

Testimony of Colleen A. Malloy, MD
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Committee on the Judiciary,
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Chairman Franks and distinguished members of the subcommittee, my name is Colleen A. Malloy. I serve as an assistant professor in the Division of Neonatology in the Department of Pediatrics at Northwestern University Feinberg School of Medicine. Thank you for this opportunity to testify regarding some of the scientific and clinical issues that are pertinent to your consideration of the District of Columbia Pain-Capable Unborn Child Protection Act (H.R. 3803).

This legislation would prohibit abortion within the District of Columbia, a federal jurisdiction, beginning at 20 weeks fetal age. This age is equivalent to 22 weeks in the “LMP” system of dating, which is commonly used in obstetrics and neonatology. The bill contains an exception for certain cases in which an abortion is deemed necessary because a grave physical condition endangers the mother's life.

With the advancement of in utero imaging, blood sampling, and fetal surgery, we now have a much better understanding of life in the womb than we did at the time that *Roe v. Wade* was handed down. Our generation is the beneficiary of new information which allows us to understand more thoroughly the existence and importance of fetal and neonatal pain. As noted in my biography, I am trained and board-certified in the field of neonatology. The standard of care in my field recognizes neonatal pain as an important entity to be acknowledged, measured, and treated.

With advancements in neonatology and perinatal medicine, we have been able to push back the age at which a neonate can be resuscitated and resuscitated successfully. When we speak of infants at 22 weeks LMP, for example, we no longer have to rely solely on inferences or ultrasound imagery, because such premature patients are kicking, moving, reacting, and developing right before our eyes in the Neonatal Intensive Care Unit.

In neonatology, we describe the age of neonates in terms of the last menstrual period (LMP) dating system, which dates a pregnancy starting with day zero as the first day of the last menstrual period. However, the actual development in the womb is commonly referred to with post-fertilization dating. This bill utilizes the post-fertilization system of dating. These approaches are equally valid, as long as one remembers which dating system is being employed in any particular discussion. The LMP age is the post-fertilization age, plus two weeks. Thus, the cutoff point in this legislation is 20 weeks after fertilization, which would be 22 weeks in the LMP system. In today's medical arena, we resuscitate patients at this age and are able to witness their ex-utero growth and development.

Medical advancement and technology have enabled us to improve our ability to care for these infants. In June 2009, the *Journal of American Medical Association* reported a Swedish series of over 300,000 infants. Survival to 1 year of life of live born infants at 20, 21, 22, 23, and 24 weeks post-fertilization age was 10%, 53%, 67%, 82%, and 85%, respectively. In September 2010, *Pediatrics* reported survival to discharge rates of 9575 infants at a number of academic institutions in the US.

The results were similar, with survival at 20, 21, 22, 23, and 24 weeks post-fertilization age being 6%, 26%, 55%, 72%, and 84%, respectively. As we provide care for all these survivors, we are able to witness their experiences with pain. In fact, standard of care for neonatal intensive care units requires attention to and treatment of neonatal pain. There is no reason to believe that a born infant would feel pain any differently than that same infant were he or she still in utero. Thus, the difference between fetal and neonatal pain is simply the locale in which the pain occurs. The receiver's experience of the pain is the same. I could never imagine subjecting my tiny patients to horrific procedures such as those that involve limb detachment or cardiac injection.

There is ample biologic, physiologic, hormonal, and behavioral evidence for fetal and neonatal pain. As early as 8 weeks post-fertilization, face skin receptors appear. At 14 weeks, sensory fibers grow into the spinal cord and connect with the thalamus. At 13-16 weeks, monoamine fibers reach the cerebral cortex, so that by 17-20 weeks the thalamo-cortical relays penetrate the cortex. Many authors have substantiated that pain receptors are present and linked by no later than 20 weeks post-fertilization. (Myers 2004; Derbyshire 2010; Anand 1987; Vanhalto 2000; Brusseau 2008; VanScheltema 2008). In fact, by 20 weeks post-fertilization (22 weeks by LMP), the fetal brain has the full complement of neurons that are present in adulthood (Lagercrantz H et al. *Functional development of the brain in fetus and infant*. *Lakartidningan* 1991;88:1880-85).

