

Pre-Conception Planning

The relationship's the thing

There is no doubt that congenital malformations occur more frequently in the offspring of diabetic mothers than in the offspring of normal control subjects. In studies of laboratory animals, malformations can be induced in vivo and in vitro by creating conditions mimicking those of maternal diabetes, e.g., hyperglycemia and/or hyperketonemia as well as a number of other factors (1). It is also clear that in human pregnancy, major structural malformations have occurred by the time organogenesis is complete, ~6–8 weeks after conception or 8–10 weeks after the last menstrual period (2). Studies of glycosylated hemoglobin during the 1st trimester have demonstrated a significant relationship between poor metabolic control in diabetic pregnancy and the likelihood of congenital malformations (3,4). A number of case series and case-control studies have demonstrated that the establishment of normal or near-normal metabolic control before diabetic pregnancy or during very early gestation can materially reduce the malformation rate (5,6). The authors of a statewide surveillance study in Maine reported that the institution of a program of pre-conception counseling throughout the region was associated with a fourfold reduction in malformations when the mother received this service (7). Furthermore, pre-conception care has been demonstrated to be cost-effective (8,9). Thus, pre-conception counseling and the near normalization of glycemia in individuals with diabetes who are planning pregnancy have come to be understood as rare opportunities for intervention to prevent major suffering, at a very reasonable cost. For a more detailed review of the evidence supporting this viewpoint, the reader is referred to a technical review of the subject published by the American Diabetes Association (ADA) in 1996 (10). Earlier in the same year, the ADA had published a position statement on pre-conception care of women with diabetes (11), in which specific goals and a management plan were outlined. In that position statement, the potential problem of unplanned pregnancy was noted:

... However, the problem of unplanned pregnancies must also be considered. All diabetic women of child-bearing potential should be counseled about the risks of pregnancy and methods of family planning.

Although pre-conception counseling of women with diabetes is widely accepted by the health care professional as effective and desirable, the translation of that information to the population of women with diabetes has been problematic. In the previously cited Maine study (7), in which providers in a statewide network were trained in pre-conception care and attempts were made to reach all diabetic women before pregnancy, only 34% of diabetic pregnancies occurred in women who had received pre-conception counseling. Janz et al. (12) found that only one-third of women with diabetes registering for pregnancy care at any of five centers in Michigan had received pre-conception care. Factors associated with receiving pre-conception care included marriage, employment, and higher levels of education and income. Women with diabetes who received pre-conception care were more likely to have discussed pregnancy with their providers and to have been encouraged to receive pre-conception care. Among women registering for care after conception, only one-fourth of pregnancies were planned.

In this issue of *Diabetes Care*, Holing et al. (13) report the results of an important study of diabetic patients discharged after pregnancy from 15 hospitals throughout Washington State. Medical records were reviewed, and the subjects were interviewed and given questionnaires within 6 months of delivery. The aim of the study was to determine the reasons that women with diabetes do and do not seek pre-conception care. A "planned pregnancy" was defined as one in which the individual desired to become pregnant, purposely discontinued or avoided contraception, and attempted to achieve optimal blood glucose control before conception. Thus, the outcome of interest was not only a desired pregnancy, but a planned pregnancy. An

"unplanned pregnancy" was any pregnancy that did not fit all of the above criteria.

Of the 85 pregnancies in the study, 35 (41%) were planned—a proportion slightly higher than in the other studies cited above (7,12), but still disappointingly low. As would be expected, pregnancies categorized as "planned" began with significantly lower glycohemoglobin levels. Women who planned their pregnancies were much more likely to be married, older, of a higher socioeconomic class, and more highly educated, and they were more likely to be non-Hispanic whites and have private health insurance. They were more likely to be under the care of a diabetes specialist and to have made at least one pre-conception visit to an obstetrician or maternal-fetal medicine specialist. Planned and unplanned pregnancies were similar with respect to the duration of diabetes and the presence of diabetic complications before pregnancy. All of these findings are consistent with both previous studies and conventional wisdom.

A number of findings of the study were not so prosaic. Women with planned pregnancies expressed greater satisfaction with their partner relationship than did women with unplanned pregnancies, and the partners were much more likely to be well informed, supportive, and involved with the planning of the pregnancy. Diabetic women who planned their pregnancies were also much more likely to report that their relationship with their health care provider was positive, with a bond extending beyond medical advice (71 vs. 29%), and that they had received positive, encouraging prepregnancy advice from their provider (75 vs. 14%).

Although it may be a stretch to infer a causal relationship from the above associations, given the many other demographic differences between those who did and did not plan their pregnancies, this study should be considered, at the very least, hypothesis-generating and thought-provoking. Perhaps more careful attention to the education and involvement of the partner of the woman with diabetes when she is not yet pregnant would foster a more

supportive environment for the rigorous lifestyle changes that are so often necessary in achieving optimal metabolic control.

The importance of the interpersonal relationship between the health care provider and the patient may need greater emphasis. Such relationships tend to be bidirectional, and there is no question that health care providers usually find it easier to develop a positive and caring relationship with patients who take good care of themselves and follow our advice. Nevertheless, there are language, cultural, social, and other barriers to the formation of a positive bond, which if overcome may be of great importance in helping the woman with diabetes to attain the pre-conception metabolic control that is so necessary for the prevention of birth defects.

