

No. 19-1392

IN THE
Supreme Court of the United States

THOMAS E. DOBBS, M.D., M.P.H., IN HIS OFFICIAL
CAPACITY AS STATE HEALTH OFFICER OF THE MISSISSIPPI
DEPARTMENT OF HEALTH, ET AL.,

Petitioners,

—v.—

JACKSON WOMEN'S HEALTH ORGANIZATION, ON
BEHALF OF ITSELF AND ITS PATIENTS, ET AL.,

Respondents.

*On Writ of Certiorari to the United States Court of
Appeals for the Fifth Circuit*

**BRIEF OF SOCIETY FOR MATERNAL-FETAL
MEDICINE, ROYAL COLLEGE OF
OBSTETRICIANS AND GYNAECOLOGISTS, U.S.
ASSOCIATION FOR THE STUDY OF PAIN AND 27
SCIENTIFIC AND MEDICAL EXPERTS AS *AMICI
CURIAE* IN SUPPORT OF RESPONDENTS**

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**STATEMENT OF INTEREST
OF AMICI CURIAE¹**

Amici are professional organizations, physicians, and researchers committed to advancing and promoting science and medicine, and doing innovative work in the fields of maternal and fetal care, pain experience, and pain management.² *Amici* have collective experience in practicing pain and maternal-fetal medicine and conducting peer-reviewed published research. Collectively, *amici* have published more than 2,000 scholarly works and are affiliated with over 20 of the world’s most prestigious universities. *Amici* are uniquely positioned to provide the Court with the insight and perspective of the medical and scientific community, neither of which are otherwise available from the parties, on whether it is possible for human fetuses to experience pain.

SUMMARY OF ARGUMENT

The world’s leading scientists and medical organizations agree that it is impossible for a fetus to experience pain prior to viability,³ because the

¹ No counsel for any party has authored this brief in whole or in part, and no person has made any monetary contribution intended to fund the preparation or submission of this brief. As required, all parties were provided notice and consented to the filing of this brief; the consent letters have been filed with the clerk.

² See Appendix A.

³ “Viability is the capacity of the fetus for sustained survival outside the woman’s uterus. Whether or not this capacity exists is a medical determination, may vary with each pregnancy and is a matter for the judgment of the responsible health care

necessary cortical and spinal cord structures do not develop before at least 24 weeks of gestation. Despite this medical consensus, the State and its *amici* argue without scientific or medical support that an interest in preventing “fetal pain” justifies Mississippi’s 15-week abortion ban. *Amici* here provide this Court with accurate information grounded in science and medical evidence.

Substantial evidence demonstrating that a pre-viable fetus cannot experience pain supported this Court’s decision in *Roe* and cases that reaffirmed the viability line. New research using innovative techniques has only bolstered that evidence. The ability to experience pain requires multiple different levels of the nervous system to be developed, connected, and capable of processing the sensory and emotional components of pain. Experiencing pain in response to external stimuli is dependent upon sensory nerve fibers, the presence of a sufficiently developed cortex, and intact pathways to relay nociceptive messages from the sensory nerve fibers to the cortex. Neither the cortex nor nociceptive inputs to the spinal cord are sufficiently developed for a pre-viable fetus to experience pain.

The positions of the State and its *amici* on “fetal pain” have been rejected by leading medical organizations and are contradicted by peer-reviewed evidence. The State and its *amici* argue first, that

provider.” Abortion Policy, ACOG, <https://www.acog.org/clinical-information/policy-and-position-statements/statements-of-policy/2020/abortion-policy> (last visited Sept. 11, 2021). Each pregnancy is unique and requires access to individualized care; decisions should be between the patient and care provider.

pain is possible without conscious awareness, and second, that the cortex is not necessary for pain to be experienced. These are unsupported views. Significantly, several authors of the studies on which the State and its *amici* rely are signatories to *this amicus* brief. This alone informs this Court that the State’s position misrepresents those experts’ work and the science. This Court should not disturb settled precedent based on unsupported assertions that contradict both scientific evidence and the consensus of medical organizations that this Court and others have consistently viewed as authoritative—the Society for Maternal-Fetal Medicine (“SMFM”), the American College of Obstetricians and Gynecologists (“ACOG”), the Royal College of Obstetricians and Gynaecologists (“RCOG”), and the U.S. Association for the Study of Pain (“USASP”)—which all concur that a fetus cannot experience pain before 24 weeks of gestation.

ARGUMENT

I. Widely accepted scientific evidence is clear and major medical organizations agree: a fetus cannot experience pain prior to viability.

The State concedes that H.B. 1510 (the “Ban”) is a pre-viability prohibition on abortion and therefore takes the position that the Court should discard the viability line to uphold the Ban. In doing so, the State makes assertions about “fetal pain” that are demonstrably false and ignore the medical consensus.

