IN THE COURT OF APPEALS OF THE STATE OF OREGON

In the Matter of A. E. P., a Child. DEPARTMENT OF HUMAN SERVICES, Petitioner-Respondent, v. K. A. H., Appellant.	Umatilla County Circuit Court Case No. JV150031 Petition No. JV150031A A160261 CONFIDENTIAL BRIEF UNDER ORS 419A.255

EXPEDITED JUVENILE DEPENDENCY CASE (NOT TPR)

BRIEF OF *AMICUS CURIAE* OREGON INNOCENCE PROJECT IN SUPPORT OF APPELLANT K.A.H.

Appeal from the Judgment of the Circuit Court
for Umatilla County

Honorable Ronald J. Pahl, Judge

Steven T. Wax (OSB #850120) Email: wax@oregoninnocence.org Aliza B. Kaplan (OSB #135523) Email: kaplan@oregoninnocence.org Janis C. Puracal (OSB #132288) Email: puracal@oregoninnocence.org Oregon Innocence Project P.O. Box 40588 Portland, OR 97240 (503) 768-7321 Attorneys for *Amicus Curiae*	Shannon Storey (OSB #034688) Chief Defender Juvenile Appellate Section Sarah Peterson (OSB #074897) Deputy Public Defender Juvenile Appellate Section Office of Public Defense Services 1175 Court Street NE Salem, OR 97301 Email: sarah.peterson@opds.state.or.us Phone: (503) 378-3349 Attorneys for Appellant K. A. H.

	Ellen F. Rosenblum (OSB #753239) Attorney General Paul L. Smith (OSB #001870) Deputy Solicitor General Michael S. Shin (OSB #135966) Senior Assistant Attorney General 1162 Court Street NE Salem, OR 97301 Email: Michael.s.shin@doj.state.or.us Phone: (503) 378-4402 Attorneys for Respondent

January 2016

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page(s)

Cases

Other Authorities

Gordon D. Schiff, *Minimizing Diagnostic Error: The importance of Follow-up and Feedback*, 121 AM J MED S38 (2008) 27

Gregg T. Leuder et al., *Perimacular Retinal Folds Simulating Nonaccidental Injury in an Infant*, 124 ARCHIVES OPTHALMOLOGY 1782 (2006).....11, 12

J. F. Geddes et al., *Neuropathology of Inflicted Head Injury in Children, I. Patterns of Brain Damage*, 124 BRAIN 1290 (2001).....11

J.F. Geddes, et al., *Neuropathology of Inflicted Head Injury in Children, II. Microscopic Brain Injury in Infants*, 124 BRAIN 1299 (2001).....10, 11

J.R. Hall, et al., *The Mortality of Childhood Falls*, 29 J TRAUMA 1273 (1989).....10, 13

John Caffey, *On the Theory and Practice of Shaking Infants*, 124 AM J DIS CHILD 161 (1971) 5

John Caffey, *The Whiplash Shaken Infant Syndrome: Manual Shaking by the Extremities With Whiplash-Induced Intracranial and Intraocular Bleedings, Linked with Residual Permanent Brain Damage and Mental Retardation*, 54 PEDIATRICS 396 (974).....6

John Plunkett, *Fatal Pediatric Head Injuries Caused by Short-Distance Falls*, 22 AM J OF FORENSIC MED & PATHOLOGY 1 (2001).....10, 13, 15

K. Anthony Kim, et al., *Analysis of Pediatric Head Injury from Falls*, 8 NEUROSURGERY FOCUS 3 (2000).....10

Keith A. Findley et. al., *Shaken Baby Syndrome, Abusive Head Trauma, and Actual Innocence: Getting It Right,* 12 HOUS J HEALTH L & POLICY 209 (2012).....5, 9, 12, 20

Kent P. Hymel, et al., *Intracranial Hemorrhage and Rebleeding in Suspected Victims of Abusive Head Trauma: Addressing Forensic Controversies*, 7 CHILD MALTREATMENT 329 (2002).....10

M. Vaughn Emerson et al., *Ocular Autopsy and Histopathologic Features of Child Abuse*, 114 AM ACAD OPHTHALMOLOGY 1384 (2007).....12

Margaret A. Berger & Lawrence M. Solan, *The Uneasy Relationship Between Science and Law: An Essay and Introduction*, 73 BROOK L REV 847 (2008) 28

Mark Goetting & Bonnie Sowa, *Retinal Hemorrhage After Cardiopulmonary Resuscitation in Children: An Etiological Reevaluation*, 85 PEDIATRICS 585 (1990) 12

Mary Case, et al., *Position Paper on Fatal Abusive Head Injuries in Infants and Young Children*, 22 AM J FORENSIC MED & PATHOLOGY 112 (2001) 10

P.E. Lantz et al., *Perimacular Retinal Folds from Childhood Head Trauma*, 328 BRIT MED J 754 (2004) 11

P. Steinbok, et al., *Early Hypodensity on Computed Tomographic Scan of the Brain in an Accidental Pediatric Head Injury*, 60 NEUROSURGERY 689 (2007) 10

Patrick E. Lantz & Daniel E. Couture, *Fatal Acute Intracranial Injury, Subdural Hematoma, and Retinal Hemorrhages Caused by Stairway Fall*, 56 J FORENSIC SCI 1648 (2011) 10, 13

Peter G. Richards et. al., *Shaken Baby Syndrome*, 91 ARCH DIS CHILD 205 (2005) 7

Rubin Miller & Marvin Miller, *Over-representation of Males in Traumatic Brain Injury of Infancy and in Infants with Macrocephaly*, 31 AM J FORENSIC MED & PATHOLOGY 165 (2010) 21

