A calculator for HOMA

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Background and aims: The HOmeostasis Model Assessment (HOMA) is a mathematical model which can estimate an individual's degree of insulin sensitivity (HOMA %S) and level of beta cell function (HOMA %B) from simultaneous measurements of fasting plasma glucose (FPG) and fasting plasma insulin concentrations. HOMA models the physiologic glucose/insulin feedback system mathematically. It incorporates data on pancreatic beta-cell function plus peripheral (muscle and brain) and hepatic insulin sensitivity as well as glucose and insulin measured in the fasting state. The model estimates an individual's insulin sensitivity based on the assumption that any one combination of glucose and insulin is associated with a given insulin sensitivity, or, conversely, their insulin resistance. Its simplicity, reproducibility and correspondence to glucose clamp derived estimates of insulin resistance and stimulatory test estimates of insulin secretion have meant that HOMA has become a much used method for estimating insulin sensitivity and beta cell function in people with non-insulin treated Type 2 diabetes, particularly in large-scale studies. An updated HOMA model has been developed (version 2) which has been adapted to work with modern insulin assays. Although linear equations are available which can give approximate HOMA %S and %B estimates, the most accurate results are obtained using the HOMA model in its computerised form.
Materials and methods: The Fortran computer program for HOMA version 2 has been converted to C and optimised for speed of calculation. An Applications Programming Interface (API), encapsulating the HOMA software as an ActiveX module or as a Macintosh shared library, has been developed to facilitate incorporation of the program into other software packages.
Results: The updated software was checked for validity by checking the results obtained against those from the existing computer model. The new API was used with bespoke interfaces to enable the program to run on a variety of computer platforms as a stand-alone application to permit rapid calculation of an individual's HOMA %S and %B. The API was incorporated also within a Microsoft Excel Spreadsheet to facilitate the calculation of %S and %B values for many individuals simultaneously
Conclusion: This software implementation of HOMA version 2 can calculate %S and %B values instantly from paired FPG and FPI values (or fasting specific insulin or C-peptide). Its availability as free download for a variety of computer platforms (www.dtu.ox.ac.uk/homa) should assist clinicians and researchers to derive better estimates of %S and %B than can be obtained from the linear approximations in common use.