The evidence supporting the medical consensus is clear: prior to viability, a fetus lacks the neural circuitry and pathways that are essential to

experience pain. Therefore, a pre-viable fetus cannot experience pain. At the time *Roe v. Wade*, 410 U.S. 113 (1973) and *Planned Parenthood of Southeastern Pennsylvania v. Casey*, 505 U.S. 833 (1992) were decided, the scientific evidence demonstrated that pre-viable fetuses could not experience pain. Advancements in science in the decades since have only confirmed that same conclusion.

Relying on extensive evidence, the world's leading medical organizations have all firmly and consistently rejected the arguments asserted by the State and its *amici*—that pain is possible without conscious awareness and that the cortex is not required for the experience of pain. All the evidence indicates that pain cannot be experienced by a fetus until there is a developed cortex and intact pathways, regardless of gestational age.⁴

A. *International consensus holds that conscious awareness is required to experience pain.*

The universally accepted definition of pain was developed by the International Association for the Study of Pain (“IASP”)—a leading global organization whose members study and practice pain and pain relief. The IASP’s definition of pain has been overwhelmingly adopted by physicians, scientists, researchers, governments and non-governmental

⁴ Gestational age is the number of weeks that have elapsed between the first day of the last normal menstrual period and the date of delivery, irrespective of whether the gestation results in a live birth or not.

organizations.⁵ In simple terms, the definition provides that pain is an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.⁶ Pain is *both* conscious and subjective—relying on both consciousness and the ability to attribute positive or negative value to a sensation.

A movement made or a response triggered without conscious awareness is not experienced as pain.⁷ Rather, such movements are a response to activation of sensory nerve fibers (nociceptors) that respond to noxious stimuli (a type of “stimulus that is damaging or threatens damage to normal tissues”).⁸ Nociception (the activation of sensory nerve fibers in response to noxious stimuli) occurs when tissue is injured, triggering behaviors that could include reflexive movements. Nociception is only *part* of what is required for pain to be experienced. To experience pain, the sensory information must be transmitted to

⁵ See, e.g., SMFM et al., *SMFM Consult Series #59: The use of analgesia and anesthesia for maternal-fetal procedures*, at 4-5 Am. J. Obstetrics & Gynecology (2021) [hereinafter SMFM Consult #59]; RCOG, *Fetal Awareness: Review of Research and Recommendations for Practice*, at 20 (Mar. 2010) [hereinafter *Fetal Awareness*]; ACOG, *Facts are Important, Fetal Pain*, at 1 (July 2013) [hereinafter *Facts*].

⁶ Srinivasa Raja et al., *The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises*, 161 J. Int’l Ass’n for Study of Pain 1976, 1976-77 (2020).

⁷ See, e.g., SMFM Consult #59, at 5; see *infra* Section I.C.

⁸ *Terminology: Noxious Stimulus*, IASP, <https://www.iasp-pain.org/resources/terminology/#noxious-stimulus> (Dec. 14, 2017).

the cortex, and the cortex needs to recognize that the stimulus is unpleasant.⁹ That process distinguishes the experience of pain from mere reflex. Absent the involvement of the cortex, noxious stimuli are not experienced as pain. Pain cannot be inferred solely from activity in sensory neurons.¹⁰ Nociceptive responses, such as reflexive or involuntary movements, and certain hormonal responses, do not require conscious awareness, as the experience of pain does. Nociceptive responses can occur even under anesthesia.¹¹

The IASP is clear that “[p]ain and nociception are different phenomena.”¹² Major medical organizations agree. Nociception is not sufficient for the experience of pain, which requires a developed cortex, and an intact pathway to relay messages from nociceptors to the cortex. ACOG, the premier professional membership organization for obstetrician–gynecologists with more than 60,000 members, and *amicus* RCOG, a parallel association based in the United Kingdom with more than 16,000 members, have both concluded that the mere

⁹ RCOG, *Fetal Awareness*, at 7.

¹⁰ See *IASP Announces Revised Definition of Pain*, Int’l Ass’n for Study of Pain, <https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=10475> (last visited July 15, 2021).

¹¹ See J.M. Besson et al., *Forebrain areas involved in pain perception* (1995); *Effects of injury on trigeminal and spinal somatosensory systems* (L.M. Pubols et al. eds., 1986); *Mechanisms of pain and analgesic compounds* (R.F. Beers et al. eds., 1979).

¹² See SMFM Consult #59, at 3-4; ACOG, *Facts*, at 1; RCOG, *Fetal Awareness*, at 7.

occurrence of reflexive, involuntary, or hormonal changes do not indicate pain.¹³ *Amici* SMFM and USASP support the science that reflexive, involuntary, or hormonal changes in response to mechanical stimulation do not indicate pain.¹⁴ This consensus view is shared by the wider medical and scientific community. A fetus without a developed cortex cannot experience pain because it is not consciously aware of noxious stimuli.