Sandeep Narang, *A Daubert Analysis of Abusive Head Trauma/Shaken Baby Syndrome*, 11 HOUS J HEALTH L & POLICY 505 (2011) 7, 10

Scott Denton & Darinka Mileusnic, *Delayed Sudden Death in an Infant Following an Accidental Fall*, 24 AM J FORENSIC MED PATHOLOGY 371 (December 2003) 13

Tara Haelle, *Doctors Devise a Better Way to Diagnose Shaken Baby Syndrome*, NPR, July 29, 2015 8

Waney Squier & Julie Mack, *The Neuropathology of Infant Subdural Hemorrhage*, 187 FORENSIC SCI INT'L 6 (2009) 11

I. STATEMENT OF *AMICUS CURIAE*

Oregon Innocence Project (OIP) is an initiative of the Oregon Justice Resource Center. The mission of OIP is to (1) exonerate the innocent, (2) educate and train law students, and (3) promote legal reforms aimed at preventing wrongful convictions.

OIP is the only program in Oregon dedicated to securing the release of wrongfully convicted inmates. Additionally, OIP works with community partners to build support for comprehensive criminal justice reform to improve trial procedures, interrogation techniques, discovery practices, and other Oregon policies that do not serve to protect the innocent or punish the guilty.

Amicus OIP has not investigated the merits of mother's assertions and takes no position on the juvenile court's assertion of dependency jurisdiction over mother's child, Ariannah. OIP, instead, appears as *amicus curiae* in this matter to urge this court to enhance the truth-seeking functions of the judicial process by prohibiting expert testimony that is not based on sound science.

II. SUMMARY OF ARGUMENT

Although this is a juvenile dependency case, this court's ruling on the admissibility of expert testimony may have far-reaching implications in criminal cases, including potential cases of wrongful conviction based on the diagnosis of "shaken baby syndrome" or "abusive head trauma," as ruled admissible by the

trial court in this case. *Amicus* OIP respectfully asks this court to recognize the inherent unreliability of expert testimony that fails to account for the current research on infant brain injuries.

Unvalidated or improper forensic science is the second greatest cause of wrongful convictions that have been overturned with DNA testing. Of the first 325 DNA exonerations around the country, unvalidated or improper forensic science played a role in 47% of the cases, leading to those wrongful convictions and years of prison time for innocent men and women.

Although there have been positive developments in forensic science in recent years, cases of wrongful conviction have shown that experts sometimes testify without a proper scientific basis for their findings. The value of scientific evidence is realized only when that evidence is based on sound principles and methodology. In the absence of the scientific method, expert testimony, including expert testimony on causation, is nothing more than lay opinion dressed up to suggest it comes from a source of authority. Judges and jurors alike are inclined to believe, and have a limited understanding to critically assess, the testimony. For this reason, courts must exercise great care to prevent the admission of unreliable expert evidence.

Experts from around the country disagree over whether a diagnosis of "shaken baby syndrome" or "abusive head trauma" ("SBS/AHT") is based on

reliable science. Historically, proponents of the SBS/AHT hypothesis stood firm in their belief that the physical findings that make up the diagnosis could not be caused by accidental means, leaving abuse as the only possible cause. In recent years, however, medical and biomechanical researchers have proved that the physical findings once thought diagnostic of abuse can, in fact, be caused by accidental injury, including short falls from less than four feet, or nontraumatic cause, such as illness or genetics.

The debate does not represent a simple "battle of the experts" to be decided by a trier of fact. An expert espousing a theory of SBS/AHT can no longer summarily rule out injury caused by accidental or nontraumatic means. To disregard a viable theory of causation ignores a growing body of scientific research and violates the scientific method.

Courts around the country are recognizing the problem with the SBS/AHT diagnosis. Just one week before this *amicus* brief was filed, the Washington Court of Appeals ordered a new trial for Heidi Fero, who had been convicted of assault of a child in 2003 based on the SBS/AHT diagnosis.[1] Fero spent 11 years in prison based on the testimony of doctors who believed in the diagnosis. In January 2016, the Washington Court of Appeals found that "the generally accepted medical

[1] *In re Fero*, No. 46310-5-II, 2016 WL 48216, ¶ 73 (Wn App Jan 5, 2016).

paradigm now recognizes that * * * [the] injuries are known to be caused by much less extreme circumstances [than abuse]."[2]

In this case, the department's purported expert, Dr. Valvano, failed to follow the scientific method when he "ruled out" injury caused by accidental means and "ruled in" abuse without any corroborating evidence. His testimony is unreliable and misleading. It is, therefore, inadmissible under OEC 702 and OEC 403.

III. ARGUMENT

The trial court erred when it admitted the testimony of Dr. Thomas Valvano who opined that Ariannah's physical findings of subdural hemorrhage and retinal hemorrhage were caused by abuse.

A. The SBS/AHT hypothesis is not supported by scientific and medical research.

1. The classic "triad" of symptoms on which SBS/AHT is based is not exclusively diagnostic of abuse.

Shaken Baby Syndrome/Abusive Head Trauma is a label used to describe head trauma in infants purportedly caused by abuse. The SBS/AHT diagnosis is based on the following constellation of medical findings (often referred to as the "triad"): (1) blood in the subdural area around the brain (subdural hemorrhage); (2) microscopic bleeding within the retina (retinal hemorrhage); and (3) encephalopathy

[2] *Id*. ¶ 68.

