



Analysis of bone demineralization due to the use of exoprosthesis by comparing Young's Modulus of the femur in unilateral transfemoral amputees

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Agenda

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Introduction

2

Material and Methods

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Results and Discussion

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Conclusions



Introduction

1

Increase Quality of life
Our Challenge

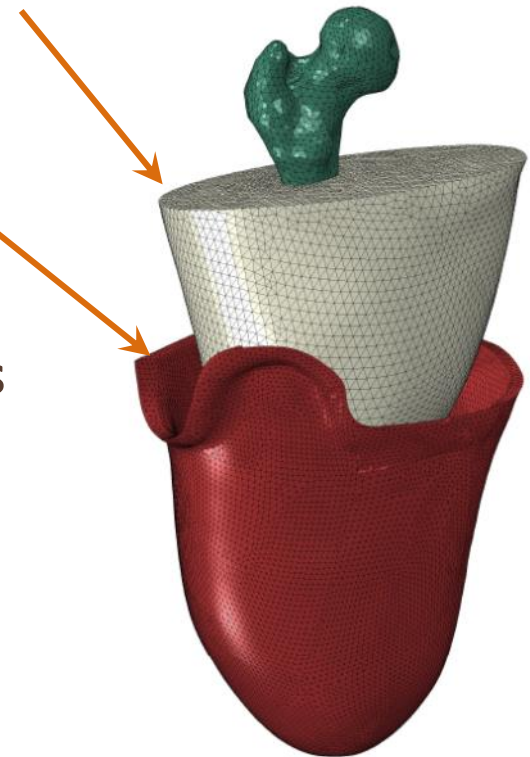
Terminology



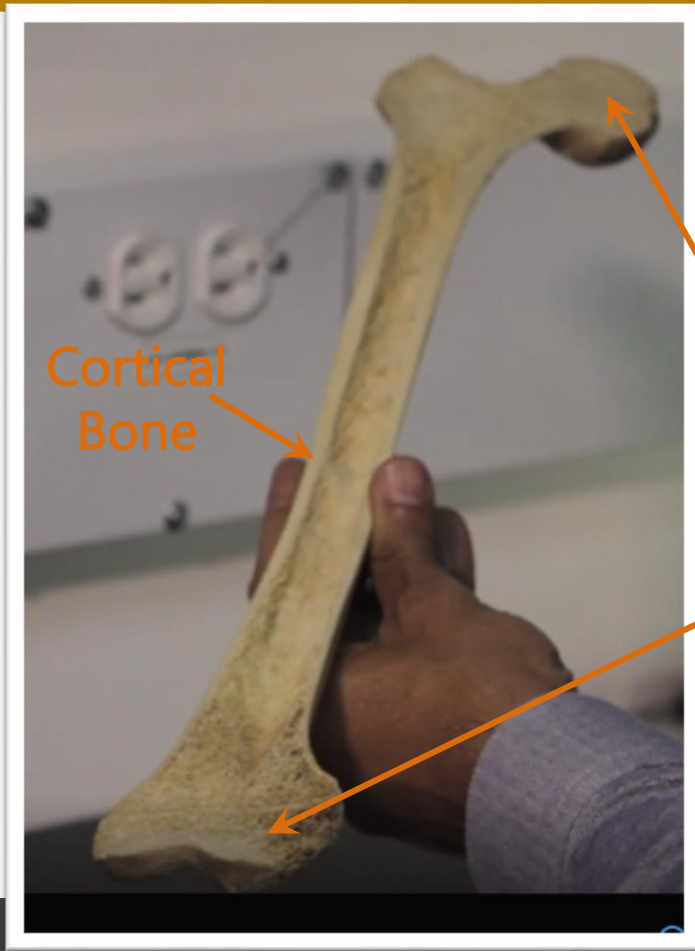
Stump or
Residual Limb

Socket

Knee Prosthesis



Bone



Trabecular
Bone



Transfemoral amputees

Violence

Traffic accident

Occupational Accident

Vascular disease





Materials and Methods

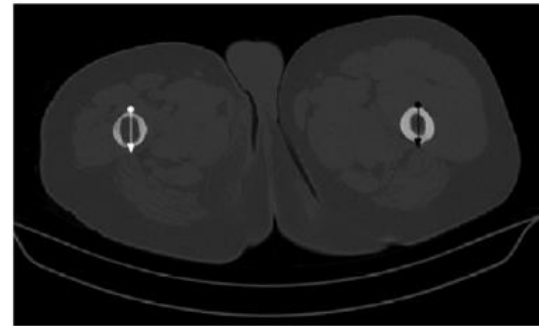
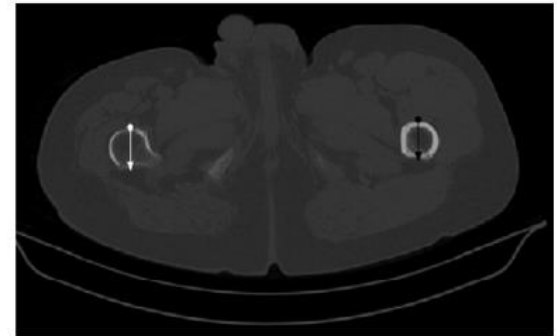
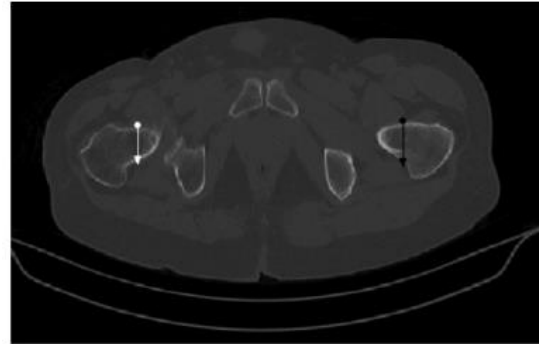
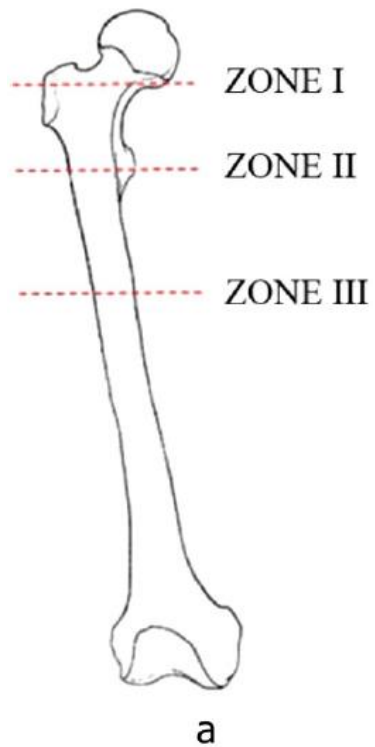
2