B. *International consensus holds that the cortex is necessary for conscious awareness.*

The evidence is incontrovertible that a developed cortex is necessary to achieve conscious awareness and thus experience pain.¹⁵ Until the cortex is developed, a fetus does not have the integrated anatomical structures necessary to experience pain. This conclusion is supported by interdisciplinary work done at a global level by physicians and scientists, including extensive analysis of peer-reviewed data and hundreds of brain imaging studies showing that the cortex is always activated during an experience of pain.

For example, in 2005, after an extensive review of the medical literature on fetal ability to experience pain, expert scientists and researchers published a

¹³ See ACOG, *Facts*, at 1; RCOG, *Fetal Awareness*, at 5.

¹⁴ SMFM Consult #59, at 8.

¹⁵ See, e.g., Susan Lee et al., *Fetal Pain: A Systematic Multidisciplinary Review of the Evidence*, 294(8) JAMA 947, 949 (2005); RCOG, *Fetal Awareness*, at 7, 9; SMFM Consult #59, at 7.

peer-reviewed article in the Journal of the American Medical Association. The review’s consensus was that certain functional regions in the cortex are required to experience pain.¹⁶ In May 2008, RCOG established an inter-disciplinary group of experts to update its 1997 report on fetal awareness. After reviewing more than 50 scientific articles, the group issued a peer-reviewed report in March 2010 stating that the cortex is required to experience pain, the necessary development of the cortex does not occur before at least 24 weeks of gestation, and continued development of the cortex occurs well after 24 weeks of gestation.¹⁷ The report concluded that “fetal pain” is “not possible” before the cortex is developed.¹⁸ In 2021, *amicus* SMFM, the Society for Family Planning, and an inter-disciplinary group of experts analyzed what is known about fetal awareness of pain and confirmed that the ability to experience pain is dependent upon the existence of a developed cortex, that the connections to carry stimuli to the cortex are not present prior to 24 weeks of gestation, and that those connections alone are not sufficient for the experience of pain.¹⁹ This review was endorsed by ACOG, and supported by RCOG. The consensus view has therefore been reaffirmed and strengthened over time, aided by advancements in science that have revolutionized how scientists study the brain and

¹⁶ Lee et al., 294 JAMA at 949.

¹⁷ RCOG, *Fetal Awareness*, at viii-x.

¹⁸ *Id.* at 3, 7, 11.

¹⁹ SMFM Consult #59, at 7-8.

observe the cortex.²⁰ Numerous studies have reaffirmed the consensus that the cortex is necessary to experience pain.

Clinical and neuroimaging evidence from studies during the past 30 years has established that certain regions of the cortex are essential for consciousness and, therefore, necessary to experience pain.²¹ For example, in a 2012 study, neuroscientists implanted electrodes in the brains of 164 adult patients with epilepsy and analyzed their behavioral responses to 4,160 cortical responses to electrical stimulation. This work showed that electrical stimulation of a specific region of the cortex, the posterior insula, gave rise to the experience of pain.²² These are the best data available on the essential role of the cortex in experiencing pain, and indicate that different cortical regions mediate pain. These data unequivocally demonstrate that the cortex was necessary for study participants to experience pain.

In addition to this causative evidence, brain imaging studies have demonstrated patterns of human brain activity that are both correlative and predictive of pain. For example, *amicus* Dr. Prasad

²⁰ A. Vania Apkarian et al., *Human brain mechanisms of pain perception and regulation in health and disease*, 9 Eur. J. of Pain 463, 464 (2005).

²¹ Melanie Boly et al., *Are the Neural Correlates of Consciousness in the Front or in the Back of the Cerebral Cortex? Clinical and Neuroimaging Evidence*, 37(40) J. of Neurosci. 9603, 9603-9613 (Oct. 2017).

²² Laure Mazzola et al., *Stimulation of the human cortex and the experience of pain: Wilder Penfield's observations revisited*, 135 Brain 631, 635-639 (2012).

Shirvalkar, a neurologist and pain medicine specialist at the University of California San Francisco (“UCSF”), and UCSF neurosurgeon Dr. Edward Chang have conducted experiments recording human cortical activity in response to certain noxious stimuli and the pain experience of the study’s participants. These data showed that, across *all* study participants, the cortex provided the signals required for predicting the individual’s pain experience. Similarly, in a 2005 study that evaluated over 90 brain imaging studies, researchers found that several cortical regions were activated in response to painful stimuli.²³ In fact, patterns of cerebral cortical activity alone can predict both the presence and the intensity with which an adult human experiences pain and can distinguish between pain and non-painful emotions, as well as between pain provoking and innocuous stimuli.²⁴ The correlative and predictive evidence from these studies reinforces that a functional cortex is essential to experience pain. Human studies also indicate that the emotional component of pain can be controlled by manipulating activity in specific regions of the cortex.²⁵

²³ A. Vania Apkarian et al., 9 E. J. of Pain, at 464.