(damage of the brain itself sometimes accompanied by a comatose state) and/or cerebral edema (brain swelling).[3]

The SBS/AHT diagnosis emerged in the 1970s when some physicians began advancing a hypothesis that, if an infant or young child became very ill or died without an obvious reason why, and the baby exhibited the "triad" of findings, that might mean the baby had been violently shaken.[4] The constellation of symptoms took on the name "Shaken Baby Syndrome." Those advocating the hypothesis claimed that the triad of physical findings is virtually unique to violent shaking or shaking with impact.[5]

Because in the last century child abuse was largely under-recognized and all-too-frequently ignored, a few physicians began a campaign to educate other doctors to recognize and report child abuse and to educate parents about the dangers of mistreating children. Even though the data was "circumstantial" and "manifestly incomplete," they reasoned that a nationwide educational campaign to prevent the

---

[3] Keith A. Findley et. al., *Shaken Baby Syndrome, Abusive Head Trauma, and Actual Innocence: Getting It Right.* 12 HOUS J HEALTH L & POLICY 209, 223-24 (2012).

[4] A. Norman Guthkelch, *Infantile Subdural Haematoma and its Relationship to Whiplash Injuries*, 2 BRITISH MEDICAL JOURNAL 430 (1971); John Caffey, *On the Theory and Practice of Shaking Infants*, 124 AM J DIS CHILD 161 (1972).

[5] *See, e.g.*, David L. Chadwick et. al., *Shaken Baby Syndrome: A Forensic Pediatric Response*, 101 PEDIATRICS 321 (1998).

jerking, jolting, and whiplash of infants was warranted.[6] At the time, these physicians never envisioned, and did not advocate, criminal prosecution based on these findings.[7] Nonetheless, the hypothesis gradually hardened into accepted medical wisdom, even though it lacked a solid scientific foundation.[8]

Since that time, the beliefs of medical doctors surrounding these findings have changed considerably.[9] Many experts have come to realize that children previously thought to have been shaken may have also or instead suffered some kind of impact injury.[10] Given the lack of scientific support for the specific mechanism of injury,

---

[6] *See, e.g.*, John Caffey, *The Whiplash Shaken Infant Syndrome: Manual Shaking by the Extremities With Whiplash-Induced Intracranial and Intraocular Bleedings, Linked with Residual Permanent Brain Damage and Mental Retardation*, 54 PEDIATRICS 396, 403 (1974); A. Norman Guthkelch, *Problems of Retino-Dural Hemorrhage With Minimal External Injury,* 12 HOUS J HEALTH L & POLICY 201 (2012).

[7] *Id.* at 203.

[8] *Id.* at 207; Mark Donohoe, *Evidence-Based Medicine and Shaken Baby Syndrome Part I: Literature Review, 1966-1998*, 24 AM J FORENSIC MED PATHOLOGY 239, 241 (2003); Deborah Tuerkheimer, *Flawed Convictions: "Shaken Baby Syndrome" and the Inertia of Injustice* (Oxford University Press 2014).

[9] *See State v. Edmunds*, 746 NW2d 590, 596 (2008) ("[A] significant and legitimate debate in the medical community has developed in the past ten years over whether infants can be fatally injured through shaking alone, whether an infant may suffer head trauma and yet experience a lucid interval prior to death, and whether other causes may mimic the symptoms traditionally viewed as indicating shaken baby or shaken impact syndrome.").

[10] *See, e.g.*, Ann-Christine Duhaime et. al., *The Shaken Baby Syndrome: A Clinical, Pathological, and Biomechanical Study*, 66 J NEUROSURG 409 (1987) ("Although shaking may, in fact, be part of the process, it is more likely that such infants suffer blunt impact…"); Derek A. Bruce and Robert A. Zimmerman, *Shaken Impact Syndrome*, 18 PEDIATRIC ANNALS 482, 492-4 (1989) (the authors concluded severe acute brain trauma cannot be produced by shaking alone and that

the American Academy of Pediatrics ("AAP") began to encourage pediatricians to stop using the term "Shaken Baby Syndrome" and, instead, use the term "Abusive Head Trauma."[11] The AAP reasoned that the term AHT is more expansive and does not require the physician to identify a precise mechanism of injury.[12]

Many terms are used interchangeably with AHT to describe the alleged mechanism of injury, including, but not limited to "acceleration-deceleration injury," "nonaccidental injury," and "inflicted head trauma."[13] Until fairly recently, the leading physicians in the child abuse protection community argued strongly that the triad was exclusively diagnostic of abuse.[14]

---

the mechanism of injury is more appropriately described as "shaking impact"). Significant research has proved that the forces required to produce the triad would necessarily produce injury to the child's neck if caused by shaking alone. Faris A. Bandak, *Shaken Baby Syndrome: A Biomechanics Analysis of Injury Mechanisms*, 151 FORENSIC SCI INT'L 71, 78 (2005); A.K. Ommaya et al., *Biomechanics and Neuropathology of Adult and Paediatric Head Injury*, 16 BRIT J NEUROSURG 220, 229-29 (2002).

[11] *See, e.g.*, American Academy of Pediatrics press release, "Abusive Head Trauma: A New Name for Shaken Baby Syndrome," dated Apr. 27, 2009, available at http://www.aap.org/en-us/about-the-aap/aap-press-room/pages/Abusive-Head-Trauma-A-New-Name-for-Shaken-Baby-Syndrome.aspx.

[12] *Id.*

[13] *E.g.* Brian Forbes, *Child Abuse: Anatomy and Pathogenesis of Retinal Hemorrhages After Abusive Head Trauma*, Up To Date, Evelyn A. Paysse & Daniel M. Lindberg (Eds.) UpToDate, Waltham, MA (Accessed on January 7, 2016); Sandeep Narang, *A Daubert Analysis of Abusive Head Trauma/Shaken Baby Syndrome*, 11 HOUS J HEALTH L & POLICY 505 (2011).

