Interpretation of HOMA indices

There is no absolute value for HOMA indices. These will depend on the specific assays used for glucose, insulin and C-peptide. Because of this, there are no defined thresholds for 'normal' vs. 'abnormal' values.

This document gives the range of HOMA indices derived from RIA insulin and C-peptide in a UK population of 299 and 383 non-diabetic men and women with mean age approximately 50 years old, using assays for insulin and C-peptide current in our laboratory between 1996 and 1998.

This data is for information only and should be quoted in any publication as 'personal communication, Dr JC Levy, Oxford Centre for Diabetes, Endocrinology and Metabolism'.

This data should be only be used with the following caveats.

1. HOMA indices, whether derived from insulin or C-peptide concentrations will be critically dependent on the assays used to derive that data. Variation between the calibration of insulin assays is considerable and there is no external quality assurance scheme to bring these into concordance (1). The situation is likely to be even more variable for C-peptide assays. For instance, a plasma or serum sample could yield insulin concentrations by different assays that vary by as much as 200%. Glucose assays, on the other hand are comparable across laboratories for at least the last three decades. However, any difference between insulin and C-peptide assays will be reflected in the derived HOMA indices. This carries with it two implications:

    a. Interpretation of HOMA indices should be interpreted with respect to a local 'Normal' or 'reference' population in which the same assays were used as in the population of interest.

    b. HOMA indices are best suited to comparisons between populations or within populations, where the same assays have been used.

2. There is no external criterion for categorising HOMA indices as 'normal' or 'abnormal'. They form a continuous range with an approximately normal distribution. Explicit local definitions, considering caveat 1., should always be supplied where such categorisation is applied.

Reference
(1) Comparison of 11 Human Insulin Assays: Implications for Clinical Investigation and Research. Susan E. Manley, Irene M. Stratton, Penelope M. Clark, and Stephen D. Luzio. Clinical Chemistry 53:5 922–932 (2007)

Population derived HOMA index data

The following data is taken from a non-diabetic population sampled using assays being used in the Diabetes Research Laboratories, Oxford between 1996 and 1998. Note, this is not the reference population which was used to calibrate the HOMA program, but a sample of a UK population.

The assays used here were radioimmunoassays and are no longer used in our laboratory. Therefore, the HOMA values should not be compared directly or be used to inform data from other study. It is presented solely to give a representative distribution of HOMA values.

Population with valid insulin derived HOMA indices

Sex		Frequency	Percent
Valids	Female	165	55.2
	Male	134	44.8
	Total	299	100

		Age	BMI	WHR	FPG	Insulin	C-Peptide	%B_Ins	%S_Ins	IR_Ins
		(years)	(kg/msq)	-	(mmol/l)	(pmol/l)	(nmol/l)	-	-	-
N	Valid	299	297	294	299	299	299	299	299	299
	Missing	0	2	5	0	0	0	0	0	0
Mean		48.5	25.2	0.84	5.0	71.9	0.59	112.7	85.2	0.95
Std. Deviation		17.2	4.4	0.09	0.3	44.1	0.28	38.1	28.2	0.22
Percentiles	2.5	21	19.0	0.71	4.3	34.9	0.25	70.3	33.4	0.53
	25	34	22.4	0.77	4.8	51.1	0.43	91.9	64.9	0.81
	50	48	24.6	0.83	5.1	61.4	0.54	106.0	85.0	0.94
	75	62	26.7	0.90	5.3	81.0	0.70	122.8	102.1	1.09
	97.5	78	36.8	1.02	5.5	161.7	1.29	188.6	149.4	1.42

Population with valid C-peptide derived HOMA indices

Sex		Frequency	Percent
Valid	Female	210	54.8
	Male	173	45.2
	Total	383	100

		Age	BMI	WHR	FPG	Insulin	C-Peptide	%B_CPep	%S_CPep	IR_CPep
		(years)	(kg/msq)	-	(mmol/l)	(pmol/l)	(nmol/l)	-	-	-
N	Valid	383	380	378	383	300	383	383	383	383
	Missing	0	3	5	0	83	0	0	0	0
Mean		50.5	25.1	0.84	5.0	71.9	0.57	108.3	90.6	1.29
Std. Deviation		16.7	4.2	0.08	0.3	44.0	0.26	31.4	36.3	0.60
Percentiles	2.5	21	19.0	0.71	4.3	34.9	0.25	62.9	37.2	0.56
	25	37	22.3	0.77	4.8	51.2	0.41	88.0	66.0	0.92
	50	51	24.5	0.83	5.1	61.8	0.52	103.9	85.0	1.18
	75	65	26.9	0.90	5.3	81.1	0.67	122.1	108.8	1.52
	97.5	78	35.6	1.02	5.5	161.2	1.19	176.6	179.0	2.69