²⁴ See, e.g., CW Woo et al., *Quantifying cerebral contributions to pain beyond nociception*, 14(8) Nat. Commun. 14211 (Feb. 2017); CW Woo et al., *Separate neural representations for physical pain and social rejection* 17(5) Nat. Commun. 5380 (Nov. 2014); Tor Wager et al., *An fMRI-based neurologic signature of physical pain* 368(15) N. Engl. J. Med. 1388 (Apr. 2013).

²⁵ Eldon Foltz & Lowell White, *The role of rostral cingulumotomy in ‘pain’ relief*, 6(3-4) Int. J. Neurology 353, 353-73 (1968).

The conclusions of these wide-ranging studies underpin the consensus view of all authoritative medical organizations that the cortex is necessary for the experience of pain.

C. *Until at least 24 weeks of gestation, the pathway needed to transmit stimuli to the cortex and the cortex itself are not sufficiently developed to experience pain.*

Medical consensus and the best available evidence show that the cortex is not sufficiently developed for pain to be experienced until at least 24 weeks of gestation, and the cortex continues to develop beyond this gestational age.

Experiencing noxious stimuli as pain requires 1) nociceptors, 2) a cortex able to interpret the stimuli as pain, and 3) intact neural pathways in between to relay these messages.²⁶ More specifically, there must be specific sensory nerve fibers and a spinal cord that can transmit the stimuli to the thalamus (a subcortical structure) which relays information about the stimuli to the cortex.²⁷ This connection—from the sensory nerve fibers to the spinal cord to the thalamus and through to the cortex—is the necessary pathway for stimuli to reach the cortex for processing. Without this intact pathway, the cortex is unable to interpret stimuli as pain.

²⁶ SMFM Consult #59, at 6-7.

²⁷ *Id.* at 3; RCOG, *Fetal Awareness*, at 3, 7; see also Enrico Schulz et al., *Gamma oscillations are involved in the sensorimotor transformation of pain*, 108 *J. Neurophysiology* 1025, 1025 (May 2012).

Anesthesiologists and other clinicians commonly prevent pain by blocking nerve activity, which breaks the connection between the sensory nerve fibers and the spinal cord, on the one hand, and the cortex, on the other. When people receive a local anesthetic from a dentist, for example, they no longer experience pain because the anesthetic blocks the sensory nerve fibers from transmitting the stimulus (e.g., dental drilling) to the cortex.

Conclusive scientific evidence is clear: connections that carry stimuli to the cortex, and are necessary at a minimum to experience pain, are not developed until after 24 weeks of gestation. Moreover, the presence of these connections after 24 weeks does not in and of itself indicate that a fetus is able to experience pain.²⁸ Pain modeling in fetal sheep also confirms the medical consensus. The neurodevelopment of a sheep fetus is comparable to a human fetus (although the sheep gestational period is about half of the human period).²⁹ Studies in sheep have concluded that neurons analogous to the sensory nerve fibers in human fetuses do not respond to stimuli until approximately 104 days of gestation in

²⁸ SMFM Consult #59, at 4-5; *see also* ACOG, *Facts*, at 1 (“A human fetus does not have the capacity to experience pain until after viability. Rigorous scientific studies have found that the connections necessary to transmit signals from peripheral sensory nerves to the brain, as well as the brain structures necessary to process those signals, do not develop until at least 24 weeks of gestation.”); RCOG, *Fetal Awareness*, at viii, 8-9, 20 (same).

²⁹ Janna Morrison et al., *Improving pregnancy outcomes in humans through studies in sheep*, 315 *Am. J. Physiology-Regul. Integrative & Compar. Physiology* R1123, R1124 (2018).

sheep, or 25 to 28 weeks in a human fetus.³⁰ Sheep studies support the consensus opinion that before at least 24 weeks of gestation, a human fetus does not have the necessary pathway required to transmit stimuli or the functional cortex required to process stimuli.

It is not developmentally plausible for a fetus to experience pain prior to at least 24 weeks of gestation.³¹ Importantly, even at 24 weeks of gestation, the cortex is still nascent. While nociceptive stimuli can reach the cortex after 24 weeks of gestation, the stimuli are unlikely to generate pain due to the lack of functional connections among critical cortical structures. Finally, even with a fully developed cortex, the level of consciousness necessary to experience pain in a fetus may not be possible in utero.³² Throughout gestation, a fetus exists within an environment that both suppresses wakefulness and certain cortical activities, keeping the fetus in a sedated, “sleep-like” state.³³

While advances in science and medicine have allowed for greater fetal surgical interventions, the use of anesthetics and analgesics for fetal surgeries is not evidence that “fetal pain” exists.³⁴ There are

³⁰ Sandra Rees et al., *Prenatal Development of Cutaneous Afferent Connections in the Spinal Cord of Fetal Sheep*, 5 *Molecular Neurobiology* 247, 247-249 (1991).