[14] Peter G. Richards et. al., *Shaken Baby Syndrome,* 91 ARCH DIS CHILD 205 (2005) ("The triad of encephalopathy, subdural haemorrhages, and retinal haemorrhages as an indicator of head injury has stood the test of time.").

Now, leaders in the pediatric field agree that no responsible physician should diagnose abuse based on the "triad." The new AAP position paper, revised in 2009, backs off the certainty of the diagnosis, now making clear that "the mechanisms and resultant injuries of accidental and abusive head injury overlap."[15] Dr. Bob Sege, director of Family and Child Advocacy at Boston Medical Center and a member of the AAP Committee on Child Abuse and Neglect recently told NPR, "[t]he real straw man argument is the idea that diagnosing abusive head trauma relies solely on those three injuries * * *."[16] Dr. Carole Jenny, a longtime child abuse pediatrician, SBS-hypothesis advocate, and former Brown University Pediatrics professor, now teaches that "the triad is a myth."[17]

In 2012, Dr. A. Norman Guthkelch, the neurosurgeon often credited with "discovering" the diagnosis of SBS, published an article "after 40 years of consideration," which is harshly critical of shaken baby prosecutions based solely on the triad of injuries.[18] Dr. Guthkelch stated in an interview, "I think we need to

---

[15] Cindy Christian et al, *Abusive Head Trauma in Infants and Children*, 123 PEDIATRICS 1409, 1410 (2009) (emphasis added), available at: http://pediatrics.aappublications.org/content/123/5/1409.full#ref-15.
[16] Tara Haelle, *Doctors Devise a Better Way to Diagnose Shaken Baby Syndrome*, NPR, July 29, 2015, available at: http://www.npr.org/sections/health-shots/2015/07/29/427449852/doctors-devise-a-better-way-to-diagnose-shaken-baby-syndrome.
[17] Carole Jenny, *Presentation on The Mechanics: Distinguishing AHT/SBS from Accidents and Other Medical Conditions*, slide 33, 2011 New York City Abusive Head Trauma/Shaken Baby Syndrome Training Conference (Sept 23, 2011).
[18] Guthkelch, *supra* n 6.

go back to the drawing board and make a more thorough assessment of these fatal cases, and I am going to bet * * * that we are going to find in every—or at least the large majority of cases, the child had another severe illness of some sort which was missed until too late."[19]

There is now widespread agreement that the presence of the triad alone—or its individual components—is not enough to diagnose abuse.[20] But the expert witness in this case did not just make his diagnosis based on this disfavored set of findings; he went a step further. Dr. Valvano diagnosed Ariannah with Abusive Head Trauma based on only two of the three signs previously (but no longer) thought to be diagnostic of abuse—subdural hemorrhage and retinal hemorrhages. (P Tr 60-61) These findings are nonspecific, associated with a variety of mechanisms, and not pathognomonic (that is, exclusively diagnostic) of abuse.

2. Subdural hemorrhage, retinal hemorrhage, and encephalopathy have a wide variety of causes unrelated to trauma or abuse.

a. Subdural hemorrhage is not pathognomonic of abuse.

Although it was once believed that subdural hemorrhage was caused exclusively by trauma, it is now known that subdural hemorrhage is a nonspecific medical finding with a wide variety of causes, including accidental trauma, birth

---

[19] Conversations with Dr. A. Norman Guthkelch, August 20, 2014, available at: http://onsbs.com/2014/08/20/conversations-with-dr-a-norman-guthkelch/.
[20] Findley, *supra* n 3, at 213 (2012); Deborah Tuerkheimer, *supra* n 8 at 10-11.

trauma, metabolic disease, nutritional deficiencies, genetic syndromes, clotting disorders, tumors, stroke, and infection.[21] Subdural hemorrhages are well known to occur in falls.[22]

The classic formulation of the SBS/AHT hypothesis suggests that traumatic injury to the brain by shaking causes a rupturing of the brain's bridging veins and axons, leading to the subdural hematoma associated with SBS/AHT.[23] The scientific community, however, has since discovered that the brain swelling frequently attributed to shaking by proponents of the SBS/AHT hypothesis is more likely to result from hypoxia-ischemia, or deprivation of oxygen or oxygenated blood to the brain.[24] Hypoxia-ischemia is associated with a variety of accidental

---

[21] Kent P. Hymel, et al., *Intracranial Hemorrhage and Rebleeding in Suspected Victims of Abusive Head Trauma: Addressing Forensic Controversies*, 7 CHILD MALTREATMENT 329, 332-337 (2002); *see also* Narang, *supra* n 13, at 627.
[22] *See, e.g.*, J.R. Hall, et al., *The Mortality of Childhood Falls*, 29 J TRAUMA 1273 (1989); Patrick E. Lantz & Daniel E. Couture, *Fatal Acute Intracranial Injury, Subdural Hematoma, and Retinal Hemorrhages Caused by Stairway Fall*, 56 J FORENSIC SCI 1648 (2011); K. Anthony Kim, et al., *Analysis of Pediatric Head Injury from Falls*, 8 NEUROSURGERY FOCUS 3 (2000); John Plunkett, *Fatal Pediatric Head Injuries Caused by Short-Distance Falls*, 22 AM J OF FORENSIC MED & PATHOLOGY 1 (2001); P. Steinbok, et al., *Early Hypodensity on Computed Tomographic Scan of the Brain in an Accidental Pediatric Head Injury*, 60 NEUROSURGERY 689 (2007).
[23] *See* Mary Case, et al., *Position Paper on Fatal Abusive Head Injuries in Infants and Young Children*, 22 AM J FORENSIC MED & PATHOLOGY 112, 112 (2001).
[24] *See* J.F. Geddes, et al., *Neuropathology of Inflicted Head Injury in Children, II. Microscopic Brain Injury in Infants*, 124 BRAIN 1299, 1304 (2001) ("Geddes II") ("Brain damage responsible for loss of consciousness in the majority of cases is hypoxic rather than traumatic.").

