Density and strength distribution in the human subchondral bone plate of the patella

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Author(s) Hoechel, Sebastian; Wirz, Dieter; Müller-Gerbl, Magdalena
Author(s) at UniBasel Müller-Gerbl, Magdalena ;
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PURPOSE: The aim of this study was to map the strength distribution of the human patella and correlate it to the subchondral bone plate density obtained by means of computed tomographyosteoabsorptiometry (CT-OAM). METHODS: Measurements were performed at 34 standardized points on each patella. The mineralization patterns of the subchondral bone plate of 20 patellae were displayed with the help of CT-OAM. False-coloured distribution patterns for our measurements were generated. The mechanical strength was determined at the same points by indentation testing. RESULTS: We showed that neither the density nor the mechanical strength is distributed homogeneously but exhibited regular, reproducible distribution patterns which mirror long-term stress distribution in articular surfaces. A direct correlation was found between both parameters in the subchondral bone plate. CONCLUSION: The correlation of density and mechanical strength makes CT-OAM a valuable tool to assess and monitor changes in the strength of the subchondral bone plate in vivo.
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