³¹ See RCOG, *Fetal Awareness*, at 10.

³² See *id.* at 9-11.

³³ See *id.* at 10.

³⁴ See Lee et al., 294 *JAMA* at 949.

many reasons why anesthetics and analgesics are used in fetal surgery and these are unrelated to pain prevention, including enabling the safe accomplishment of the procedures through muscle relaxing effects of anesthetics.³⁵

Conscious awareness is required to experience pain, and conscious awareness is not possible without sensory nerve fibers, an intact pathway to the cortex, and a developed cortex, all of which are not sufficiently present and functional until at least 24 weeks of gestation or later in pregnancy. This overwhelming global consensus has been published, peer-reviewed, and reaffirmed many times by leading scientific and medical experts, and medical organizations.³⁶

II. The State’s position on “fetal pain” is contrary to the scientific and medical consensus and has never been accepted by a major medical organization.

The State would have this Court ignore the leading medical organizations including SMFM, RCOG, USASP, and ACOG—which all agree that a pre-viable fetus cannot experience pain. Rather, the

³⁵ See *id.* See also SMFM Consult #59, at 10-13; RCOG, *Fetal Awareness*, at viii. Anesthetics and analgesics (1) maintain physical stability during a procedure, (2) improve surgical access and prevent contractions and placental separation, (3) prevent hormonal stress responses associated with poor surgical outcomes, and (4) prevent possible adverse effects on long-term neurodevelopment. See Lee et al., 294 JAMA at 949.

³⁶ See, e.g., SMFM Consult #59, at 4-5; RCOG, *Fetal Awareness*, at viii (“A fetus cannot experience pain prior to 24 weeks because the cortex is insufficiently developed.”).

State asks this Court to endorse fringe views³⁷ and to undo decades of legal precedent on the basis of discredited pseudo-science.³⁸

A. *The State’s amici conflate nociception and pain, which are fundamentally distinct.*

The State’s *amicus* and expert, Dr. Condic, has no clinical experience providing pain management or

³⁷ The American College of Pediatricians (“ACP”) claims 500 members, merely .02% of U.S. pediatricians. U.S. Bureau of Labor Occupational Employment and Wage Statistics, <https://www.bls.gov/oes/current/oes291221.htm> (last visited Sept. 4, 2021). *Cf. Groups: American College of Pediatricians*, Southern Poverty Law Center, <https://www.splcenter.org/fighting-hate/extremist-files/group/american-college-peditricians> (last visited Aug. 18, 2021) (identifying the ACP as a political organization); *Groups: Pacific Justice Institute*, Southern Poverty Law Center, <https://www.splcenter.org/fighting-hate/extremist-files/group/pacific-justice-institute> (last visited Aug. 18, 2021) (identifying the Pacific Justice Institute as a political organization).

³⁸ The State and its *amici* describe the age of a fetus in a way that is at odds with general practice. Scientific and medical literature generally describes fetal growth in weeks post last menstrual period, or weeks of gestation. Dr. Condic, by contrast, uses “weeks of fetal development,” which is based on the moment of conception. *See* Pet. for a Writ of Certiorari App. (Decl. of Maureen Condic) at 76a, *Dobbs, et al. v. Jackson Women’s Health Org., et al.* (U.S. June 15, 2020) (No. 19-1392) [hereinafter Pet. App.]; Brief of Maureen Condic and the Charlotte Lozier Institute as *Amici Curiae* Supporting Petitioners at 11 n.10, *Dobbs, et al. v. Jackson Women’s Health Org., et al.* (U.S. July 29, 2021) (No. 19-1392) [hereinafter Condic *Amicus* Brief]. Dr. Condic’s unusual metric may confuse readers into believing that fetal development occurs approximately two weeks earlier than the scientific community agrees that it does.

maternal or fetal care in any capacity.³⁹ She has no peer-reviewed publications on “fetal pain,” and has never conducted research on or taught the topic.⁴⁰ Dr. Condic also admits that not a single article she cites in the declaration she submitted to the district court in this case reached the same conclusion that she did.⁴¹ In a different case, after she admitted in her deposition that her opinions about “fetal pain” lacked support, the opposing party moved to preclude her testimony, and she was thereafter withdrawn as an expert.⁴² Her attempts to misrepresent the science of pain should not be credited by this Court.⁴³

Dr. Condic relies on a faulty definition that equates pain with reflexive and hormonal responses. As discussed *supra* Section I.A, the scientific and medical consensus is that pain involves both a sensory *and* an emotional experience, and requires

³⁹ See Pet. App. at 75a-76a.

⁴⁰ See *id.* at 101a.

⁴¹ See *id.* at 85a-87a; Deposition of Maureen Condic at 128-129, *Elderkin v. Greater New Haven OB-GYN Grp., P.C.*, No. NNH-CF-15-6056191-S (Conn. Super. Ct. Mar. 6, 2017).

