The following abstracts from *The Journal of Clinical Endocrinology & Metabolism* have been selected by the editors of *Endocrinology* as being particularly relevant to readers interested in translational science.

### Relationship between Vitamin D, Parathyroid Hormone, and Bone Health

*A. J. Sai, R. W. Walters, X. Fang, and J. C. Gallagher*

**Context:** There is a controversy regarding the definition of vitamin D insufficiency as it relates to bone health.

**Objective:** The objective of the study was to examine the evidence for a threshold value of serum 25-hydroxyvitamin D (25(OH)D) that defines vitamin D insufficiency as it relates to bone health.

**Design and Participants:** This was a cross-sectional analysis of baseline data in 488 elderly Caucasian women, mean age 71 yr, combined with a literature review of 70 studies on the relationship of serum PTH to serum 25(OH)D.

**Setting:** The study was conducted in independent-living women in the midwest United States.

**Main Outcome Measure:** The relationship between serum 25OHD, serum PTH, and serum osteocalcin and 24-h urine N-telopeptides was measured.

**Results:** Serum PTH was inversely correlated with serum 25OHD ($r = -0.256$, $P < 0.0005$), but no threshold as defined by suppression of serum PTH was found within the serum 25OHD range 6–60 ng/ml (15–150 nmol/liter). However, in contrast, there was a threshold for bone markers, serum osteocalcin and urine serum osteocalcin and N-telopeptides, that increased only below a serum 25OHD of approximately 18 ng/ml (45 nmol/liter). Calcium absorption was not correlated with serum PTH and serum 25OHD, and no threshold was found. A literature review of 70 studies generally showed a threshold for serum PTH with increasing serum 25OHD, but there was no consistency in the threshold level of serum 25OHD that varied from 10 to 50 ng/ml (25–125 nmol/liter).

**Conclusions:** Vitamin D insufficiency should be defined as serum 25OHD less than 20 ng/ml (50 nmol/liter) as it relates to bone.

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### Vitamin D₃ Is More Potent Than Vitamin D₂ in Humans

*Robert P. Heaney, Robert R. Recker, James Grote, Ronald L. Horst, and Laura A. G. Armas*

**Background:** Current unitage for the calciferols suggests that equimolar quantities of vitamins D₂ (D2) and D₃ (D3) are biologically equivalent. Published studies yield mixed results.

**Objective:** The aim of the study was to compare the potencies of D2 and D3.

**Design:** The trial used a single-blind, randomized design in 33 healthy adults. Calciferols were dosed at 50,000 IU/wk for 12 wk. Principal outcome variables were area under the curve for incremental total 25-hydroxyvitamin D (25(OH)D) and change in calciferol content of sc fat.

**Results:** Incremental mean (so) 25(OH)D area under the curve at 12 wk was 1366 ng·dl⁻¹ (516) for the D2-treated group and 2136 (606) for the D3 (P < 0.001). Mean (so) steady-state 25(OH)D increments showed similar differences: 24 ng/ml for D2 (10.3) and 45 ng/ml (16.2) for D3 (P < 0.001). Subcutaneous fat content of D2 rose by 50 µg/kg in the D2-treated group, and D3 content rose by 104 µg/kg in the D3-treated group. Total calciferol in fat rose by only 33 ng/kg in the D2-treated, whereas it rose by 104 µg/kg in the D3-treated group. Extrapolating to total body fat D3, storage amounted to just 17% of the administered dose.

**Conclusion:** D3 is approximately 87% more potent in raising and maintaining serum 25(OH)D concentrations and produces 2- to 3-fold greater storage of vitamin D than does equimolar D2. For neither was there evidence of sequestration in fat, as had been postulated for doses in this range. Given its greater potency and lower cost, D3 should be the preferred treatment option when correcting vitamin D deficiency.

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### Pubertal Presentation in Seven Patients with Congenital Adrenal Hyperplasia due to P450 Oxidoreductase Deficiency

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**Context:** P450 oxidoreductase (POR) is a crucial electron donor to all microsomal P450 cytochrome (CYP) enzymes including 17α-hydroxylase (CYP17A1), 21-hydroxylase (CYP21A2) and P450 aromatase. Mutant POR causes congenital adrenal hyperplasia with combined glucocorticoid and sex steroid deficiency. P450 oxidoreductase deficiency (ORD) commonly presents neonatally, with disordered sex development in both sexes, skeletal malformations, and glucocorticoid deficiency.

**Objective:** The aim of the study was to describe the clinical and biochemical characteristics of ORD during puberty.

**Design:** Clinical, biochemical, and genetic assessment of seven ORD patients (five females, two males) presenting during puberty was conducted.