

OSTEOSCOOP

News on current events in osteoporosis and rheumatology

Pregnancy upregulates intestinal calcium absorption and skeletal mineralization independently of the vitamin D receptor

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Without the vitamin D receptor (VDR), adult mammals develop reduced intestinal calcium absorption, rickets, and osteomalacia. Intestinal calcium absorption normally increases during the pregnancy so that the mother can supply sufficient calcium to her foetus. The maternal skeleton is rapidly resorbed during lactation to provide calcium needed for milk; lost bone mineral content is completely restored after weaning. Recently [1], the authors studied *VDR* null mice to determine whether these adaptations during pregnancy and lactation require the vitamin D receptor.

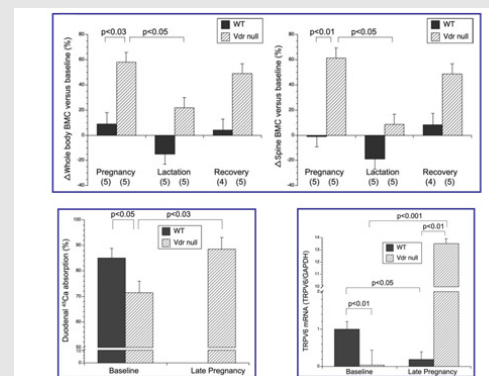
VDR nulls were severely rachitic at 10 weeks of age on a normal diet. Pregnancy induced a 158% increase in *VDR* null bone mineral content to equal the pregnant wild-type value. Lactation caused bone mineral content losses that were equal in *VDR* nulls and wild type mice. *VDR* nulls recovered after weaning to a bone mineral content 50% higher than before pregnancy and equal to wild type mice. Additional analyses showed that in *VDR* nulls, during pregnancy, duodenal calcium absorption increased, secondary hyperparathyroidism lessened, bone turnover markers decreased, and osteoid became fully mineralized. A genome-wide microarray analysis of duodenal RNA found marked reduction of the calcium channel *Trpv6* in *VDR* nulls at baseline but a 13.5-fold increase during pregnancy. The intestinal calcium-binding protein calbindin D-9K and Ca^{2+} -ATPase were not altered by pregnancy. Several other solute transporters increased during pregnancy in *VDR* nulls.

In summary, in the absence of effective Vitamin D, mice adapt to pregnancy by upregulating duodenal *Trpv6* and intestinal calcium absorption, thereby enabling rapid normalization of bone mineral content during pregnancy. These mice lactate normally and fully restore bone mineral content after weaning. Therefore, VDR is not required for the skeletal adaptations during pregnancy, lactation, and after weaning.

1. Fudge NJ et al. Endocrinology. 2009;151: 886-895.

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