The White classification is a system of alphabetically designated categories of diabetes in pregnancy based on age at onset, duration of disease, and the presence or absence of vascular complications. The original classification system underwent several revisions, each progressively increasing in detail and complexity. Individual authors and institutions have modified the classes, resulting in identically lettered classes having different definitions. Some publications make reference to the class of diabetes by letter without providing a reference defining that class. Despite a 1994 American College of Obstetricians and Gynecologists Bulletin, which suggested that the White classification system was less helpful, publications still appear using lettered designations with and without modifications and with and without attendant definitions of terms. A clinically useful system of disease classification should consist of clearly defined, mutually exclusive, easily remembered categories. The current American Diabetes Association classification of diabetes fulfills these requirements and is applicable to diabetes during pregnancy. Adoption of such a system by the obstetrics community in verbal and written medical communication will likely enhance patient care and facilitate accurate data collection and comparison.

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Financial Disclosure
The authors did not report any potential conflicts of interest.

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ISSN: 0029-7844/13

Current Commentary

Meaningful medical discourse depends upon clearly defined, generally accepted diagnostic categories and standardized laboratory procedures.” So began a clinical opinion, published in 1982, addressing the ambiguity of nomenclature for the classification of diabetes mellitus during pregnancy in use at that time. The authors expressed specific concern about the persistent use in medical publications of the terms “Class A diabetes” and “Class B diabetes” absent universally accepted definitions of these terms. Thirty years hence, publications are still appearing using the same alphabetical terminology despite persistence of a lack of agreement of definitions of the terms used. Our intent is to briefly review the history of the evolution of this classification system and to propose terminology and classification for diabetes during pregnancy that would be both clinically applicable and universally understood.

In 1924, 2 years after the first injection of insulin had been administered at the Joslin Clinic in Boston, Dr. Priscilla White launched her career at that institution caring for pregnant women who had diabetes. The addition of insulin to the physicians’ armamentarium made it possible for young women who had diabetes to survive to an age when they could reproduce as well as to live long enough to develop major vascular complications. In 1949, Dr. White reviewed 439 cases of diabetic pregnancies delivered at New England Deaconess Hospital during the previous 15 years in an effort to determine possible causes and means of prevention of perinatal wastage. Five percent of the women included in this report had diabetes based on the results of a glucose tolerance test, although the diagnostic criteria that were used and timing of administration of that test relative to pregnancy are unclear. It seems likely that the majority of the other 95% consisted of women who had what is now referred to as type 1 diabetes. Maternal factors found to be associated with fetal and neonatal deaths included early age at onset and long duration of diabetes and the presence of hypertensive disorders and vascular and renal complications. Based on these observations, Dr. White developed a classification system for diabetes in pregnancy...
Major changes included redefining Class A as “chemical diabetes” with no definition of the latter term supplied. Vascular complications were moved to Class D, and Class R (proliferative retinopathy) was added. A further modification was presented in 1972. In it Dr. White expanded the definition of Class A diabetes to include gestational diabetes, subdivided Class D into five subcategories, which now included hypertension, and, although not deleting Class E, remarked that calcified pelvic arteries were no longer sought. A subsequent iteration of the White classification subdivided Class C and added classes for cardiopathy, multiple pregnancy losses, and renal transplant. A final version deleted the division of Classes C and D into enumerated subclasses, removed Classes E and G, and added gestational diabetes as a separate class7 (Box 1, part B). Despite these modifications, a remaining problem is that not all classes are mutually exclusive. For example, a woman and who is now 24 years of age whose diabetes became manifest at age 8 years would fall into either Class C by virtue of her having had diabetes for 15 years or Class D because of her age at onset of the disease.

Some recent publications have modified the White designations to include categories and definitions that are not universally understood or used. Examples include the creation of Classes AB and FR and the designation of membership in Classes B–D by duration of disease but not by age at onset. The lack of a universally accepted definition of members of a class identified by the same letter or letters of the alphabet renders comparison of data from different institutions difficult at best and inaccurate at worst.

Perhaps more attention has been paid to the definition of Class A diabetes than to that of any of the other classes. Dr. White’s 1965 and 1978 revisions included the term “gestational diabetes” for Class A. Although no definition or citation defining gestational diabetes was provided in those revisions, the term was first used by Carrington in 1957. In an article accompanying the final version of the White classification, Drs. Hare and White noted that the White classification was intended to apply to women whose onset of diabetes antedated their pregnancies. Thus, the term “Class A diabetes” had been intended to apply only to women whose diabetes had been identified before pregnancy and who required diet alone to maintain glycemic control during pregnancy. In an effort to prevent further confusion, they created a separate class for gestational diabetes to indicate those women whose glucose intolerance was first recognized during pregnancy, taking note that for some of the latter, diet would prove insufficient for care (Box 1, part B). However, in its 1986 Technical Bulletin on diabetes in pregnancy, the American College of Obstetricians and Gynecologists (the College) retained the designation “Class A” for gestational diabetes and divided it into two mutually exclusive subcategories. Class A diabetes referred to those whose onset or first recognition of carbohydrate intolerance occurred during pregnancy. Membership in Class A-1 required both a fasting glucose level less than 105 mg/dL and a postprandial glucose less than