At 19-20 weeks post-fertilization, electroencephalogram (EEG) recordings are possible (Flower MJ. *Neuromaturism of the human fetus*. *J Med Philos* 1985;10:237-251). We have no difficulty performing EEG studies on infants at this gestational age. At 22 weeks, continuous EEGs reflect awake and REM sleep state typical of neonate.

In the Neonatal Intensive Care Unit, we can witness first hand the change in vital signs associated with pain. When procedures such as IV placement or chest tube insertion are performed on neonates at 20 weeks post-fertilization age and above, the response is similar to those seen in older infants or children. With the advent of ultrasound including real-time ultrasound, we know that even at 8 weeks post fertilization, the fetus makes movements in response to stimuli. At 20 weeks post-fertilization, the fetus responds to sound, as mothers will commonly report increased fetal movement in response to music, sirens, or alarms.

At 23 weeks in utero, a fetus will respond to pain (intrahepatic needling, for example) with the same pain behaviors as older babies: screwing up the eyes, opening the mouth, clenching hands, withdrawal of limbs. In addition, stress hormones rise substantially with painful blood puncture, beginning at 18 weeks gestation (Giannakoulopoulos X, Sepulveda W, Kourtis P, Glover V, Fisk NM. "Fetal plasma cortisol and beta-endorphin response to intrauterine needling," *Lancet* 1994;344:77-81). This hormonal response is the same one mounted by born infants.

In addition, use of analgesia during neonatal surgery is standard of care; any infant undergoing fetal surgery is expected to receive appropriate pain medication as adults receive. In a 1992 study published in the *New England Journal of Medicine*, infants undergoing cardiac surgery had large increases in adrenaline, noradrenaline, and cortisol levels. Opioid analgesia markedly reduced these responses, as well as reduced peri-operative mortality.

Moreover, the fetus and neonate born prior to term may have an even heightened sensation of pain compared to an infant more advanced in gestation. There is ample evidence to show that while the pain system develops in the first half of pregnancy, the pain modulating pathways do not develop until the second half. It is later in pregnancy that the descending, inhibitory neural pathways mature,

which then allow for dampening of the pain experience. As reported in the *British Journal of Obstetrics and Gynecology*, the "... fetus may actually be more sensitive than the older child, and [this] may explain why the newborn shows exaggerated behavioral responses to sensory provocation" (*Br J Obs Gyn* 1999;106:881-886).

The idea that premature infants actually have greater pain sensitivity is supported by the fact that while pain transmitters in the spinal cord are abundant early on, pain inhibiting transmitters are sparse until later. (Anand KS, McGrath PJ, editors. *Pain Research and Clinical management*. Vol. 5. *Pain in neonates*. Amsterdam:Elsevier 1993:19-38). In addition, compared to the older infant, the premature infant requires greater concentrations of medications to maintain effective anesthesia. Thus, the fetus and premature infant appear to be even more susceptible to the pain experience.

In conclusion, I have no doubt that my premature neonatal patients feel and experience pain. Even early on, they demonstrate personalities and interact positively as well as negatively with their environments. With our advanced "views into the womb," we are now able to appreciate the active life of the developing fetus as one who is engaged with his or her uterine locale. I firmly believe, as the evidence shows, that the fetal pain experience is no less than the neonatal or adult pain experience. It may even be greater than that which you or I would experience from dismemberment or other physical injury.

One of the most basic of government principles is that the state should protect its members from harm. Technology, imaging, and clinical neonatology enable us to know much more about fetal life than ever before. We now understand the fetus to be a developing, moving, interacting member of the human family who feels pain as we do. If we are to be a benevolent society, we are bound to protect the fetus. We should not tolerate the gruesome and painful procedures being performed on the smallest of our nation.