Mechanical Engineering and the Ageing Population: Proposal for Post-Graduate Training

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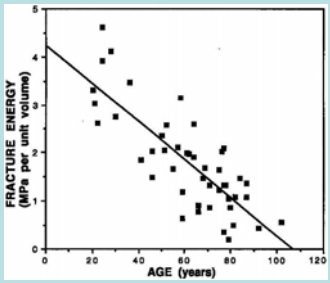
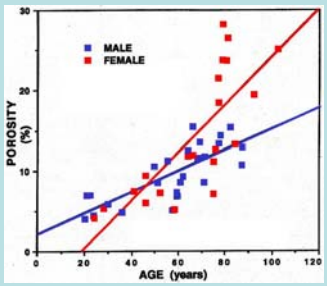
Introduction

People are living longer, but their bodies are finding it difficult to cope with the effects of old age. Falls occur, bones fracture and arthritis sets in. This creates increased demand on health services to which engineering solutions are required as well as post-graduate training of engineers to meet this demand.



The Effect of Impact with Age

- Steady decrease in fracture energy with increasing age
- Bone fracturing is more likely with older people
- Simple falls constitute 20% of bone fractures



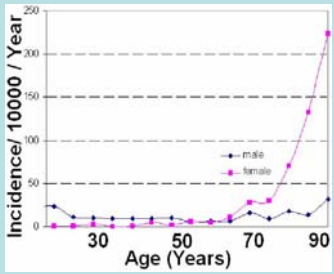
JBJS, 1993 Vol 75-A pp 1193-1205, McCalden, McGeough, Barker, Court-Brown

The Effect of Porosity with Age

- Bone porosity rises with age
- More prevalent in older women
- Decrease in structural strength of bone

Bone Fracture

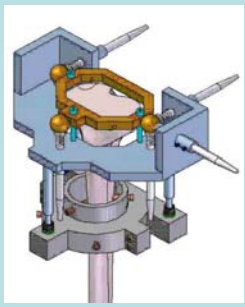
- 80% of fractures occur in women over 70 years



Singer BR et al., JBJS (Br) 1998

Total Knee Replacement

- Average age for knee replacement 68 years
- Engineering problems include fitting without cement
- Key to longevity of replacement lies in engineering design



A. MacLean, J. McGeough, C. Howie, H. Simpson, University of Edinburgh

Post-Graduate Training

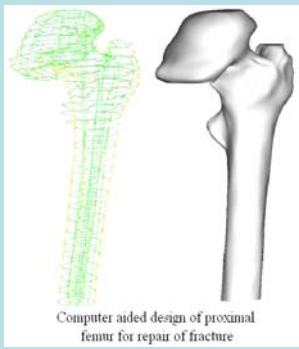
- Post-graduate course in Mechanical Engineering for Surgery on the Human Skeleton

Including:

- Biomedical and health science for engineers
- Optional modules: Instrumentation, Computational and experimental methods, Finite Element Analysis (FEA), Applied human movement, Tissue mechanics, Prosthesis technology
- Research Thesis

Engineering Problems

- Loosening of implants
- Material selection for implants
- Coating technology for implants



Computer aided design of proximal femur for repair of fracture

See Kalski, Vadillo, Poland

Conclusion

With the world's ageing population, there is a need for post-graduate training in mechanical engineering linked to surgery. This need requires cooperation between the engineer and clinician. The proposed course of study is intended to provide this link.