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Science of Fetal Pain & Survival at 20 Weeks

Babies as young as 20 weeks post-fertilization can survive and thrive with appropriate care and treatment

- Groundbreaking *New England Journal of Medicine* study demonstrates that babies delivered as young as 20 weeks post-fertilization (22 weeks gestation) can survive, and active intervention for treatment greatly improves their survival.[1]
- An NIH-funded study of infants delivered at 20-22 weeks post-fertilization (22-24 weeks gestation) and who received active treatment observes increasing rates of survival without any neurological impairment. Yet, three-fourths of those delivered at 20 weeks post-fertilization still received no active care.[2]

Unborn babies are treated as patients by fetal surgeons, and receive pain medication

- Fetal surgeons recognize unborn babies as patients. A leading children's hospital has performed nearly 1,600 fetal surgeries between 1995 and June 2017.[3] Perinatal medicine now treats unborn babies as young as 16 weeks post-fertilization (18 weeks gestation). Pain medication for unborn patients is routinely administered as standard medical practice.[4]
- One of the premier fetal surgeons makes the obvious point: "Fetal therapy is the logical culmination of progress in fetal diagnosis. In other words, the fetus is now a patient."[5]
- A European fetal surgery team states: "The administration of anesthesia directly to the fetus is critical in open fetal surgery procedures."[6]
- The leading textbook on clinical anesthesia says: "It is clear that the fetus is capable of mounting a physiochemical stress response to noxious stimuli as early as 18 weeks gestation,"[7] (16 weeks post-fertilization).
- A prenatal surgery group that has performed many fetal surgeries informs the mother before the surgery:[8] "You will be given general anesthesia, and that anesthesia will put your baby to sleep as well. In addition, during the prenatal surgery, your unborn baby will be given an injection of pain medication and medication to ensure that the baby doesn't move."

Unborn babies can feel pain by 20 weeks post-fertilization or earlier

- Previous uninformed notions that unborn and newborn babies could not feel pain, or misinformation on ability of preterm infants to survive, are refuted by a growing body of scientific evidence. Legislation should reflect the scientific facts.
- Embryological development shows presence of pain sensory mechanisms. The basic organization of the human nervous system is established by 4 weeks (28 days) post-fertilization (6 weeks gestation).[9] The earliest neurons in the cortical brain (the part responsible for thinking, memory and other higher functions) are established during the fourth week.[10] Nerve synapses for spinal reflex are in place by 8 weeks post-fertilization (10 weeks gestation).[11] Sensory receptors for pain (nociception) develop first around the mouth at 5 weeks post-fertilization (7 weeks gestation), and are present throughout the skin and mucosal surfaces by 18 weeks post-fertilization (20 weeks gestation).[12] Connections between the spinal cord and the thalamus (which functions in pain perception in fetuses as well as adults) are relatively complete by 18 weeks post-fertilization (20 weeks gestation).[13]
- Fetal reactions provide evidence of pain response. The unborn baby reacts to noxious stimuli with avoidance reactions and stress responses. As early as 6 weeks post-fertilization (8 weeks gestation) the baby exhibits reflex movement during invasive procedures.[14] There is extensive evidence of a hormonal stress response by unborn babies as early as 16 weeks post-fertilization (18 weeks gestation)[15] including "increases in cortisol, beta-endorphin, and decreases in the pulsatility index of the fetal middle cerebral artery."[16] Two independent studies in 2006 used brain scans of the sensory part of unborn babies' brains, showing response to pain.[17] They found a "clear cortical response" and concluded there was "the potential for both higher-level pain processing and pain-induced plasticity in the human brain from a very early age."

- Dr. Ruth Grunau, a pediatric psychologist at the University of British Columbia, said, "We would seem to be holding an extraordinary standard if we didn't infer pain from all those measures."[18]
- Brain responses & connections. In 2013 a study used functional magnetic resonance imaging (fMRI) to study the brains of healthy human babies still within the womb, from 22-37 weeks post-fertilization (24-39 weeks gestation). They found that functional neuronal connections sufficient to experience pain already exist by 22 weeks post-fertilization (24 weeks gestation).[19]
- Increased sensitivity to pain. In 2010 one group noted that "the earlier infants are delivered, the stronger their response to pain."[20] This increased sensitivity is due to the fact that the neural mechanisms that inhibit pain sensations do not begin to develop until 32-34 weeks post-fertilization (34-36 weeks gestation), and are not complete until a significant time after birth.[21] This means that unborn, as well as newborn and preterm infants, show "hyperresponsiveness" to pain.[22] Authors of a 2015 study used the fMRI technique to measure pain response in newborns (1-6 days old) vs. adults (23-36 years old), and found that "the infant pain experience closely resembles that seen in adults."[23] Babies had 18 out of 20 brain regions respond like adults, yet they showed much *greater* sensitivity to pain, responding at a level four times as sensitive as adults.

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