

# The One Step approach for diagnosing gestational diabetes is associated with better perinatal outcomes than the Two Step approach: evidence of randomized clinical trials

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There is controversy regarding the diagnosis of gestational diabetes mellitus (GDM) by either the One Step or Two Step approaches. The One Step approach consists of an oral glucose tolerance test with a 75-g glucose overload with 2 hours duration that measures plasma glucose concentration at fasting state, 1 hour, and 2 hours after glucose administration. A positive result is defined as 1 value higher than 92, 180, or 153 mg/dL, respectively.<sup>1–4</sup> The Two Step approach consists of a nonfasting oral 50-g glucose load, with a glucose blood measurement 1 hour later. A positive result is defined as a blood glucose value higher than 130, 135, or 140 mg/dL; the most common value used is 135 mg/dL.<sup>5</sup> A positive screening test is followed by a diagnostic test that consists of a 100-g oral glucose load with the glucose measurement fasting and after 1, 2, and 3 hours. A positive result is defined as 2 values higher than target values. Although the American College of Obstetricians and Gynecologists recommends the Two Step approach, the International Association of the Diabetes and Pregnancy Study Groups, American Diabetes Association, International Federation of Gynecology and Obstetrics, and World Health Organization recommend the One Step approach.<sup>1–7</sup>

There are several ways of comparing these approaches with GDM testing. First, one should establish whether women who meet the criteria for GDM based on the One Step test, but not on the Two Step test, have worse maternal and perinatal outcomes, in particular, the perinatal morbidity and mortality rates. Second, outcomes could be examined in terms of

“before and after” implementation of the One or Two Step approaches. Third, outcomes could be examined from trials that randomly assign women to the One Step vs the Two Step approach. Fourth, outcomes could be examined from randomized controlled trials in which women underwent both the One Step and the Two Step test, and the women whose result is positive for the One Step test, but negative for the Two Step test, could be assigned randomly to treatment of GDM vs no treatment.

A review that analyzed the evidence from 8 retrospective studies that included 29,983 women showed that, compared with women whose result was negative at the One Step test, women whose result was positive at the One Step test, but negative at the Two Step test, have higher incidences of gestational hypertension, preeclampsia, preterm birth, cesarean delivery, macrosomia, large-for-gestational-age (LGA) infants, neonatal intensive care admission, and hypoglycemia (Table 1).<sup>8</sup> The evidence is clear that a milder degree of hyperglycemia in pregnancy that is detected by the One Step test, but not the Two Step, is associated with worse maternal and perinatal outcomes. In fact, even pregnancies that are positive at the 50-g 1 hour glucose test, but negative at the 3-hour test of the Two Step approach, have been shown to be associated with these maternal and perinatal complications.<sup>9</sup> The relationship between hyperglycemia and worse maternal and perinatal outcomes is on a continuum.<sup>1</sup>

“Before and after” studies that compared a period when the Two Step test was used vs another period when the One Step test was used for GDM testing have provided conflicting results.<sup>10,11</sup> Although the most recent study showed increases in the incidences of GDM (from 6.9% with the Two Step to 11.4% with the One Step), induction (25.2–28.6%) and neonatal hypoglycemia (1.3–2.0%) associated with the One Step approach, there were no significant decreases but only trends for less cesarean delivery (18.5–17.0%), macrosomia (2.5–2.1%), and LGA (10.4–9.5%).<sup>10</sup> As the authors state, several confounding variables in this before and after study could have affected results. In fact, the One Step period also saw implementation of hemoglobin A1c testing before 16 weeks, which could also have affected results. Moreover, there are several management issues that can influence outcome in GDM pregnancies (Table 2).<sup>12</sup> Non-randomized control trials do not control for these.

There is a randomized controlled trial in which women underwent both the One Step and the Two Step test; the

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**TABLE 1**

**Complications in pregnancies that are positive at the One Step test but negative at the Two Step test, compared with pregnancies that are negative at the One Step test<sup>8</sup>**

| Maternal                 | Neonatal                      |
|--------------------------|-------------------------------|
| Gestational hypertension | Preterm birth                 |
| Preeclampsia             | Macrosomia                    |
| Cesarean delivery        | Large for gestational age     |
|                          | Intensive care unit admission |
|                          | Hypoglycemia                  |

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women whose result was positive for the One Step, but negative for the Two Step, test were assigned randomly to treatment of GDM vs no treatment.<sup>13</sup> No maternal or perinatal outcomes were reported.

