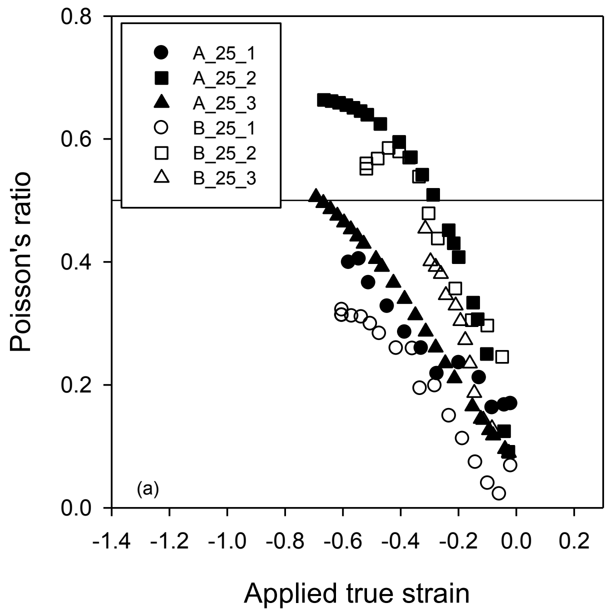
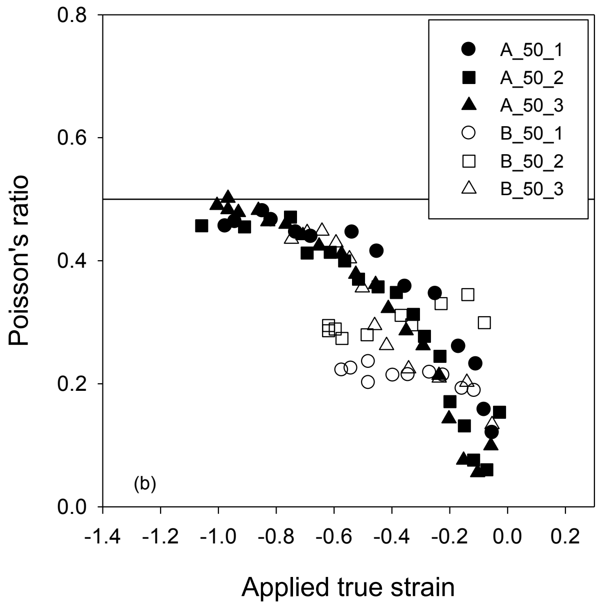
Supplementary data

In this paper, strain data are presented as engineering, or Cauchy, strains and Poisson's ratios are calculated from these. This is to facilitate comparisons with previous studies of Poisson's ratio and make the data more accessible to a wider audience who are probably more familiar with this definition. In studies of large-strain materials, however, a logarithmic definition of strain lends itself more readily to analysis. This is often called "true" or Hencky, strain and is defined by $e_t = \ln(x_i/x_0)$, where x_i and x_0 are the deformed and original dimensions respectively. Clearly this can be calculated from engineering strain, e_z, by $e_t = \ln(1+ e_z)$; e_z is traditionally negative for compression but was shown positive in Fig 3 in the main text for convenience. One immediate advantage of this definition is that Poisson's ratio calculated from true strain is constant and equal to 0.5 for all applied strains for an isovolumetric deformation of an isotropic, homogeneous material. In Fig S1 the plots in Fig 3 are replotted in terms of true strain.





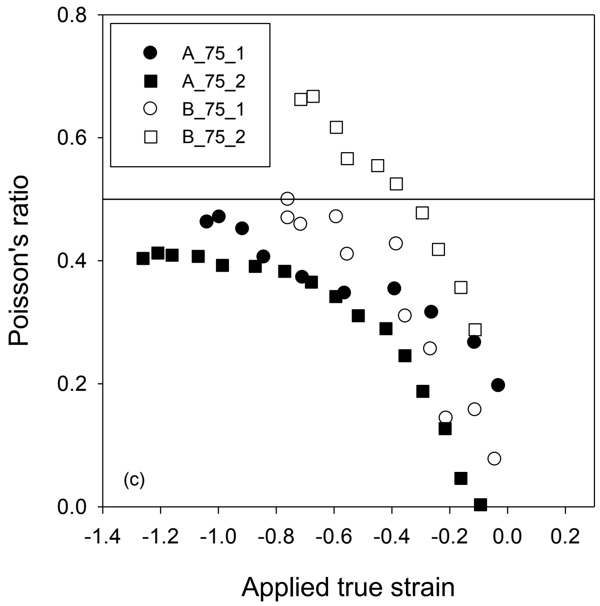


Figure S1. Plots of Poisson's ratio as a function of true longitudinal strain from each femoral head, A and B, for drop heights of (a) 25 mm, (b) 50 mm and (c) 75 mm. An isovolumetric deformation of a homogeneous, isotropic material has a constant Poisson's ratio of 0.5 marked as a solid line.