

## Milestones

# Virginia Apgar and Evaluation of the Newborn Infant

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Birth is the first, shortest, most dangerous and eagerly anticipated journey of a human being. The experiences of the neonate in the birth process reflect heavily on the immediate condition and have a bearing on survival and long term development. Well into the second half of the last century, there was no standardized method to assess neonatal health at birth. Seldom have there such imaginative ideas, such enthusiasms, prejudices and unscientific observations in a situation that demanded objectivity. Barring a few review articles, the subject of neonatal assessment was largely neglected<sup>1</sup>. The main focus of attention was maternal health.

On this background of a general lack of interest or discipline in the evaluation of the neonate emerged

Virginia Apgar. In 1949, she began studying obstetric anesthesia and its effects on the neonatal condition at the Presbyterian Hospital of the Columbia University. She formulated a list of the objective signs which pertained to the condition of the infant at birth and selected five signs which could be determined easily with minimal intervention and with reasonable speed. This was the first standardized method for evaluating the newborn's transition to life outside the womb. "Five points - heart rate, respiratory effort, muscle tone, reflex response, and color - are observed and given 0, 1, or 2 points. The points are then totaled to arrive at the baby's score." The score was presented in 1952 at a scientific meeting, and first published in 1953<sup>2</sup>. The paper described the scores of 1021 infants and various



**Figure 1.** Virginia Apgar

applications in different clinical situations and types of deliveries. The intended functions of the Apgar score were twofold: first to quantify the neonatal condition; and second, to compare the effects of resuscitation. She maintained that the one minute score was the most important. Being an anesthetist, her focus was on the effects of asphyxia and the necessity of prompt resuscitation. Others began to take measurements at longer intervals, to evaluate how the baby had responded to resuscitation and to give a prognosis about long term outcomes.

Virginia Apgar (Figure 1) was a trail blazer. She was one of the few women to become a doctor and eventually the first woman to become a full professor at Columbia University College of Physicians and Surgeons. She graduated from Mount Holyoke College at the onset of the Great Depression. With steely determination and a clutch of scholarships, she graduated fourth in her class in 1933 from the Columbia University. Determined to become a surgeon, she won a surgical internship at Columbia and performed brilliantly. Nevertheless, the chair of surgery, Dr. Alan Whipple, encouraged her to pursue anesthesia. Whipple believed that innovations and improvements were needed in anesthesia (at that time handled mostly by nurses) if surgery was to advance. In 1938, Dr. Apgar returned to Columbia University after training at the University of Wisconsin-Madison as the director of the division of anesthesia and as an attending anesthetist. This is where the Apgar score was devised. By the early 1960s, many hospitals were using Apgar's scoring method. In 1961, Dr. Joseph Butterfield at the University of Colorado Medical Center in Denver wrote to Apgar with the news that one of his residents had used the letters of her name as a mnemonic device for the five scoring criteria <sup>3</sup>:

A- Appearance (Color)

P- Pulse (Heart rate)

G- Grimace (Reflex irritability)

A- Activity (Muscle tone)

R- Respiration

In 1959, while on sabbatical leave, Apgar earned a master's degree in public health from the Johns Hopkins University. Deciding not to return to academic medicine, she devoted herself to the prevention of birth defects through public education and fundraising for research. She became the director of the division of congenital defects at the National Foundation for Infantile Paralysis (now the March of Dimes) and received many honors and awards for her work. The honors continued posthumously after her death in 1974. To honor her, the U.S. Postal Service issued a 20-cent commemorative stamp in 1994. The woman who broke new ground in medicine would be pleased. Stamp collecting was one of her favorite hobbies.

The Apgar score has proven to be an excellent guide to neonatal resuscitation. However, equating a low score to birth asphyxia is a misuse of the score. Low scores may be seen with maternal sedation, neurological or cardiac disease. A low score even at five minutes cannot be considered either as evidence or consequence of birth asphyxia or cerebral palsy. Even a child with low Apgar scores has a 99% chance of not suffering cerebral palsy and over three quarters of children with cerebral palsy have a normal Apgar score <sup>4</sup>. The one- and five-minute Apgar score are standard measures in every maternity unit today and should be used as originally intended – a guide to the evaluation of the newborn.

## References

1. Little DM Jr., Tovell RM. Collective Review: A physiological basis for resuscitation of the newborn. *Internat Abstr Surg* 1948; 86:417-428.
2. Apgar V. A proposal for a new method of evaluation of the newborn infant. *Curr Res Anesth Analg* 1953; 32:260-267.
3. Profiles in science [Internet]. Bethesda (MD): National Library of Medicine (US). [2001]. Accessed 01 August 2008. Available at <http://profiles.nlm.nih.gov/CP/Views/Exhibit/narrative/obstetric.html>.
4. Eskes TKAB, Longo LD, eds. *Classics in Obstetrics and Gynecology: innovative papers that have contributed to current clinical practice*. New York: Parthenon Publishing; 1994. pp 19-20.