

Getting Enough Calcium in Early Life Could Be Key for Optimal Lifelong Bone Health

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(PhysOrg.com) -- There's no denying that people need calcium for strong, healthy bones. But new research from North Carolina State University suggests that not getting enough calcium in the earliest days of life could have a more profound, lifelong impact on bone health and perhaps even obesity than previously thought.

During an 18-day trial involving 24 newborn pigs, the researchers documented markedly lower levels of [bone density](#) and strength in 12 piglets fed a calcium-deficient diet compared to 12 piglets that received more calcium. Not only that, but when researchers looked at certain [stem cells](#) in [bone marrow](#), they found that many of these cells in the calcium-deficient piglets appeared to have already been programmed to become [fat cells](#) instead of bone-forming cells.

Because these programmed mesenchymal stem cells replicate to provide all the bone-forming cells for an animal's entire life, very early calcium deficiency may have predisposed the piglets to have bones that contain more fat and less mineral. That could make those pigs more prone to osteoporosis and obesity in later life, said Dr. Chad Stahl, an associate professor of animal science who led the study.

In a longer-term study that Stahl plans to begin this month, the researchers will look at whether that's the case: By conducting a longer feeding trial, the scientists will be able to see if the changes persist through sexual maturity, which occurs for pigs at around eight months of age.

The researchers are using pigs as a model for human health because pigs and humans are similar when it comes to bone growth and nutrition. Pigs are one of the few animals known to experience bone breaks related to osteoporosis, Stahl said.

One of the most surprising findings of the 18-day feeding study was that while the calcium-deficient pigs had substantially lower bone strength and density, blood tests didn't indicate any difference in levels of the hormonal form of vitamin D, which regulates the amount of calcium circulating in the blood of older children and adults. Stahl said this suggests that calcium regulation in newborns isn't dependent on [vitamin D](#).

Stahl thinks the research is relevant to the infant food industry and suggests the significance of the nutritional status of breastfeeding mothers. It also points to a need for greater emphasis in very early life on bone health, not just during those times when children are growing most rapidly.

“While the importance of calcium nutrition throughout childhood and adolescence is well-recognized, our work suggests that calcium nutrition of the neonate may be of greater importance to lifelong [bone health](#), due to its programming effects on mesenchymal stem cells,” Stahl reported at the recent Experimental Biology 2010 meeting in Anaheim. “It also points to a potential paradigm shift in which health professionals might want to begin thinking about [osteoporosis](#) not so much as a disease of the elderly, but instead as a pediatric disease with later onset.

“For me,” Stahl said, “the biggest message is that [calcium](#) nutrition, or mineral nutrition as a whole, needs to be a priority from day one. Early life nutrition is setting children up physiologically for the rest of their lives.”

Provided by North Carolina State University

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