Finally, we should re-examine the advice that we offer to women with diabetes who are considering pregnancy. It is no longer appropriate to tell young women with diabetes, "Don't get pregnant because you'll be taking your life in your hands." While diabetic women with coronary artery disease may be at increased mortality risk during pregnancy, such cases are quite rare (14). Pregnancy may have an independent effect to accelerate the progression of proliferative retinopathy (15), and the long-term effect of pregnancy on nephropathy is controversial (16-19). Nevertheless, even if we assume an adverse effect of pregnancy on these vascular complications, we have an obligation to inform our patients of these concerns but also to respect their wishes regarding procreation. Nephropathy and proliferative retinopathy tend to be progressive, whether the patient becomes pregnant or not. If pregnancy may accelerate the process, the patient needs to weigh the relative importance of her desire to have children against the hastening of medical complications. The caregiver's preference in this situation has little relevance. In the majority of women with diabetes, neither proliferative retinopathy nor detectable nephropathy are present, and there is little if any evidence of an adverse long-term effect of gestation. Such individuals should be counseled with a positive, supportive attitude on the part of the caregiver. The Washington State study in this

issue of *Diabetes Care* suggests that negative reinforcement on the part of the caregiver is less likely to discourage pregnancy than it is to discourage pre-pregnancy planning.

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References

1. Reece EA, Eriksson UJ: Congenital malformations: epidemiology, pathogenesis, and experimental methods of induction and prevention. In *Diabetes Mellitus in Pregnancy*. 2nd ed. Reece EA, Coustan DR, Eds. New York, Churchill Livingstone, 1995, p. 119-154
2. Mills JL, Baker L, Goldman AS: Malformations in infants of diabetic mothers occur before the seventh gestational week: implications for treatment. *Diabetes* 28:292-293, 1979
3. Miller E, Hare JW, Cloherty JP, Dunn PJ, Gleason RE, Soeldner S, Kitzmiller JL: Elevated maternal hemoglobin A_{1c} in early pregnancy and major congenital anomalies in infants of diabetic mothers. *N Engl J Med* 304:1331-1334, 1981
4. Greene MF, Hare JW, Cloherty JP, Benaceraf BR, Soeldner JS: First-trimester hemoglobin A1 and risk for major malformation and spontaneous abortion in diabetic pregnancy. *Teratology* 39:225-231, 1989
5. Fuhrmann K, Reiher H, Semmler K, Glockner E: The effect of intensified conventional insulin therapy before and during pregnancy on the malformation rate in offspring of diabetic mothers. *Exp Clin Endocrinol* 83:173-177, 1984
6. Kitzmiller JL, Gavin LA, Gin GD, Jovanovic-Peterson L, Main EK, Zigrang WD: Preconception care of diabetes: glycemic control prevents congenital anomalies. *JAMA* 265:731-736, 1991
7. Wilhoite MB, Bennert HW Jr, Palomaki GE, Zaremba MM, Herman WH, Williams JR, Spear NH: The impact of preconception counseling on pregnancy outcomes. *Diabetes Care* 16:450-455, 1993
8. Scheffler RM, Feuchtbaum LB, Phibbs CS: Prevention: the cost-effectiveness of the California Diabetes and Pregnancy Program. *Am J Public Health* 82:168-175, 1992
9. Elixhauser A, Weschler JM, Kitzmiller JL, Marks JS, Bennert HW Jr, Coustan DR, Gabbe SG, Herman WH, Kaufmann RC, Ogata ES, Sepe SJ: Cost-benefit analysis of preconception care for women with established diabetes mellitus. *Diabetes Care* 16:1146-1157, 1993
10. Kitzmiller JL, Buchanan TA, Kjos S, Combs CA, Ratner RE: Pre-conception care of diabetes, congenital malformations, and spontaneous abortions (Technical Review). *Diabetes Care* 19:514-541, 1996
11. American Diabetes Association: Preconception care of women with diabetes (Position Statement). *Diabetes Care* 19 (Suppl. 1):S25-S28, 1996
12. Janz NK, Herman WH, Becker MP, Charon-Prochownik D, Shayna VL, Lesnick TG, Jacober SJ, Fachnie JD, Kruger DF, Sanfield JA, Rosenblatt SI, Lorenz RP: Diabetes and pregnancy: factors associated with seeking pre-conception care. *Diabetes Care* 18:157-165, 1995
13. Holing EV, Beyer CS, Brown ZA, Connell FA: Why don't women with diabetes plan their pregnancies? *Diabetes Care* 21:889-895, 1998
14. Brown FM, Hare JW: Diabetic neuropathy and coronary heart disease. In *Diabetes Mellitus in Pregnancy*. 2nd ed. Reece EA, Coustan DR, Eds. New York, Churchill Livingstone, 1995, p. 345-351
15. Klein BEK, Moss SE, Klein R: Effect of pregnancy on progression of diabetic retinopathy. *Diabetes Care* 13:34-40, 1990
16. Biesenbach G, Stöger H, Zazgornik J: Influence of pregnancy on progression of diabetic nephropathy and subsequent requirement of renal replacement therapy in female type 1 diabetic patients with impaired renal function. *Nephrol Dial Transplant* 7:105-109, 1992
17. Reece EA, Winn HN, Hayslett JP, Coulehan J, Wan M, Hobbins JC: Does pregnancy alter the rate of progression of diabetic nephropathy? *Am J Perinatol* 7:193-197, 1990
18. Purdy LP, Hantsch CE, Molitch ME, Metzger BE, Phelps RL, Dooley SL, Hou SH: Effect of pregnancy on renal function in patients with moderate-to-severe diabetic renal insufficiency. *Diabetes Care* 10:1067-1074, 1996
19. Miodovnik M, Rosenn BM, Khoury JC, Grigsby JL, Siddiqi TA: Does pregnancy increase the risk for development and progression of diabetic nephropathy? *Am J Obstet Gynecol* 174:1180-1191, 1996