⁴² See Disclosure of Expert Witness, *Elderkin v. Greater New Haven OB-GYN Grp., P.C.*, No. NNH-CV-15-6056190-S (Conn. Super. Ct. Oct. 19, 2016); Plaintiffs’ Witness List, *Elderkin v. Greater New Haven OB-GYN Grp., P.C.*, No. NNH-CV-15-6056190-S (Conn. Super. Ct. Jan. 26, 2018).

⁴³ For example, Dr. Condic claims that RCOG’s May 2008 review relies on three papers. Pet. App. at 86a-87a; Condic *Amicus* Brief, at 15. The RCOG report utilized over 50 papers in its analysis. See RCOG, *Fetal Awareness*, at 3.

conscious awareness.⁴⁴ Dr. Condic admits that she equates pain with nociception, thereby ignoring necessary components of pain, and adopting a definition rejected by the medical community.⁴⁵ The sources Dr. Condic and other *amici* cite do not conclude (or even suggest) that nociception is equivalent to pain, yet Dr. Condic testified in her declaration that they do.⁴⁶ This view disregards decades of accumulated evidence of the physiology of pain and the universally accepted definition of pain.

Equating “pain” with nociception conflates two fundamentally distinct phenomena. As discussed *supra* Section I.A, reacting to nociception is not the same thing as experiencing pain. Infants born with anencephaly (lacking part of the brain and skull) and individuals in a vegetative state can both exhibit nociceptive reflexive withdrawal, but cannot experience pain.⁴⁷ The stimulus requires transmission to the cortex in order to be perceived as pain.⁴⁸ Even in an individual with a complete spinal cord transection, a noxious stimulus to the leg can provoke reflexive movement, but the individual will not experience pain. In this example, nociception from the leg remains, but there is no pain experience

⁴⁴ Raja et al., 161 J. of the Int’l Ass’n for the Study of Pain at 1976, 1977.

⁴⁵ See Deposition of Maureen Condic at 114-116, *Elderkin v. Greater New Haven OB-GYN Grp., P.C.*, No. NNH-CF-15-6056191-S (Conn. Super. Ct. Mar. 6, 2017); Pet. App. at 77a-78a, 85a.

⁴⁶ Pet. App. at 77a-78a.

⁴⁷ See Lee et al., 249 JAMA at 948, 950.

⁴⁸ See *supra* Section I.C.

because the stimulus is not transmitted to the cortex. This example illustrates that nociceptive activity must be processed by the cortex in order for pain to be experienced.⁴⁹ Thus, any definition of pain that does not include conscious awareness, mediated by the cortex, is entirely contrary to well-established science and clinical practice.

B. *International consensus rejects the State's assertion that the cortex is not necessary to experience pain.*

The State's *amici* submit that a developed cortex is not necessary for conscious experience of pain. Again, this ignores the scientific consensus, defying decades of multidisciplinary research explained *supra* Section I.

The State's *amici* assert that the thalamus is sufficient and responsible for conscious pain experience,⁵⁰ contrary to the international consensus that a developed cortex is necessary to experience pain.⁵¹ Scientific evidence shows that the thalamus, while part of the sensory pathway that transmits nociceptive information to the cortex, is not sufficient to generate a pain experience alone. Rather, the

⁴⁹ RCOG, *Fetal Awareness*, at 5.

⁵⁰ See Condic *Amicus* Brief at 14, 19-20; Brief of the ACP & the Association of American Physicians & Surgeons as *Amici Curiae* Supporting Petitioners at 18-19, *Dobbs, et al. v. Jackson Women's Health Organization, et al.*, (U.S. July 29, 2021) (No. 19-1392); Brief of Monique Chireau Wubbenhorst et al. as *Amici Curiae* in Support of Petitioners at 23-24, *Dobbs, et al. v. Jackson Women's Health Organization, et al.* (U.S. July 29, 2021) (No. 19-1392).

⁵¹ See *supra* Section I.C.

scientific consensus is that the thalamus is merely part of the pathway that brings sensory information to different parts of the cortex.⁵² There is no evidence that the thalamus itself can process that information.⁵³ In fact, the evidence consistently points to the contrary: the thalamus is not the center of the pain experience in the brain. If the thalamus is responsible for pain experience, then lesioning the thalamic region where nociceptive information is relayed should nullify pain. There is 100 years' worth of evidence to the contrary: such thalamic lesions commonly lead to chronic pain rather than the absence of pain.⁵⁴

In contrast, there is evidence that specific lesions in the cortex can create distortions in pain experience.⁵⁵ That is, disturbing cortical circuits can affect conscious pain experience. The best example of a condition demonstrating the role of the cortex is called pain asymbolia, where the subject can feel a sensation in response to noxious stimuli but it “doesn’t hurt.” This rare condition is associated with damage to tissue in and around the region of the cortex known as the insular cortex.⁵⁶ Pain asymbolia could not exist if the thalamus, and not the cortex, was the center of the pain experience. In that

⁵² *Id.*

⁵³ *Id.*

⁵⁴ See Vartiainen et al., *Thalamic pain: anatomical and physiological indices of prediction*, 139 *Brain J. of Neurology* 708, 709 (2016).