Participants

Table 1. Characteristics of the patients.

P	Ages	Time since amputation (years)	Height (cm)	Weight (kg)	Gender	Amputated limb
1	37	9	176	72.0	M	L
2	43	15	175	71.0	M	L
3	39	7	177	91.5	M	L
4	65	1	165	83.8	M	R
5	41	4	175	67.9	M	R
6	55	8	171	70.0	M	L
7	58	24	167	73.6	M	L
8	50	2	163	58.7	M	R
9	35	6	176	74.0	M	L
10	23	6	167	72.0	F	L
11	49	28	170	67.7	M	L
12	71	23	164	64.7	F	L
13	33	3	162	59.0	M	R
14	47	5	168	59.0	M	R
15	40	20	176	85.2	M	R
16	32	4	171	81.0	M	L
17	22	2	168	75.3	M	R
18	59	7	169	78.0	M	L
19	44	2	172	57.0	M	R
20	49	42	161	64.5	F	R
Mean	44.6±12.9	10.9±11.0	169.7±5.1	71.3±9.5	M: 17 F: 3	R: 9 L: 11

TAC Images



Images Information

Trayectoria Vectors
Anterior to posterior



Hunsfield Units (HU)



$$\rho_{EQM} = 0.0006822 \times HU - 0.00548 \frac{g}{cm^3} \quad [1]$$

$$\rho_{ash} = 1.22 \rho_{EQM} + 0.00523 \frac{g}{cm^3} \quad [2]$$

$$E = 10.5 \rho_{ash}^{2.29} GPa \quad [2]$$

Histograms



[1] Yosibasha, et al. 2007

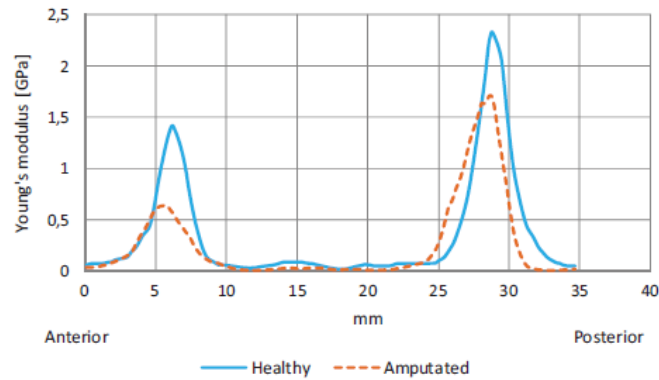
[2] Keller. 1994



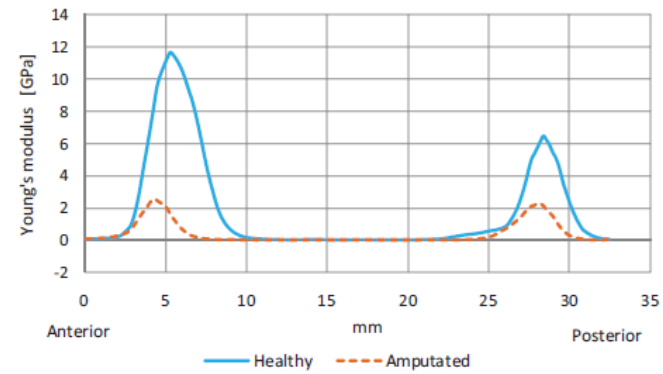
Results and Discussion

3

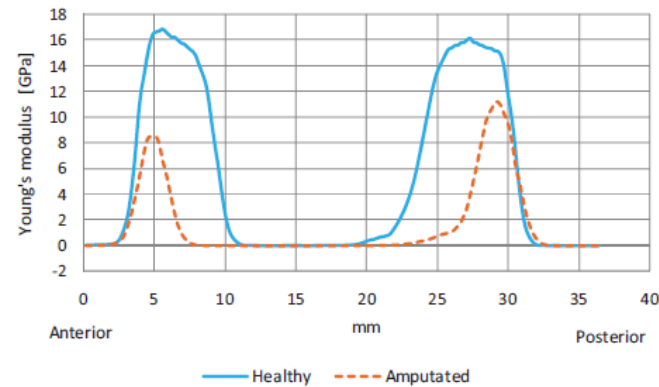
Histograms



a



b



c



Conclusions

4

Conclusions

Stress shielding phenomenon appears at residual femur.

The use of a prosthetic system causes bone demineralization.

Fracture risk in residual femur is bigger than in sound femur.



THANKS!

Questions?

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