INTRODUCTION:
Total hip replacement (THR) is one of the most clinically successful and commonly performed surgical procedures. In recent years an increasing number of THR are being performed in the younger patient group (less than 60 years). One of the major prerequisites for successful outcome of uncemented THR is the proper fit of prosthesis. It is known that the geometry of proximal femur varies between different patient populations. The influence of age on the topography of proximal femur is also previously studied (1-4). The current study was designed to evaluate the topography of proximal femur in a group of young patients undergoing THR and to determine differences in CFI with age and gender.

METHODS:
Digital AP radiographs from 227 male and female pre-operative hip arthroplasty patients (both left and right) aged 22 to 59 were collected according to IRB with approval through the Rothman Institute. Femoral canal dimensions were measured using a custom programmed semi-automated macro. Briefly, an axis through the femoral canal was generated, segmenting the femur at the midpoint of the isthmus. Measurements were taken at ten millimeter intervals along the length of the femur starting from the lesser trochanter (0 point). The automation was achieved using an algorithm identifying differences in pixel intensity along each measurement line. Misidentified distances were manually corrected by the operator using the mouse to indicate the cortical/canal boundary. The values generated were automatically calculated the medial and lateral flare index (MFI). The collected data was binned into three age groups and data is shown in Table 3, a trend toward significance is highlighted in yellow. Unfortunately the 20-40 age group contained only 20 total indicated measurements. CFI shows a trend towards significance between 20-40 and older age groups.

To further investigate the changes in the proximal femur we calculated the medial and lateral flare indices to find out where the variation was occurring. These measurements (Table 2) show that CFI decreases with age in both sexes. However, of note is lack of change in the MFI in females. To understand how each value changes with age we applied the t-test to investigate statistical significance of the 20-40 age group to the others. When the t-test is applied to males versus females regardless of age CFI shows a p-value of .0009, and LFI a p-value of .0007. When the data is grouped by age neither gender alone showed a statistical difference but when compared to each other statistical differences are apparent. The data is shown in Table 3, a trend toward significance is highlighted in yellow. Unfortunately the 20-40 age group contained only 20 total patients. The lack of statistical significance may relate to the sample size. It is plausible that increasing the number of patients in the 20-40 age group, or comparing this age group with patients older than 60, may result in statistical significance.

CONCLUSIONS:
• There exists a decreasing trend in CFI from younger to older individuals, with a greater decrease occurring in males. A comparison of CFI by gender reveals a large significant difference.
• A breakdown of CFI into medial and lateral variations show that the LFI in females predominantly decreases with age. Males tend to show larger decreases in MFI.
• A comparison of males and females with respect to age shows that significant differences exists in the 40-50 and 50-60 groups in relation to CFI and LFI.
• A clear difference occurs between male and female proximal femoral changes with age. The importance of these differences may indicate how implants are design with gender and age.

REFERENCES: