OBJECTIVE — To examine perceived risk of developing diabetes in primary care patients.

RESEARCH DESIGN AND METHODS — We recruited 150 nondiabetic primary care patients. We made standard clinical measurements, collected fasting blood samples, and used the validated Risk Perception Survey for Developing Diabetes questionnaire.

RESULTS — Patients with high perceived risk were more likely than those with low perceived risk to have a family history of diabetes (68 vs. 18%; P < 0.0001) and to have metabolic syndrome (53 vs. 35%; P = 0.04). However, patients with high perceived risk were not more likely to have intentions to adopt healthier lifestyle in the coming year (high 26.0% vs. low 29.2%; P = 0.69).

CONCLUSIONS — Primary care patients with higher perceived risk of diabetes were at higher actual risk but did not express greater intention to adopt healthier lifestyles. Aspects of health behavior theory other than perceived risk need to be explored to help target efforts in the primary prevention of diabetes.

Many clinical trials have shown that healthier lifestyles leading to modest weight loss can prevent diabetes in populations at risk (1,2), but changing behavior in real-life patients remains a challenge. Risk perception is a major component of most health behavior theories (3). Perceived risk to develop diabetes can be measured using a validated questionnaire such as the Risk Perception Survey for Developing Diabetes (RPS-DD) (4). There are no reports of diabetes risk perception estimated by the RPS-DD in primary care settings. We tested the hypotheses that primary care patients who perceive themselves at higher risk are 1) actually at higher risk for future diabetes and 2) more likely to intend to adopt healthier lifestyle behaviors.

RESEARCH DESIGN AND METHODS — We invited patients from the Massachusetts General Hospital Internal Medicine Associates primary care practice to participate. After obtaining written informed consent, we performed standardized measures of anthropometry, resting blood pressure, and fasting blood glucose. We used a validated electronic health record algorithm (M.F.H., R.W.G., P.S., J.B.M., unpublished data) to recruit patients at actual low, moderate, and high risk but who were not particularly aware of their personal risk. We used the validated RPS-DD (4) with added questions regarding intention to change behaviors. We report here results of 150 patients with complete clinical and questionnaire data. Details of the study participants and recruitment are provided in the supplemental methods, available in an online appendix at http://care.diabetesjournals.org/cgi/content/full/dc09-0720/DC1.

Statistical analysis

We dichotomized perceived risk of getting diabetes (4-point scale): patients who answered 1 or 2 were considered at low risk, whereas those who answered 3 or 4 were considered at high risk. Data non-normally distributed were transformed as appropriate. We compared the two groups using χ2 tests for proportions and two-sided t tests for means using SAS (SAS v. 9.1; SAS Institute, Cary, NC), with two-sided P values <0.05 indicating statistical significance.

RESULTS — Patients who perceived themselves to be at high risk of developing diabetes were more likely to be women (69 vs. 44%; P = 0.005) and to have self-reported family history of diabetes (68 vs. 18%; P < 0.0001) but did not otherwise differ compared with patients with low perceived risk (supplemental Table S1). Patients with high perceived risk had higher measured metabolic risk factors (anthropometric and biochemical measurements; supplemental Table S1). Patients with high perceived risk were at higher actual risk to develop diabetes according to the Framingham Heart Study diabetes risk score (4.97 vs. 2.37% 8-year cumulative incidence of diabetes; P = 0.002) (5) and to meet criteria for metabolic syndrome (52.9 vs. 35.4%; P = 0.04). Only four patients (2.7%) reported having received a diagnosis of metabolic syndrome (two with low and two with high risk). Metabolic syndrome was strongly associated with perceiving oneself at high risk for diabetes, even when adjusting for age, sex, and family history (odds ratio 5.6 [95% CI 2.0–15.6]). RPS-DD subscore data are presented in supplemental Table S2.

Regarding diet, physical activity, or weight management, we observed no difference between groups in reported previous efforts over the last year or in intentions over the coming year (Table 1; all P > 0.05). In both groups, the majority of patients agreed that lifestyle changes could prevent diabetes, with the benefits...
greater than the efforts. On the other hand, patients with a high perceived risk were more likely to believe that “Doing regular exercise and following a diet takes a lot of effort” ($P = 0.006$). In the hypothetical situations, there was no difference in intentions to change lifestyle overall in the coming year according to perceived risk for diabetes, modified by specific risk factors (Table 1).

**CONCLUSIONS** — We demonstrated that primary care patients with high perceived risk to develop diabetes actually are at higher risk, measured by the Framingham Heart Study diabetes risk score or by metabolic syndrome characteristics. Despite high perceived risk, those patients did not intend to modify their lifestyle more than the patients with low perceived risk.

Using the validated RPS-DD, 34.0% of primary care patients considered themselves at high risk, which fits well in between populations considered at lower (27% for nondiabetic physicians [6]) and higher (56.7% in women with history of gestational diabetes [7]) risk and nearly 80% of the Diabetes Prevention Program participants (8) based on previous reports using the same questionnaire. In our population, high perceived risk was associated with being a woman or having a positive family history of diabetes, consistent with other literature (7,9).

We noted that high perceived risk was associated with higher actual risk, despite the very uncommon formal metabolic syndrome diagnosis (2.7% self-reported). Based on health behavior theories (3), we expected higher perceived risk to lead to higher intentions to adopt healthy behavior, but this was not the case. We need to explore other aspects of health behavior theories to improve adoption of healthier lifestyles in high-risk patients.

Strengths include data from directly phenotyped patients to measure actual risk and from a validated questionnaire to measure perceived risk (with high internal validity in our sample). To address limitation of the cross-sectional design, we asked patients their intentions of modifying health behaviors: intentions have been shown to be moderately related to future health behaviors (10,11). Bias of desirability is likely to have reduced differences between the groups. Participants were recruited as part of a study about risk for future diabetes and may have been relatively more health conscious than nonparticipants (as illustrated by high reporting of recent behavior changes); difference in intentions might have been reduced by this fact. Our population is middle-aged, mainly Caucasian, and well educated, perhaps limiting generalizability of results to other populations.

In summary, we have shown that pri-
Primary care patients with high perceived risk are at actual higher risk of developing diabetes. Unfortunately, intentions to adopt healthy lifestyles were not increased in patients with high perceived risk, even if the majority of patients agreed about the benefits of healthy diet and exercise to prevent diabetes. Diet and physical activity are complex behaviors; it is likely that more than perceived risk is implicated in intention to change. Primary prevention of type 2 diabetes will require exploration of other aspects of individual health behavior modification as well as strategies at the community level.

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References