⁵⁵ See, e.g., Berthier et al., *Asymbolia for Pain: A Sensory-Limbic Disconnection Syndrome*, 24(1) *Annals Neurology* 41 (1988).

⁵⁶ *Id.*

scenario, cortical damage would not result in any change to pain experience: that kind of change in experience would occur only if the thalamus was injured.

C. *The State’s amici misinterpret scientific evidence related to the cortex to support their erroneous conclusions.*

Dr. Condic’s misrepresentation of the science of pain and fetal development becomes apparent upon examination of her sources—whether those used in her declaration below or her *amicus* brief to this Court. Her submissions and those of the State’s other *amici* persistently mischaracterize scientific data and rely on inapplicable studies.

Dr. Condic’s *amicus* brief relies heavily on the article *Reconsidering Fetal Pain* by Stuart Derbyshire and John Bockmann, which attempts to call into question the necessity of the cortex for the “apprehension” of pain.⁵⁷ Notably, the “apprehension” of pain is a definition that is not supported by the IASP.⁵⁸ The article itself concedes that conscious pain experience requires certain functioning cortical regions.⁵⁹ And most significantly, three authors of the two most important studies used by Derbyshire—Dr. Salomons, Professor Iannetti,

⁵⁷ Stuart Derbyshire and John Bockmann, *Reconsidering Fetal Pain*, 46 J. Med. Ethics 3 (2020) [hereinafter Derbyshire].

⁵⁸ *IASP Announces Revised Definition of Pain*, Int’l Ass’n for Study of Pain, <https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=10475> (last visited July 15, 2021).

⁵⁹ Derbyshire, at 5.

and Dr. Feinstein—are signatories to this *amicus* brief and assert that the results of their studies are being misinterpreted by the Derbyshire article and consequently by the State’s *amici*.

Dr. Salomons’ and Professor Iannetti’s decades of studies focus specifically on the functional significance of the brain responses elicited by noxious stimuli. They note that Derbyshire mischaracterizes their extensive research when describing their empirical results.⁶⁰ Dr. Salomons and Professor Iannetti unequivocally state that their research does not support Derbyshire’s conclusions. For example, citing a study co-authored by Dr. Salomons and Professor Iannetti on patients congenitally insensitive to pain, Derbyshire suggests that the results support their claim that the cortex is unnecessary to perceive pain.⁶¹ In fact, although study participants had a normally functioning cortex and thalamus, the nociceptive sensory nerve fibers that transmitted stimuli to the spinal cord were not functioning due to certain gene mutations. Therefore, the study actually shows that in the absence of activity in functioning nociceptive sensory nerve fibers, activity of the thalamus and cortex is not sufficient to generate pain.⁶² The study does not show that the cortex is unnecessary for pain to be experienced. The original study, as well as subsequent, more recent papers, state that the study

⁶⁰ *Id.* at 4.

⁶¹ *Id.* (citing Tim Salomons et al., *The “Pain Matrix” in Pain-Free Individuals*, 73(6) JAMA Neurology 755 (2016)).

⁶² *See* Salomons et al., 73 JAMA Neurology at 755-56.

results do not imply that the cortex is not necessary to experience pain.⁶³

Derbyshire also misinterprets the results of a one-patient study conducted by *amici* Drs. Feinstein and Salomons and uses those misinterpretations to form further erroneous conclusions. The study patient had experienced extensive, but importantly, not complete, damage to the cortex, and was able to experience pain. Derbyshire claims the patient's experience of pain—with a partly functioning cortex—somehow provides support for the idea that a cortex is *not* necessary to experience pain.⁶⁴ The study actually concludes that the patient's experience of pain was due to the damaged brain's adaptability to develop circuits around the damaged section of the cortex.⁶⁵ The study emphasized that many other regions of the patient's cortex were intact that could potentially be mediating his pain experience,⁶⁶ and that it is entirely plausible that the patient was able to feel pain using the preserved areas of his cortex. The study did not comment on the experience of an undamaged brain, or an undeveloped fetal brain. Nor did it show that the thalamus was the "source" of the patient's pain experience, as Derbyshire claims.

⁶³ See, e.g., Andre Mouraux & Giandomenico Iannetti, *The search for pain biomarkers in the human brain*, 141 *Brain* 3290 (2018).

⁶⁴ Justin Feinstein et al., *Preserved emotional awareness of pain in a patient with extensive bilateral damage to the insula, anterior cingulate, and amygdala*, 221(3) *Brain Structure & Function* 1499, 1509-1510 (2016).

⁶⁵ *Id.*

⁶⁶ Including the supplementary motor area, paracingulate gyrus, and primary and secondary somatosensory cortices.