and nontraumatic causes.[25] The subdural bleeding sometimes seen in infants is often described as a "thin film" and is very different from the bleeding that would be expected to result from the bursting of the high-volume bridging veins thought to be caused by shaking.[26] Dr. Valvano, here, testified that the subdural hemorrhage he saw in Ariannah's brain "was a thin layer hemorrhage[.]" (P Tr 24)

b. Retinal hemorrhage is not pathognomonic of abuse.

Proponents of the SBS/AHT hypothesis often testify that an infant's eye injuries can be attributed to abuse, citing as support the number and multilayered nature of the hemorrhages and the presence of perimacular retinal folds in the infant's eye. But research on eye injuries indicates this opinion has not been tested and is not supported by objective scientific evidence.[27] According to one expert, "[m]uch of what we think we know about the systemic and ocular findings of child

---

[25] *Id.*

[26] *See* J. F. Geddes et al., *Neuropathology of Inflicted Head Injury in Children, I. Patterns of Brain Damage*, 124 BRAIN 1290, 1292, 1297 (2001); Waney Squier & Julie Mack, *The Neuropathology of Infant Subdural Hemorrhage*, 187 FORENSIC SCI INT'L 6, 7-8 (2009).

[27] *See* Ommaya, *supra* n 10 at 233 ("The hypothesis of 'intra-ocular' retinal haemorrhages caused by orbital shaking has not been tested experimentally."); P.E. Lantz et al., *Perimacular Retinal Folds from Childhood Head Trauma*, 328 BRIT MED J 754, 756 (2004) ("Statements in the medical literature that perimacular retinal folds are diagnostic of [SBS/AHT] are not supported by objective scientific evidence."); Gregg T. Leuder et al., *Perimacular Retinal Folds Simulating Nonaccidental Injury in an Infant*, 124 ARCHIVES OPHTHALMOLOGY 1782, 1782 (2006).

abuse will continue to be the result of speculation rather than based on sound science."[28]

Although retinal hemorrhages have been known to occur as a result of trauma caused by tremendous force, such as a car accident or a fall from a great height, they are also seen in situations where there has been minimal or no trauma. For example, retinal hemorrhages have been seen to result from short falls, metabolic disease, nutritional deficiencies, genetic syndromes, tumors, stroke, infection, vasculitis, hypoxia, hypotension, hypertension, and cranial pressure.[29] Retinal hemorrhages are even known to result from cardiopulmonary resuscitation (CPR).[30] Even proponents of SBS/AHT concede that "[r]etinal hemorrhage is an important indicator of possible abusive head trauma, but it is also found in a number of other conditions."[31] There is no scientific basis for the belief that retinal hemorrhages (or a particular type or pattern of retinal hemorrhages) are reliably diagnostic of abuse.

---

[28] M. Vaughn Emerson et al., *Ocular Autopsy and Histopathologic Features of Child Abuse*, 114 AM ACAD OPHTHALMOLOGY 1384, 1393 (2007).
[29] Findley, *supra*, n 3 at 214; Evan Matshes, *Retinal and Optic Nerve Sheath Hemorrhages Are Not Pathognomonic of Abusive Head Injury*, 16 PROC AM ACAD FORENSIC SCIENCE 272, 272 (2010); Leuder, *supra*, n 27 at 1782.
[30] Mark Goetting & Bonnie Sowa, *Retinal Hemorrhage After Cardiopulmonary Resuscitation in Children: An Etiological Reevaluation*, 85 PEDIATRICS 585, 587 (1990).
[31] Alex V. Levin *et al.*, *Clinical Report – The Eye Examination in the Evaluation of Child Abuse*, 126 PEDIATRICS 376, 376 (2010).

c. Encephalopathy is not pathognomonic of abuse.

Ariannah did not exhibit signs of encephalopathy (brain dysfunction) or cerebral edema (brain swelling), but the symptom normally makes up the final element of the triad for SBS/AHT. Encephalopathy or cerebral edema, however, are known to be caused by any sort of insult to the brain and is, in fact, defined as "any degenerative disease of the brain."[32] Injury or swelling itself, therefore, adds little to the diagnosis of abuse and could be caused by any sort of disease or accidental trauma.

3. The triad of symptoms once thought to be pathognomonic of abuse have now been found to arise as a result of a short fall or other accidental injury.

It has been scientifically established that falls of less than four feet can produce the triad once thought to exist only in cases of abuse. Experts have long confirmed that household and other low-velocity falls can and do cause serious injury and death in children,[33] and falls, such as from a trampoline or down steps, can and do cause the same types of injury seen in SBS/AHT cases.[34] The Consumer

---

[32] *Dorland's Medical Dictionary* at 590 (29th ed 2000).

[33] *See, e.g.*, Hall, *supra* n 22; Plunkett, *supra* n 22; Lantz, *supra* n 22; Scott Denton & Darinka Mileusnic, *Delayed Sudden Death in an Infant Following an Accidental Fall*, 24 AM J FORENSIC MED PATHOLOGY 371 (December 2003).

