

# BEST PRACTICES: Understanding the Role of Delayed Cord Clamping During Cord Blood Collection

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## INTRODUCTION

Traditionally, a newborn's umbilical cord was clamped immediately after birth. In fact, that approach was considered the standard of care in the United States for decades. Early umbilical cord clamping (ECC) is defined as clamping the umbilical cord less than 10 seconds after the delivery. This established practice was based on efforts to reduce maternal hemorrhage and facilitate newborn resuscitation. In recent years, evidence has mounted to support the view that delaying the clamping of the cord can benefit the newborn.

Delayed cord clamping (DCC) is usually defined as waiting at least 30 seconds after birth before cutting the cord, although some have defined DCC as waiting until the cord has stopped pulsating altogether. While DCC is a personal decision that requires a discussion between clinician and patient, it is important for both parties to be aware of the scientific evidence on the topic and to take into consideration the recommendations of experts in the specialty.

Studies have found that most of the blood that passes from the umbilical cord to the baby occurs in the first 60 seconds after delivery.<sup>1</sup> The American College of Obstetricians and Gynecologists (ACOG), which recommends at least 30 to 60 seconds after birth for premature babies before 34 weeks' gestation and for full-term infants.<sup>1,2</sup>

The January 2017 Committee Opinion explains that adhering to its recommendation increases hemoglobin levels in term infants and improves iron stores in the first several weeks of life.<sup>1</sup> That in turn may potentially have a positive impact on the child's neurodevelopment.<sup>3</sup> DCC can also improve transitional circulation in preterm infants, as well as provide better red blood cell volume, less of a need for blood transfusion, and a reduced risk of necrotizing enterocolitis and intraventricular hemorrhage (most notably in preterm infants).<sup>1</sup> The ACOG Opinion points out, however, that DCC in term babies carries a small increased risk of jaundice and need for phototherapy.<sup>1</sup> There are also situations in which DCC should be avoided. These include known congenital anomalies, multiple gestations, in neonates in whom immediate resuscitation is required (eg, the presence of meconium or cord entanglement), and abnormal placentation (eg, placenta previa or abruption).<sup>4</sup>

## THE ROLE OF CORD BLOOD STEM CELLS

Today cord blood stem cells are used in transplant medicine, where a person's own stem cells or a donor's stem cells are used to regenerate the patient's blood and immune system. Currently, stem cell transplants can be used in the treatment of more than 80 conditions such as leukemia, lymphoma, sickle cell anemia, and some immune and metabolic disorders.<sup>5</sup> Since the first cord blood transplant in 1988 there have been more than 35,000 transplants worldwide using cord blood stem cells stored in both public and family cord blood banks.<sup>6</sup>

Beyond the current uses of cord blood stem cells, research in a field of study called regenerative medicine is looking at using stem cells to help repair and regenerate damaged tissue to help the patient's body heal itself. Some of these studies are exploring how cord blood stem cells may play a role in regenerative medicine. Many clinical trials are underway worldwide investigating the use of cord blood as treatment for conditions that currently have no cures, such as cerebral palsy, hearing loss, and autism. In many of these studies the child's own cord blood is used for experimental treatment.



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## IMPACT OF DCC IN CORD BLOOD COLLECTION

With the progress in stem cell therapy, expecting families have increasing interest in preserving their babies' umbilical cord blood. However, one of the consequences of DCC is that it decreases the amount of blood that remains in the umbilical cord, which limits

the quantity of blood available for cord blood banking. But it is important for clinicians and patients to realize that the length of the umbilical cord, the size of the placenta, and the amount of cord blood varies greatly from infant to infant. That variation means some babies can undergo DCC without any significant impact on the amount of blood available for banking while others may fall short.

## COMBINING DCC AND CORD BLOOD COLLECTION

Although there is no clear way to know in advance whether DCC will seriously reduce the amount of cord blood available for collection—because of variations at birth such as gestation age, birth weight, and clinical situations—as a general rule it is possible to combine DCC with cord blood collection.

Families who consider DCC and cord blood preservation, either through public donation or family banking, are encouraged to discuss their decision and priorities with their health care providers. Families who are specifically interested in public donation should be aware that public banks usually require a higher volume of cord blood compared with family banks. Certain DCC units may be disqualified automatically by some public banks. Therefore, it is important to set clear expectations with families during the process.

It is also important to discuss the benefits of DCC and cord blood stem cell preservation for preterm infants. There are clear guidelines and numerous advantages to DCC for preterm infants, especially as they are prone to the risk of intraventricular hemorrhage and other complications.<sup>7</sup> Because preterm infants are also at increased risk of developing cerebral palsy, preserving their cord blood for future use is an important consideration.<sup>8</sup> In this case, although DCC reduces the cord blood available for banking, research has shown that the concentration of stem cells is higher in the cord blood of premature babies. Even a small volume of cord blood collected may have a higher than expected cell count.<sup>9</sup>

Ultimately, DCC can be performed together with cord blood collection. Expecting families should recognize that smaller units may limit clinical utility in both transplant and regenerative cellular therapy. While there is promising research in stem cell therapy and cell expansion technology, health care providers and expecting families are tasked to strike the balance in meeting immediate needs and future therapeutic potential for the newborns.

## IS THERE AN IDEAL TIME TO CLAMP THE UMBILICAL CORD?

There is no simple formula to enable clinicians to determine the optimum DCC time. The appropriate delay time needs to be long enough to allow some of the cord blood to flow into the newborn but not so long that the blood available for future storage is depleted. Thirty seconds may be a reasonable delay, because this is the shortest length of time defined as a delay in published opinions. It is best to start cord blood collection immediately after cord clamping. Expecting families may partner with health care providers to individualize the plan while taking into account all known pregnancy complications, the risk of premature delivery, and any need to save cord blood stem cells for potential future use by the family.

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