 (2.5)	0.39
L_{at}Length (mm)	28.0 (5.5)	27.8 (5.5)	0.62	27.7 (5.3)	27.9 (5.6)	0.60
L_{at}CGLoc (mm)	-5.8 (1.6)	-5.7 (1.7)	0.74	-5.7 (1.6)	-5.6 1.5)	0.92

Supplemental Table 2: Summary of injured to uninjured side comparisons made within ACL injured and within matched control subjects with males as a separate group. Within control subject comparisons were made with the injured and uninjured sides defined to correspond to the legs of their matched ACL-injured subject. Comparisons tested using paired t-tests.

	Male ACL Injured Subjects			Male Control Subjects		
	Injured Side	Uninjured Side		Injured Side	Uninjured Side	
Variable	Mean (SD)	Mean (SD)	P-value	Mean (SD)	Mean (SD)	P-value
M_{ed}VOL (mm^3)	368.3 (132.5)	340.8 (173.6)	0.20	487.0 (189.2)	462.1 (202.1)	0.44
M_{ed}Height (mm)	11.0 (1.2)	10.7 (1.3)	0.24	11.3 (1.2)	11.4 (1.3)	0.78
M_{ed}Width (mm)	19.0 (2.0)	19.3 (1.9)	0.48	19.2 (1.9)	19.7 (1.8)	0.13
M_{ed}Length (mm)	37.1 (5.1)	37.0 (4.4)	0.92	37.7 (5.5)	38.4 (6.2)	0.32
M_{ed}CGLoc (mm)	1.7 (1.9)	1.7 (1.8)	0.88	2.3 (2.2)	2.2 (2.2)	0.64
L_{at}VOL (mm^3)	656.3 (226.8)	719.0 (251.8)	0.15	701.4 (229.2)	704.1 (262.7)	0.94
L_{at}Height (mm)	8.0 (1.4)	8.1 (1.3)	0.59	8.8 (1.3)	8.8 (1.6)	0.93
L_{at}Width (mm)	19.3 (2.2)	18.8 (2.1)	0.30	19.3 (2.1)	19.1 (2.3)	0.58
L_{at}Length (mm)	28.6 (4.6)	29.4 (5.1)	0.40	29.9 (6.0)	30.6 (6.3)	0.46
L_{at}CGLoc (mm)	-5.8 (1.8)	-5.4 (1.9)	0.12	-5.9 (1.4)	-6.0 (1.1)	0.74

Supplemental Table 3: Summary of injured to uninjured side comparisons made within ACL injured and within matched control subjects with females as a separate group. Within control subject comparisons were made with the injured and uninjured sides defined to correspond to the legs of their matched ACL-injured subject. Comparisons tested using paired t-tests.

	Female ACL Injured Subjects			Female Control Subjects		
	Injured Side	Uninjured Side		Injured Side	Uninjured Side	
Variable	Mean (SD)	Mean (SD)	P-value	Mean (SD)	Mean (SD)	P-value
M_{ed}VOL (mm^3)	265.9 (97.7)	275.9 (112.3)	0.42	261.0 (96.3)	265.7 (111.6)	0.65
M_{ed}Height (mm)	9.8 (1.1)	9.8 (1.1)	0.65	9.6 (1.2)	9.6 (1.2)	0.74
M_{ed}Width (mm)	17.3 (1.7)	17.1 (1.6)	0.41	17.0 (1.7)	16.9 (1.8)	0.67
M_{ed}Length (mm)	33.3 (4.7)	32.9 (5.4)	0.48	32.6 (5.3)	32.9 (5.7)	0.64
M_{ed}CGLoc (mm)	0.7 (2.1)	0.8 (2.0)	0.52	1.3 (2.3)	1.3 (2.3)	0.86
L_{at}VOL (mm^3)	546.3 (154.7)	528.8 (177.0)	0.41	541.3 (174.2)	519.5 (151.5)	0.23
L_{at}Height (mm)	7.5 (1.0)	7.6 (1.2)	0.21	7.8 (1.3)	7.7 (1.2)	0.58
L_{at}Width (mm)	16.3 (1.7)	16.2 (2.0)	0.85	16.2 (2.1)	16.0 (2.0)	0.52
L_{at}Length (mm)	27.7 (5.9)	27.1 (5.5)	0.22	26.7 (4.7)	26.8 (4.9)	0.91
L_{at}CGLoc (mm)	-5.8 (1.6)	-5.9 (1.6)	0.57	-5.6 (1.7)	-5.5 (1.6)	0.75

Supplemental Table 4: Univariate associations between tibial spine measurements and risk of suffering an ACL injury. Odds ratio and 95% confidence interval (CI) obtained from conditional logistic regression using the injured leg of ACL injured subjects and corresponding leg of control. Females and males analyzed as both separate and combined groups. (Note: M_{ed}Vol and L_{at}Vol odds ratios correspond to the effect of a 100 mm^3 increase and the odds ratios for the other variables correspond to a 1 mm change.)

	Female subjects		Male subjects		Males and Females combined	
Variable (Unit Change)	**Odds Ratio (95% CI)**	**P-value**	**Odds Ratio (95% CI)**	**P-value**	**Odds Ratio (95% CI)**	**P-value**
M_{ed}VOL (100 mm^3)	1.05 (0.74 - 1.49)	0.79	**0.55 (0.33 - 0.9)**	**0.02**	0.80 (0.62 - 1.03)	0.08
M_{ed}Height (1 mm)	1.23 (0.88 - 1.72)	0.22	0.72 (0.43 - 1.22)	0.22	1.04 (0.8 - 1.37)	0.75
M_{ed}Width (1 mm)	1.17 (0.89 - 1.53)	0.26	0.94 (0.73 - 1.22)	0.66	1.04 (0.87 - 1.25)	0.64
M_{ed}Length (1 mm)	1.03 (0.96 - 1.1)	0.45	0.96 (0.84 - 1.11)	0.60	1.01 (0.95 - 1.08)	0.66
M_{ed}CGLoc (1 mm)	0.87 (0.73 - 1.03)	0.11	0.81 (0.59 - 1.12)	0.20	**0.85 (0.74 - 0.99)**	**0.04**
L_{at}VOL (100 mm^3)	1.02 (0.8 - 1.3)	0.85	0.88 (0.66 - 1.18)	0.40	0.96 (0.8 - 1.15)	0.67
L_{at}Height (1 mm)	0.82 (0.61 - 1.11)	0.19	0.64 (0.39 - 1.07)	0.09	**0.76 (0.59 - 0.98)**	**0.03**
L_{at}Width (1 mm)	1.02 (0.84 - 1.23)	0.85	0.98 (0.74 - 1.29)	0.89	1.01 (0.86 - 1.17)	0.94
L_{at}Length (1 mm)	1.04 (0.97 - 1.12)	0.28	0.93 (0.81 - 1.07)	0.30	1.01 (0.95 - 1.08)	0.66
L_{at}CGLoc (1 mm)	0.9 (0.71 - 1.15)	0.40	1.07 (0.74 - 1.55)	0.70	0.95 (0.78 - 1.16)	0.61