CT2S: Patient-specific bone strength estimation from QCT data

Insigneo Predictive Medicine Online Services

Job No. 125

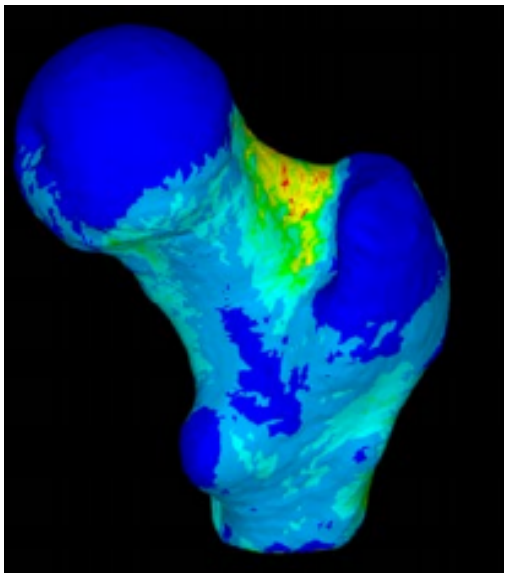
Reference		Materials	
Job Ref.	**001-subj001-reg001**	Patient Scan ID	**Obs001**
Requesting Organisation	**University of Sheffield**	Phantom Scan ID	**ESP001**
Date Submitted	**Jun 19, 2017**		

Results - Stance		Results - Fall	
Femur strength under stance loading		Femur strength under side-fall loading	
Minimum	**4136N***	Minimum	**2658N**
Maximum	**7622N**	Maximum	**4271N**

*strengths are provided in Newtons; a kilogram force is approximately 10 Newtons.

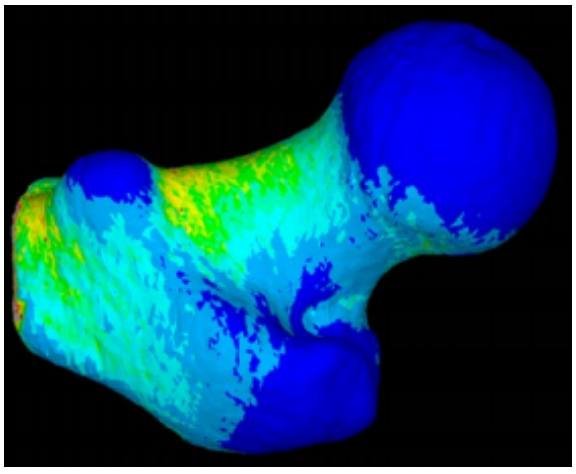
Loading Condition - Stance

Picture showing the location of fracture for the loading case with minimum strength.



Loading Condition - Fall

Picture showing the location of fracture for the loading case with minimum strength.



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Operator	
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Software Used

ANSYS v15.0

BoneMat v2.0

BuilderM2O v1.0

ITKSnap v3.4

MatLab v16.0

References for the CT2S service

The CT2S service is based on the research of Prof Marco Viceconti and his co-workers at the Rizzoli Institute in Italy and at the Insigneo institute in UK.

An assessment of the method as predictor of the risk of hip fracture can be found in these two papers:

Falcinelli, C., Schileo, E., Balistreri, L., Baruffaldi, F., Bordini, B., Viceconti, M., Albisinni, U., Ceccarelli, F., Milandri, L., Toni, A., Taddei, F., 2014. Multiple loading conditions analysis can improve the association between finite element bone strength estimates and proximal femur fractures: A preliminary study in elderly women. Bone Oct(67), 71-80. https://doi.org/10.1016/j.bone.2014.06.038.

Qasim, M., Farinella, G., Zhang, J., Li, X., Yang, L., Eastell, R., Viceconti, M., 2016. Patient-specific finite element estimated femur strength as a predictor of the risk of hip fracture: the effect of methodological determinants. Osteoporos Int 27(9), 2815-22. https://doi.org/10.1007/s00198-016-3597-4.

The inherent accuracy of the method in predicting the femoral strength is reported here:

Schileo, E., Balistreri, L., Grassi, L., Cristofolini, L., Taddei, F., 2014. To what extent can linear finite element models of human femora predict failure under stance and fall loading configurations? J Biomech 47(14), 3531-8. https://doi.org/10.1016/j.jbiomech.2014.08.024.

Schileo, E., Taddei, F., Cristofolini, L., Viceconti, M., 2008. Subject-specific finite element models implementing a maximum principal strain criterion are able to estimate failure risk and fracture location on human femurs tested in vitro. J Biomech 41(2), 356-67. https://doi.org/10.1016/j.jbiomech.2007.09.009.

For a complete bibliography on this predictive technology, please see here:
https://ct2s.sheffield.ac.uk/ct2s/bibliography

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