

Solutions

2.1 Hormones travel in the bloodstream to reach their target organ, which is slower than electrical impulses along neurones; but hormones are not broken down immediately, so their effect lasts longer.

2.2 Insulin; the pancreas.

2.3 LH.

3.1 Type 1: the pancreas fails to produce sufficient insulin; treated with insulin injections. Type 2: body cells no longer respond to the insulin produced; treated with a carbohydrate-controlled diet and an exercise regime. Obesity is a risk factor for Type 2.

3.2 When glucose is too high the pancreas releases insulin, so cells take up glucose and liver/muscle converts it to glycogen, and glucose falls; when glucose is too low the pancreas releases glucagon, converting glycogen back to glucose released into the blood, and glucose rises; each change switches the opposite response off – negative feedback.

3.3 Dehydration makes the blood too concentrated, detected by the hypothalamus/receptors; the pituitary gland releases more ADH into the blood; ADH makes the kidney tubules more permeable, so more water is selectively reabsorbed into the blood; so less, more concentrated, urine is produced – an example of negative feedback.

3.4 The woman is given FSH and LH to stimulate several eggs to mature; eggs are collected and fertilised with the father's sperm in the laboratory; embryos develop into tiny balls of cells and one or two are inserted into the uterus. Concerns: it is emotionally and physically stressful; success rates are not high and it can lead to multiple births, a risk to babies and mother.