Thus, the study of Modan et al [1], while confirming the consensus view that (extreme) obesity is a determinant of Type 2 diabetes, also stimulates investigators to look for the other, less obvious, factors.

Yours sincerely,
R.J. Jarrett

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Response from the authors

Dear Sir,

Dr. Jarrett's point that a sizeable portion of patients with Type 2 (non-insulin-dependent) diabetes is not related to obesity is well taken. However, his conclusions from our data are overstated. Firstly, as reported [1], our analysis concentrated only on the 132 newly found diabetic patients detected by the oral glucose tolerance test in the course of the study. This mode was chosen for the obvious reason that weight reduction is a mainstay of treatment as well as a frequent outcome of diabetes at its more advanced stages, so that, in diabetic patients under medical follow-up, the pre-existing interrelationship with past and concurrent body mass index is altered. The 247 previously known diabetic patients in our sample were consequently excluded from the study group and their association with body mass index was not presented. Secondly, while there was a sharp increase in risk for diabetes associated with past body mass index ≥ 31 , there was a milder but continuous increase in risk throughout the body mass index range. This increase may have been less evident in Figure 1 of our report, due to the scale chosen to accommodate the total rate of glucose intolerance in the same graph. It was, however, documented and shown to be significant in Tables 3 and 4.

Table 1 in this letter presents the rates of both newly found and previously known diabetic patients as well as of the rate of the total group with glucose intolerance (borderline + impaired + diabetes by National Diabetes Data Group Criteria [1]) in our sample, in successive 2-U intervals of past body mass index. Presentation by past body mass index was chosen here since our report indicates that this and not the concurrent body mass index determines the risk for diabetes. It should be noted that this table comprises the total sample, while in Figure 1 of the report only individuals who were not known diabetic patients and whose body mass index stayed within the same two-unit interval in both time points were included. A continuous increase throughout the body mass index range with a sharp increase when body mass index reaches values above 31 is evident in both Type 1

Table 1. Prevalence of newly found diabetes, previously known diabetes and glucose intolerance in a representative sample ($n = 2387$) of the Israeli Jewish population aged 40-70, examined by oral glucose tolerance test (OGTT), according to past body mass index examined 10 years before the OGTT

Age	Total examined <i>n</i>	Diabetes			Glucose intolerance %	Ratio of diabetes: abnormal tolerance
		New %	Known %	Total %		
< 21	317	2.2	3.5	5.7	25.6	1:3.5
21.0-22.9	368	2.2	5.4	7.6	26.6	1:2.5
23.0-24.9	545	6.1	6.2	12.3	34.7	1:1.8
25.0-26.9	468	4.5	12.4	16.9	41.2	1:1.4
27.0-28.9	318	9.1	13.5	22.6	51.9	1:1.3
29.0-30.9	177	7.3	16.9	24.2	53.1	1:1.2
≥ 31	194	10.8	26.3	37.1	63.4	1:0.7

and Type 2 diabetes. Moreover, the likelihood of developing diabetes among glucose intolerant subjects seems to increase with increasing obesity. This is indicated by the increasing ratio of diabetes to abnormal tolerance (borderline + impaired) ranging from 3.5 to 0.7 cases of abnormal tolerance to each case of diabetes in the lowest and highest body mass index categories respectively.

If one considers the total rate of diabetes in the body mass index categories < 23 as representing the rate of non-obesity-related cases, it can be estimated that in our sample about 60% of the diabetes is associated with obesity. As our population is more obese than the USA [2] and (based on Dr. Jarrett's quotation) British populations, it may well be that in these countries the proportion of the obesity-related diabetes among diabetic patients is lower, perhaps even substantially so.

In view of Dr. Jarrett's plea to look for other risk factors for diabetes, it is of interest that preliminary analysis of interviews regarding recent habitual physical activity and diet conducted in a subsample of more than 500 individuals of our study group [3] indicated that, independent of the effects of body mass index and age, at all levels of body mass index and in both sexes the risk of abnormal glucose tolerance and diabetes in the upper tertile of energy expenditure was half that of less active individuals. No effect of total caloric intake or of specific food components was found.

Yours sincerely,
M. Modan, A. Karasik and H. Halkin

References

1. Modan M, Karasik A, Halkin H, Fuchs Z, Lusky A, Shitrit A, Modan B (1986) Effect of past and concurrent body mass index on prevalence of glucose intolerance and Type 2 (non-insulin-dependent) diabetes and on insulin response: The Israel study of glucose intolerance obesity and hypertension. *Diabetologia* 29: 82-89
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3. Modan M, Lubin F, Shitrit A, Lusky A (1986) Habitual diet, physical activity, body mass index and glucose intolerance. The Israel GOH Study. *Diabetes* 35 (Supply 1) (abstract, in press)

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Announcement

2nd Annual Meeting of the Deutsche Gesellschaft für Adipositasforschung (German Society for the Study of Obesity).

This meeting will be held at the Rheinterrasse in Düsseldorf, FRG from 4-6 December 1986. The topics of the Meeting will include: obesity as a biological phenomenon; physiology and pathology of en-

ergy metabolism; pathological anatomy. Abstracts for lectures or poster sessions should be submitted to Professor Dr. F. A. Gries or Professor Dr. L. Herberg, Diabetes Forschungsinstitut an der Universität Düsseldorf, Aufm Hennekamp 65, D-4000 Düsseldorf 1, FRG by 20 September 1986