[34] Doctors have also now abandoned the once-common view that children lose consciousness immediately after sustaining severe brain injuries. Doctors have now confirmed that children can remain lucid for up to 72 hours after suffering trauma. For example, one 2003 report describes a nine-month-old child who fell 30 inches from a bed onto a vinyl-covered concrete floor. Denton, *supra* n 33.

Products Safety Commission has issued alerts about the potential danger or even lethality of short-distance falls from shopping carts,[35] child seats,[36] and high chairs,[37] to name a few. While seemingly "minor" falls can be dangerous even to healthy children, medical conditions and prior injuries can make children even more susceptible to serious injury from falls that may initially appear minor.

Three adults independently told police that the child acted normally after the fall. Seventy-two hours after the fall, however, the child was found dead. An autopsy revealed subdural hemorrhage, cerebral edema, skull fractures, and other injuries. Courts in other jurisdictions have recognized the medical research on the "lucid interval." The Seventh Circuit, for example, noted that "[a]lthough the medical profession once thought that there is no interim between trauma and collapse in shaken-baby syndrome, the medical profession now believes * * * that there can be an interim in which the child would be conscious, but probably lethargic or fussy or feverish or have difficulty sleeping or eating." *Aleman v. Vill. of Hanover Park*, 662 F3d 897, 902-03 (7th Cir 2011). Ariannah, here, suffered a known fall one day before doctors found subdural hemorrhage and retinal hemorrhages. *See* Appellant's Opening Brief at 6-7.

[35] U.S. Consumer Product Safety Comm'n Alert, Falls from Shopping Carts Cause Serious Head Injuries to Children, available at: http://www.cpsc.gov/pagefiles/122338/5075.pdf (last visited Jan 7, 2016).

[36] Press Release, U.S. Consumer Product Safety Comm'n, Baby Seats Recalled for Repair by Bumbo International Due to Fall Hazard (Aug 15, 2012), available at: http://www.cpsc.gov/en/Recalls/2012/Baby-Seats-Recalled-for-Repair-by-Bumbo-International-Due-to-Fall-Hazard/; Michael Finney, Bumbo Baby Seats Recalled Over Safety Danger, ABC News, Aug 16, 2012, available at: http://abc7news.com/archive/8774353/; Laurent Belsie, Bumbo baby seats: unsafe at any height, Christian Science Monitor, Aug 15, 2012, available at: http://www.csmonitor.com/Business/2012/0815/Bumbo-baby-seats-unsafe-at-any-height.

[37] Press Release, U.S. Consumer Product Safety Comm'n, Fisher-Price Recalls 3-in-1 High Chairs Due to Fall Hazard (Mar 24, 2009), available at: http://www.cpsc.gov/en/Recalls/2009/Fisher-Price-Recalls-3-in-1-High-Chairs-Due-to-Fall-Hazard/.

Current research shows that short falls can, and sometimes do, cause injuries that mimic injuries seen in SBS/AHT. In 2001, the American Journal of Forensic Medicine and Pathology published a report of 18 accidental fatal head injuries caused by short-distance falls in children.[38] Thirteen of the children who died as a result of those short falls had subdural hemorrhage.[39] One such fall was videotaped, and later, the videotape was used to reconstruct the child's fatal fall. The biomechanical analysis of the recreated fall corroborated the medical analysis; the reconstructed fall exceeded known injury thresholds. This is significant because it shows reproducibility (not only was the fall observed, videotaped, and reconstructed, the biomechanical reconstruction supported the medical hypothesis that the fall was biomechanically capable of causing the injuries and death seen in the patient).[40]

Even the AAP now acknowledges that short falls can indeed be fatal and even produce the triad. Prior to this shift, in 2001, the AAP published a position statement informing their members that pediatricians should presume abuse when a child younger than one-year-old has intracranial injury (such as subdural hematoma and cerebral edema) and that "the constellation of these injuries does

---

[38] Plunkett, *supra* n 22.
[39] *Id.* at 3.
[40] *See* Chris Van Ee et al., *Child ATD Reconstruction of a Fatal Pediatric Fall*, Proc. ASME (2009).

not occur with short falls."[41] By 2009, however, the AAP revised this official position in accordance with developing medical research. The AAP acknowledged the possibility that injuries seen in SBS/AHT cases can be caused by accidental falls, stating that "controversy is fueled because the mechanisms and resultant injuries of ***accidental and abusive*** head injury overlap."[42] The AAP, therefore, removed the language from its official position suggesting the triad cannot result from a short fall and the presumption of abuse when a young child presents with intracranial injuries.[43]

Courts around the country are recognizing the change in science and its impact on past convictions.[44] It is simply incorrect to suggest that subdural hemorrhage and retinal hemorrhage cannot occur as a result of a short fall.

B. The SBS/AHT hypothesis does not meet Oregon's standard for expert testimony based on scientifically valid methodology.

Because "evidence perceived by lay jurors to be scientific in nature possesses an unusually high degree of persuasive power," courts in Oregon must act as

---

[41] *See* American Academy of Pediatrics, Committee on Child Abuse and Neglect, *Shaken Baby Syndrome: Rotational Cranial Injuries-Technical Report*, 108 PEDIATRICS 206 (2001).
[42] Cindy Christian et al, *Abusive Head Trauma in Infants and Children*, 123 PEDIATRICS 1409 (2009) (emphasis added), available at: http://pediatrics.aappublications.org/content/123/5/1409.full#ref-15.
[43] *Id.*
[44] *See* section III(C), *infra*.