Dr. Condic also mischaracterizes other studies. For example, in her declaration below, Dr. Condic asserts that “the largest study conducted to date of human patients with disorders of consciousness unambiguously concludes that loss of subcortical, not cortical, circuitry is associated with loss of consciousness.”⁶⁷ This is demonstrably false. The study only considered structures *within* the subcortex⁶⁸ in patients with extensive mechanical damage to the cortex. The study authors fully acknowledge the role of the cortex in conscious perception.⁶⁹ Therefore, the study did not even contemplate that the cortex is unnecessary for consciousness or that the thalamus is sufficient for conscious awareness.

The State’s *amici* also cite outdated and inapposite studies. For example, Dr. Condic’s declaration below relies on a 1954 study about the brain’s pain responses in adult patients with epilepsy conducted before brain imaging was possible.⁷⁰ However, a 2012 study of adult patients with epilepsy, discussed *supra* Section I.B, showed that the cortex plays a causal role in pain experience.⁷¹ Dr.

⁶⁷ Condic *Amicus* Brief at 19 (citing Evan Lutkenhoff et al., *Thalamic and Extrathalamic Mechanisms of Consciousness After Severe Brain Injury*, 78 *Annals of Neurology* 68, 68 (2015)); Pet. App. at 90a.

⁶⁸ *I.e.*, thalamus, basal ganglion, hippocampus, and brainstem.

⁶⁹ Lutkenhoff et al., 78 *Annals of Neurology* at 68.

⁷⁰ Condic *Amicus* Brief, at 21; Pet. App. at 93a & n.43.

⁷¹ Laure Mazzola et al., *Stimulation of the human cortex and the experience of pain: Wilder Penfield’s observations revisited*, 135 *Brain* 631, 635-639 (2012).

Condic also points to studies that focus on chronic pain in adults to support her assertions that the cortex is not necessary for “fetal pain” to exist.⁷² However, the studies’ findings that distinct chronic pain conditions generate distinct brain activity patterns do not demonstrate that a fetus can feel pain, and actually discredit her position because the cortex was always involved in the chronic pain brain activities reviewed.⁷³

In other instances, Dr. Condic relies on flawed interpretations of studies relating to the cortex’s role in pain experience, and her conclusions often directly contradict the research she cites. For example, Dr. Condic’s declaration below cites an article that investigates how general anesthesia renders a patient unconscious.⁷⁴ Dr. Condic cites this study to support her false claims that the cortex is *not* involved in conscious pain experience. In fact, that study found that it was the disruption of cortical activity that

⁷² Condic *Amicus* Brief, at 21-22; Pet. App. at 93a & n.43.

⁷³ See, e.g., Marwan Baliki et al., *Corticostriatal functional connectivity predicts transition to chronic back pain*, 15(8) *Nature Neuroscience* 1117, 1117-1119 (2012); Paul Geha et al., *Brain activity for spontaneous pain of postherpetic neuralgia and its modulation by lidocaine patch therapy*, 128(1) *J. of Pain* 88 (2007); Javeria Hashmi et al., *Shape shifting pain: chronification of back pain shifts brain representation from nociceptive to emotional circuits*, 136 *Brain J. of Neurology* 2751 (2013); Etienne Vachon-Preseu et al., *Corticolimbic anatomical characteristics predetermine risk for chronic pain*, 139 *Brain J. of Neurology* 1958 (2016).

⁷⁴ Pet. App. at 91a & n.37 (citing Lynn Uhrig et al., *Cerebral mechanisms of general anesthesia*, 33 *Annales Fr. Anesth. Reanim.* 72, 72-83 (2014)).

suppressed consciousness.⁷⁵ Further, the study did not even evaluate the thalamus, which Dr. Condic erroneously concludes is the main site of action for anesthesia to take effect.⁷⁶

Lastly, Dr. Condic's declaration below cites an article relating to brain imaging pain modulation and asserts that there are only two regions in the cortex involved when processing painful experiences.⁷⁷ In fact, the study Dr. Condic cites shows brain imaging that supports the conclusions of *amici* here: a wide range of regions in the cortex and connected circuitry are necessary for the experience of pain.⁷⁸

CONCLUSION

The international scientific and medical consensus is clear that it is not possible for a pre-viable fetus to experience pain. This Court should not disturb settled precedent based on unsupported claims that contradict both scientific evidence and the consensus of medical organizations.

⁷⁵ Uhrig et al., 33 *Annales Fr. Anesth. Reanim.* at 72-83.

⁷⁶ Pet. App. at 91a-92a.

⁷⁷ Condic *Amicus* Brief, at 19 n.28; Pet. App. at 92a & n.40.

⁷⁸ Ulrike Bingel & Irene Tracey, *Imaging CNS modulation of pain in humans*, 23 *Physiology* 371, 373 & fig. 2 (2008).

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