

Publication**Correlation between mineralization and mechanical strength of the subchondral bone plate of the humeral head****JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)****ID** 2832900**Author(s)** Zumstein, Valentin; Kraljević, Marko; Wirz, Dieter; Hügli, Rolf; Müller-Gerbl, Magdalena**Author(s) at UniBasel** [Müller-Gerbl, Magdalena](#) ;**Year** 2012**Title** Correlation between mineralization and mechanical strength of the subchondral bone plate of the humeral head**Journal** Journal of shoulder and elbow surgery**Volume** 21**Number** 7**Pages / Article-Number** 887-93**Keywords** Mineralization, indentation, subchondral bone, humeral head, glenohumeral joint, shoulder arthroplasty

BACKGROUND: One of the main problems in shoulder arthroplasty is the fixation of the prosthesis, where the subchondral bone plate plays an important role. Subchondral mineralization patterns represent the loading history of a joint and give information about the individual biomechanical situation. The objective of this study was to determine if a correlation between subchondral mineralization and mechanical strength in the humeral head exists. **MATERIALS AND METHODS:** Subchondral mineralization of 32 shoulder specimens was investigated by use of computed tomography (CT) osteoabsorptiometry. The previously dissected specimens were scanned axially in a CT scanner, and the obtained data sets were transferred into an image analyzing system. Maximum intensity projection was used to evaluate the density distribution of the subchondral bone plate. To get information about mechanical strength of the subchondral bone, each specimen was investigated at 29 predefined points by means of an indentation-testing machine. **RESULTS:** The maximum strength was mostly detected in the center (monocentric pattern) or in anterior and posterior areas of the articular surface (bicentric pattern). The distribution of mineralization showed the same 2 reproducible patterns. The coefficient of correlation between mechanical strength and mineralization shown on CT was between 0.59 and 0.96. The obtained information was statistically significant ($P < .01$). **CONCLUSION:** Mechanical strength and subchondral mineralization in the humeral head are significantly associated ($P < .01$). As a consequence of these findings, CT osteoabsorptiometry can be indirectly used to give information about bone quality in vivo. Our findings could be useful for the development of new fixation methods in shoulder surgery (eg, humeral resurfacing arthroplasty).

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