The discovery of the aquaporin family of proteins in the 1990s resolved a long-standing debate about how water is transported across cell membranes. More recent data indicate that aquaporins could be targeted to treat disorders including oedema and obesity, and these therapeutic opportunities as well as challenges such as the development of appropriate assays for aquaporin modulators are discussed in a Review by Verkman and colleagues. In the second Review, Wagner et al. focus on therapeutic approaches to restore the function of insulin-secreting β-cells, which are destroyed by the immune system in patients with type 1 diabetes, and have reduced functionality in those with type 2 diabetes. Various approaches are discussed, including promoting insulin secretion, inhibiting apoptosis of β-cells or stimulating their proliferation. Cyclic nucleotide phosphodiesterases (PDEs), the subject of a Review by Manganiello and colleagues, regulate a plethora of biological activities through their effects on concentrations of the key signalling mediators cAMP and cGMP. Consequently, PDE inhibitors can be used to treat numerous diseases such as erectile dysfunction and pulmonary hypertension, and are in development for many more. In particular, the next generation of inhibitors aim to exploit emerging knowledge indicating that PDEs regulate specific pathways through the formation of multiprotein complexes with different molecular compositions in specific subcellular compartments. Finally, this month we are featuring a poster illustrating metabolic targets for cancer therapy. The poster was produced with exclusive support from Forma Therapeutics and is freely available at http://www.nature.com/nrd/posters/index.html. As always, Nature Publishing Group carries sole responsibility for all editorial content.