There are 4 randomized controlled trials that compared the One Step vs the two Step approaches: 2 from United States,<sup>14,15</sup> 1 from Canada,<sup>16</sup> and 1 from Turkey.<sup>17</sup> In these randomized controlled trials, women were assigned randomly to be screened for GDM with either the One Step or the Two Step approach. A metaanalysis of these 4 randomized controlled trials, which included 2617 women and 152 total cases of GDM, showed, in a comparison of the One Step approach with the Two Step approach, that the incidence of GDM was not significantly increased from 4.4–8.3% and that mothers gained 1.3 kg less weight and had a nonsignificant decrease by 34% in preeclampsia and by 17% in cesarean delivery, respectively.<sup>18</sup> The One Step approach was also associated with several neonatal benefits, which included significantly decreased incidences of LGA infants by 57%,

**TABLE 2**

**Selected management issues that can influence outcome in gestational diabetes mellitus pregnancies**

|  |
|--|
| Indications for screening (who to screen)                        |
| Timing of screening (when to screen)                             |
| Type of screening (eg, One vs Two Step tests; how to screen)     |
| Criteria for diagnosis   |
| Criteria to start therapy after diet alone                       |
| Type of initial therapy (eg, insulin vs oral hypoglycemic agent) |
| Dose and frequency of initial therapy                            |
| Frequency of glucose monitoring                                  |
| Target glucose values  |
| Criteria for pharmacologic therapy dose adjustment               |
| Criteria for adding or switching pharmacologic therapy           |

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**TABLE 3**

**Neonatal benefits that were associated significantly with gestational diabetes mellitus testing with the use of the One Step test, compared with the Two Step test, by data from a metaanalysis of the 4 published randomized controlled trials<sup>18</sup>**

| Variable                               | Decreased by, % |
|--|-----------------|
| Large for gestational age              | 57              |
| Hypoglycemia                           | 48              |
| Neonatal intensive care unit admission | 51              |

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hypoglycemia by 48%, and neonatal intensive care unit admission by 51%. Neonatal death occurred in 1 baby of 1 mother who was assigned randomly to the One Step test and in 4 babies of mothers who were assigned randomly to the Two Step approach (a 74% nonsignificant decrease for the One Step test; Table 3).<sup>18</sup> The Two Step test is associated also with a 4.2% chance of not completing the test (only the 50-g part was done and not the diagnostic 100-g 3-hour test) and with lower compliance compared with the One Step test.<sup>14</sup> The Two Step test is also associated with a later gestational age at diagnosis, given that it comprises of 2 tests, which usually takes approximately 2 weeks for final diagnosis compared with the immediate diagnostic results that are obtained from the One Step test. The data represent evidence of randomized controlled trial (level-1) data. Tests of heterogeneity in the metaanalysis and of quality all point to the better outcomes in the One Step test group.<sup>18</sup> Benefit of the One Step approach does make not only statistical but also clinical sense in pregnant women.

The decreased incidence in LGA infants may be the most important benefit of the use of the One Step vs the Two Step tests for GDM screening. Being LGA at birth is associated with long-term health harms, such as obesity, diabetes mellitus, and metabolic syndrome.<sup>19</sup>

In summary, the One Step approach is associated with an increase in compliance, earlier diagnosis, and a nonsignificant increased incidence of GDM from approximately 4–8% and is also associated with significantly fewer LGA infants, neonatal hypoglycemia, and admission to the neonatal intensive care unit, compared with screening with the Two Step approach, according to the level 1 evidence from 4 randomized controlled trials with 2617 women (Table 3).<sup>18</sup> Therefore, it is time to use the One Step approach for diagnosing GDM in the United States and to reconsider this recommendation by the guidelines of the American College of Obstetricians and Gynecologists. ■

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