"gatekeepers" to "ensure that the persuasive appeal is legitimate."[45] That is, the court must "exclud[e] 'bad science' in order to control the flow of confusing, misleading, erroneous, prejudicial, or useless information to the trier of fact."[46]

Under Oregon law, expert testimony is admissible if it is relevant under OEC 401, would assist the trier of fact under OEC 702, and is not subject to exclusion under OEC 403 because its probative value is outweighed by the danger of unfair prejudice or jury confusion.[47]

The Oregon Supreme Court has set out a number of factors that should be considered to determine the admissibility of scientific evidence.[48] "Underlying the various considerations and factors described by the court is the fundamental question of the 'scientific validity of the general propositions utilized by the experts.'"[49]

1. Dr. Valvano did not properly conduct a differential diagnosis.

A "differential diagnosis" is "the determination of which one of two or more diseases or conditions a patient is suffering from"; it is determined by "systematically comparing and contrasting their clinical findings."[50] The medical

---

[45] *State v. O'Key*, 321 Or 285, 291, 307, 899 P2d 663 (1995).
[46] *Id.* at 306.
[47] *Marcum v. Adventist Health System/West*, 345 Or 237, 243, 193 P3d 1 (2008).
[48] *State v. Brown*, 297 Or 404, 417, 687 P2d 751 (1984); *O'Key*, 321 Or at 303. Mother discussed the factors in detail in her Opening Brief, and, to avoid duplication, *Amicus* OIP will not repeat that analysis here.
[49] *Marcum*, 345 Or at 245 (citing *Jennings v. Baxter Healthcare Corp.*, 331 Or 285, 303, 14 P3d 596 (2000)).
[50] *Dorland's Illustrated Medical Dictionary* 490 (29th ed 2000).

expert must first "rule in" various potential diseases or conditions and then "rule out" those diseases or conditions one by one.[51] SBS/AHT is purportedly based on a differential diagnosis whereby the expert first "rules in" all potential causes, including abuse, and then "rules out" accidental and nontraumatic injury. Dr. Valvano, here, summarily ruled out accidental injury and nontraumatic injury. He then used circular reasoning to conclude the findings must have been caused by abuse, although there was no corroborating evidence to rule in abuse. As discussed below, the differential diagnosis was not based on sound science and methodology.

a. Dr. Valvano did not—and cannot—reliably "rule out" accidental or nontraumatic injury.

A differential analysis requires the expert to apply the facts of the patient's case to each potential cause in order to form a reliable opinion about the ***actual*** cause of the patient's symptoms.[52] The "expert must provide reasons for rejecting alternative hypotheses using scientific methods and procedures[,] and the elimination of those hypotheses must be founded on more than subjective beliefs or unsupported speculation."[53] Courts have held that failing to consider alternative causes renders a methodology incomplete and unreliable.[54]

---

[51] *Marcum*, 345 Or at 247.
[52] *Hendrix ex rel. G.P. v. Evenflo Co., Inc.*, 609 F3d 1183, 1197 (11th Cir 2010); *Clausen v. M/V New Carissa*, 339 F3d 1049, 1058 (9th Cir 2003).
[53] *Clausen*, 339 F3d at 1058 (internal quotations omitted).
[54] *See, e.g.*, *In re Paoli R.R. Yard PCB Litig.*, 35 F3d 717, 757 (3d Cir 1994) ("However, while we think that the standard techniques of differential diagnosis

The SBS/AHT diagnosis is based on the outdated and mistaken hypothesis that the triad of symptoms can be caused only by abuse and cannot result from accidental or nontraumatic injury. Dr. Valvano, here, testified that Ariannah's injuries—subdural hemorrhage and retinal hemorrhages—were "not something seen with a short fall," although he agrees that a short fall "probably did happen." (P Tr 28, 61) In Dr. Valvano's opinion, "to a reasonable degree of medical certainty * * * the most likely explanation for those injuries is abuse." (P Tr 61) Dr. Valvano's opinion appears to be based primarily on outdated medical literature from pre-1997 (P Tr 40-43) and his unsubstantiated belief that challenges to the SBS/AHT hypothesis stem only from lawyers and the lay press (P Tr 16, 31). In his pretrial testimony, Dr. Valvano cited one study from 2008 (the Chadwick study

---

are reliable and will allow a doctor who employs them to testify to a novel conclusion, we also think that part of differential diagnosis is using these standard techniques to rule out alternative causes—thus, where a defendant points to a plausible alternative cause and the doctor offers no explanation for why he or she has concluded that was not the sole cause, that doctor's methodology is unreliable."); *see also Viterbo v. Dow Chem. Co.*, 826 F2d 420, 424 (5th Cir 1987) (excluding a doctor's testimony that the defendant had caused plaintiff's illness because the doctor had relied on a medical history that omitted important information, the doctor had admitted the ailments could have a number of causes, and there was no good evidence that the defendant had caused these types of illnesses.); *Clausen*, 339 F3d at 1058 ("[E]xpert testimony that neglects to consider a hypothesis that might explain the clinical findings under consideration may also be unreliable.").

on short falls) and concluded that, because deaths from short falls are rare, Ariannah's short fall here cannot explain her injuries.[55] (P Tr 58-59)

