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## Research reveals link between beer and bone health

### *Study finds beer is a rich source of silicon, may help prevent osteoporosis*

A new study suggests that beer is a significant source of dietary silicon, a key ingredient for increasing bone mineral density. Researchers from the Department of Food Science & Technology at the University of California, Davis studied commercial beer production to determine the relationship between beer production methods and the resulting silicon content, concluding that beer is a rich source of dietary silicon. Details of this study are available in the February issue of the *Journal of the Science of Food and Agriculture*, published by Wiley-Blackwell on behalf of the Society of Chemical Industry.

"The factors in brewing that influence silicon levels in beer have not been extensively studied" said Charles Bamforth, lead author of the study. "We have examined a wide range of beer styles for their silicon content and have also studied the impact of raw materials and the brewing process on the quantities of silicon that enter wort and beer."

Silicon is present in beer in the soluble form of orthosilicic acid (OSA), which yields 50% bioavailability, making beer a major contributor to silicon intake in the Western diet. According to the National Institutes of Health (NIH), dietary silicon (Si), as soluble OSA, may be important for the growth and development of bone and connective tissue, and beer appears to be a major contributor to Si intake. Based on these findings, some studies suggest moderate beer consumption may help fight osteoporosis, a disease of the skeletal system characterized by low bone mass and deterioration of bone tissue.

The researchers examined a variety of raw material samples and found little change in the silicon content of barley during the malting process. The majority of the silicon in barley is in the husk, which is not affected greatly during malting. The malts with the higher silicon contents are pale colored which have less heat stress during the malting process. The darker products, such as the chocolate, roasted barley and black malt, all have substantial roasting and much lower silicon contents than the other malts for reasons that are not yet known. The hop samples analyzed showed surprisingly high levels of silicon with as much as four times more silicon than is found in malt. However, hops are invariably used in a much smaller quantity than is grain. Highly hopped beers, however, would be expected to contain higher silicon levels.

No silicon was picked up from silica hydrogel used to stabilize beer, even after a period of 24 hours and neither is there pick up from diatomaceous earth filter aid.

The study also tested 100 commercial beers for silicon content and categorized the data according to beer style and source. The average silicon content of the beers sampled was 6.4 to 56.5 mg/L.

"Beers containing high levels of malted barley and hops are richest in silicon," concludes Dr. Bamforth. "Wheat contains less silicon than barley because it is the husk of the barley that is rich in this element. While most of the silicon remains in the husk during brewing, significant quantities of silicon nonetheless are extracted into wort and much of this survives into beer."

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