#### A. 1949 (3)*

- **Class A**: Diagnosis of diabetes made on a glucose tolerance test, which deviates but slightly from the normal
- **Class B**: Duration less than 10 y
  - Onset age 20 y or older
  - No vascular disease
- **Class C**: Duration 10–19 y
  - Onset 10–19 y of age or
  - Minimal vascular disease (eg, retinal arteriosclerosis or calcified leg vessels)
- **Class D**: Duration 20 y or longer
  - Onset younger than 10 y of age
  - More evidence of vascular disease, eg, retinitis, transitory albuminuria, or transitory hypertension

#### B. 1980 (7)†

- **Class A**: Diet alone, any duration or onset age
- **Class B**: Onset age 20 y or older and duration less than 10 y
- **Class C**: Onset age 10–19 y or duration 10–19 y
- **Class D**: Onset age younger than 10 y, duration over 20 y, background retinopathy, or hypertension (not preeclampsia)
- **Class E**: Calcified pelvic arteries on X-ray
- **Class F**: Nephritis
- **Class G**: Proteinuria
- **Class H**: Arteriosclerotic heart disease clinically evident
- **Class T**: Prior renal transplantation

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120 mg/dL and required management with diet only. Those designated as belonging to Class A-2 had fasting glucose levels 105 mg/dL or greater, postprandial glucose concentrations 120 mg/dL or greater, or both, and require the addition of insulin. However, in another article published the year prior to this document, the terms “Class A-1,” “Class A-2,” and “Class B-1” were used for women who had a post–100-g glucose tolerance test with interclass differences based only on fasting plasma glucose (respectively, less than 105 mg/dL; 105–129 mg/dL, and 130 mg/dL or greater).13 In the 1994 College Technical Bulletin, which replaced the 1986 Bulletin, it was noted that “ Improvements in fetal assessment, neonatal care, and metabolic management of the pregnant woman have rendered the White classification system less helpful.”14 Despite this pronouncement, the alphabetical designation of diabetes in pregnancy continues to appear in publications dealing with this topic. When used, the terms Class A-1 and Class A-2 rarely refer to the quantitative definitions supplied in the 1986 College publication but usually refer to patients whose selection of treatment by diet or diet and medication, respectively, was dictated by institutional protocol. The current College Practice Bulletin on gestational diabetes, which replaced the 1994 document, makes no reference to any alphabet-based classification system of diabetes in pregnancy.15

The prevalence of the different types of diabetes during pregnancy as well as that of diabetes-related vascular changes has changed over time. Although the prevalence of pre-existing diabetes and gestational diabetes varies from one population to the next, one large multicenter study reported a prevalence of 1.82% for the former and 7.6% for the latter.16 Recent data demonstrate that although vascular disease remains significantly associated with some adverse maternal and perinatal outcomes, no significant differences exist between women who have pregestational diabetes when compared according to their assignment to the White classes. The authors did, however, find that the presence of vascular complications was associated with greater risk of adverse outcomes.17

For a clinical disease classification to be of value, it must consist of mutually exclusive, clearly defined, easy-to-remember categories that are relevant to patient care. Classifying diabetes in pregnancy by the age at onset, duration, or onset and duration of disease is of extremely limited value in deciding on a course of patient management. Knowing that the diabetic patient’s primary mechanism of disease is insulin resistance (ie, type 2) rather than the absence of endogenous insulin (ie, type 1) aids the clinician in deciding whether the patient may be responsive to an oral hypoglycemic, if she will need a relatively large or small increment in her insulin dose in response to hyperglycemia, or both. Knowing that the patient was first recognized to be glucose-intolerant during pregnancy suggests that an initial trial of diet and exercise during pregnancy may be prudent, reserving medication if the patient’s hyperglycemia remains unaltered despite initial care with diet and exercise and also indicating the need for postpartum testing for glucose intolerance.

The current system of classification of diabetes of the American Diabetes Association18 contains four mutually exclusive, clearly defined categories. Assignment to one of the first three (type 1, type 2, and other) is based on mechanism of disease. Membership in the fourth category, gestational diabetes, is limited to those women whose glucose intolerance was first diagnosed during pregnancy exclusive of those women who meet criteria defining overt diabetes (ie, types 1 or 2). The addition of a notation (eg, retinopathy, nephropathy, hypertension) to the patient’s class designation would give further notice to her caregivers of complications requiring additional evaluation and possible treatment during pregnancy (Box 2). Under this proposed classification system, for example, a 35-year-old pregnant woman whose insulin-resistant diabetes had its onset at age 25 years and who had chronic hypertension would now be classified as “diabetes, type 2, hypertension” rather than the less descriptive “Class D diabetes.” Adoption of such a system by the obstetrics community would likely not only improve verbal and written communication in the clinical setting, but also facilitate meaningful comparisons of data from different venues. We submit this suggested classification system to our colleagues for their consideration, evaluation, and, hopefully, endorsement.

### Box 2. Proposed Classification System for Diabetes in Pregnancy

Gestational diabetes: Diabetes diagnosed during pregnancy that is not clearly overt (type 1 or type 2) diabetes

**Type 1 diabetes:** Diabetes resulting from beta-cell destruction, usually leading to absolute insulin deficiency

a. Without vascular complications

b. With vascular complications (specify which)

**Type 2 diabetes:** Diabetes resulting from inadequate insulin secretion in the face of increased insulin resistance

a. Without vascular complications

b. With vascular complications (specify which)

Other types of diabetes (eg, genetic in origin, associated with pancreatic disease, drug-induced or chemically induced)

REFERENCES