similar to those seen in advanced osteoporosis. Analysis showed these changes were caused by decreased bone formation, rather than by increased bone resorption. Daily administration of PTH 1–34 resulted in a profound improvement in bone mass and microarchitecture, surpassing that observed in treated wild-type littermates. Although the mechanism involved in this improvement has not been identified by this study, there are several possible explanations, such as increased availability of the PTH receptor and reduction in levels of PTHrP after PTH 1–34 administration.

This study has implications for clinical practice, by offering an explanation (PTHrP levels) for individual variation in response to PTH in the treatment of osteoporosis and helping predict clinical efficacy of PTH 1–34.

Katherine Sole

Original article Miao D *et al.* (2005) Osteoblast-derived PTHrP is a potent endogenous bone anabolic agent that modifies the therapeutic efficacy of administered PTH 1–34. *J Clin Invest* **115:** 2402–2411

Extrathyroidal types 1 and 2 iodothyronine deiodinase as sources of plasma T_3

Peripheral conversion of T_4 to T_3 accounts for 80% of T_3 production in humans. Extrathyroidal types 1 and 2 iodothyronine deiodinases (D1 and D2) have been identified in the liver and in skeletal muscle, respectively, but their quantitative contribution to the production of serum T_3 from T_4 in normal individuals and those with thyroid disorders is unknown.

To establish the relative roles of the two enzymes, Maia and colleagues calculated the rate of conversion of T_4 to T_3 in transfected cells transiently expressing D1 or D2, at physiologically relevant concentrations of free T_4 (2 pM, 20 pM and 200 pM). Cells were then sonicated for assay of deiodinase activities. The ratio of T_3 production in cell sonicates was multiplied by the tissue activities reported in human liver (D1) and skeletal muscle (D2). Extrapolating the results from these *in vitro* studies, the authors conclude that D2 from extrathyroidal sites such as skeletal muscle is the major source of T_3 in euthyroid individuals. In hypothyroidism, D2-generated T_3 accounts for ~71% of peripheral production; D1-generated T_3 makes up the majority (67%) in thyrotoxic patients. Furthermore, intracellular D2-generated T_3 has a twofold to threefold greater effect on T_3-dependent gene transcription than that from D1. Given the important role of D2 in euthyroid individuals, and its short half-life, the authors also argue that the rapid decrease in serum T_3 seen in patients with euthyroid sick syndrome is more likely to be due to impairment of D2-catalysed T_3 generation rather than to the smaller decrease seen in hepatic D1 activity.

Carol Lovegrove

Original article Maia AL *et al.* (2005) Type 2 iodothyronine deiodinase is the major source of plasma T_3 in euthyroid humans. *J Clin Invest* **115:** 2524–2533

School dinners and cardiovascular risk

The nutritional content of school dinners has been a recent topic of debate. Whincup and colleagues therefore investigated the markers of nutrition, cardiovascular health and type 2 diabetes in pupils who eat school dinners, and those who eat their school-day meal from home.

The authors studied data from the Ten Towns Heart Health Study, which took place in 72 secondary schools in England and Wales from 1998 to 2000. Participants' height, weight, waist and hip circumference, skin-fold thicknesses, bioimpedance measurements and pubertal status were measured. Serum leptin, insulin and folate, plasma glucose, and blood lipid levels were also measured.

Overall 1,112 pupils participated. Pupils who ate school dinners had significantly lower systolic blood pressure, ratio of cholesterol to HDL cholesterol, and levels of leptin, glucose, insulin, and folate compared with pupils who ate from home. This remained statistically significant despite the social class of participants.

Even though differences in the risk-factor profile and nutritional status between pupils who eat school dinners and those who eat from home are modest, the long-term importance remains unclear. The authors conclude that it might be beneficial to increase folate content in school dinners and that the average health status of children who eat school dinners is no worse than that of children who eat from home. Efforts will, therefore, have to extend beyond school dinners in order to