

Pharmacokinetics of recombinant human growth hormone administered by cool.click 2, a new needle-free device, compared with subcutaneous administration using a conventional syringe and needle.

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Abstract

BACKGROUND: Growth hormone (GH) is used to treat growth hormone deficiency (GHD, adult and paediatric), short bowel syndrome in patients on a specialized diet, HIV-associated wasting and, in children, growth failure due to a number of disorders including Turner's syndrome and chronic renal failure, and in children born small for gestational age. Different brands and generic forms of recombinant human growth hormone (r-hGH) are approved for varying indications in different countries. New ways of administering GH are required because the use of a needle and syringe or a device where a patient still has to insert the needle manually into the skin on a daily basis can lead to low adherence and sub-optimal treatment outcomes. The objective of this study was to assess the relative bioavailability of r-hGH (Saizen, Merck Serono) administered by a new needle-free device, cool.click 2, and a standard needle and syringe.

METHODS: The study was performed with 38 healthy volunteers who underwent pituitary somatotrope cell down-regulation using somatostatin, according to a randomized, two-period, two-sequence crossover design. Following subcutaneous administration of r-hGH using cool.click 2 or needle and syringe, pharmacokinetic parameters were analysed by non-compartmental methods. Bioequivalence was assessed based on log-transformed AUC and C(max) values.

RESULTS: The 90% confidence intervals for test/reference mean ratio of the plasma pharmacokinetic variables Cmax and AUC(0-inf) were 103.7-118.3 and 97.1-110.0, respectively, which is within the accepted bioequivalence range of 80-125%. r-hGH administered by cool.click 2 is, therefore, bioequivalent to administration by needle and syringe with respect to the rate and extent of GH exposure. Treatment using cool.click 2 was found to be well tolerated. With cool.click 2 the tmax was less (3.0 hours) than for needle and syringe delivery (4.5 hours), $p = 0.002$ (Friedman test), although this is unlikely to have any clinical implications.

CONCLUSION: These results demonstrate that cool.click 2 delivers subcutaneous r-hGH exposure that is bioequivalent to the conventional mode of injection. The new device has the additional advantage of being needle-free, and should help to increase patient adherence and achieve good therapeutic outcomes from r-hGH treatment.