As discussed above, current medical research proves that the injuries once thought diagnostic of abuse can, in fact, occur as a result of a short fall.[56] The AAP has specifically recognized that "the mechanisms and resultant injuries of accidental and abusive head injury overlap[.]"[57] Recently, a court in New York rejected, post-conviction, the very contention made by Dr. Valvano in this case—that the physical findings cannot be caused by a short fall.[58] In that case, a 29-month-old fell from an 18" chair and died.[59] At trial, the prosecution relied on shaken baby/shaken impact theory to argue that the described short fall would not account for the physical findings, which included brain swelling (edema), a brain contusion, intracranial bleeding, and retinal hemorrhages.[60] At a three-week evidentiary hearing with testimony from multiple prominent experts on both sides, all the experts agreed that falls can cause fatal injuries.[61] The court determined that the testimony given at the

---

[55] *But see* Findley, *supra* n 3, at 247 (discussing the problems associated with the Chadwick study). *See also Clausen*, 339 F3d at 1058 ("Including even rare entities in the list 'ensures that such disorders are not overlooked.'").
[56] *See, infra*, section III(A)(3).
[57] Christian, *supra* n 15, at 1410.
[58] *People v. Bailey*, 999 NYS2d 713 (NY Cnty Ct, Dec. 16, 2014).
[59] *Id.* at 715.
[60] *Id.* at 715.
[61] *Id.* at 717.

original trial suggesting that short falls cannot kill was ***false***.[62] The post-conviction court agreed with the experts that "even falls of just a few feet generate levels of force and velocity that exceed known thresholds for brain injury."[63]

Dr. Valvano, here, dismissed the current medical research and concluded that Ariannah's injuries "were not explained by the short fall." (P Tr 61) For example, Dr. Valvano testified that he was initially contacted by Ariannah's treating physician because the MRI images found "mixed density blood, raising the question of whether there was a combination of new blood and old blood," which Dr. Valvano testified "was not what would be expected as [*sic*] a fall[.]" (P Tr 25) Recent scientific research proves this testimony was false. In a 2010 article published in the American Journal of Forensic Medicine, experts found that "[s]mall, asymptomatic [subdural hematomas] from the normal trauma of the birth process can spontaneously rebleed or rebleed with minimal forces, enlarge, and then present with clinical symptoms and [subdural hematoma, retinal hemorrhages, and neurologic dysfunction] in the first year of life. * * * [This situation] mimic[s] child abuse, and we believe many such infants in the past have been mistakenly diagnosed as victims of child abuse, when they were likely not."[64]

---

[62] *Id.* at 724.
[63] *Id.* at 718.
[64] Rubin Miller & Marvin Miller, *Over-representation of Males in Traumatic Brain Injury of Infancy and in Infants with Macrocephaly*, 31 AM J FORENSIC MED &

The fact that the experts disagree does not present a simple "battle of the experts" scenario to be decided by a trier of fact. It is, rather, the fact that Dr. Valvano cannot account for the other side of the debate that should cause this court concern. To reliably rule out a possible cause, the expert must "show his work." Dr. Valvano testified that he does not know the minimum force required to produce the injuries at issue, but concluded, nonetheless, that those injuries cannot result from a short fall. (P Tr 38) He did not explain how or why the recent studies on short falls are, in his opinion, wrong.

Dr. Valvano cannot reliably "rule out" a short fall to explain Ariannah's injuries. His conclusion that the injuries could be caused only by abuse is unreliable and, therefore, inadmissible.

b. Dr. Valvano cannot "rule in" abuse without corroborating evidence.

The first step in a proper differential diagnosis is for the expert to compile a "comprehensive" list of causes that are each capable of explaining the clinical findings.[65] For each potential cause the expert "rules in" at this stage, that cause

---

PATHOLOGY 165, 170 (2010) (cited with approval in *Cavazos v. Smith*, 132 S Ct 2, 11, 181 L Ed 2d 311 (2011) (Ginsburg, J., dissenting)).

[65] *Hendrix*, 609 F3d at 1195; *Clausen*, 339 F3d at 1057.

"must actually be capable of causing the injury.'"[66] If the expert's testimony rules in a potential cause that is not so capable, that testimony is unreliable.[67]

No one has offered any explanation of what actually happened to Ariannah, beyond the claim of some unspecified "abuse." There is no information about any act or omission that led to Ariannah's medical findings. Dr. Valvano speculated that "shaking is only one of the mechanisms that can cause these injuries," although he was clear that "it's certainly not the only way this injury, these injuries, could be inflicted on her." (P Tr 37-38) Nonetheless, in Dr. Valvano's opinion, no matter what the mechanism of injury, it had to be abuse and could not be accidental. (P Tr 25, 28, 29, 38, 39, 40, 55, 60, and 61) Dr. Valvano only ruled in abuse because he mistakenly ruled out all other causes, including the undisputed fact that Ariannah's seven-year-old sister dropped her while carrying her.

If a subdural hemorrhage and retinal hemorrhage could ***only*** be caused by abuse, it might be reasonable to assume that some abuse occurred. Abuse, however, is only one of many causes of those two findings and, here, no evidence "rules in" abuse. If the injuries could equally result from a car accident, the court would not

---

[66] *Hendrix*, 609 F3d at 1195 (quoting *McClain v. Metabolife Intern., Inc.,* 401 F3d 1233, 1253 (11th Cir 2005)); *see also Hall v. Baxter Healthcare Corp.,* 947 F Supp 1387, 1413 (D Or 1996) ("Testimony regarding specific causation in a given patient is irrelevant unless general causation is established.").

[67] *Clausen*, 339 F3d at 1058.

allow the medical expert to opine that the injuries resulted from a car accident absent some evidence that a car accident, in fact, occurred.

The trial court, nonetheless, permitted Dr. Valvano to testify that the physical findings were caused by abuse, despite the absence of any corroborating evidence. The diagnosis is based on circular reasoning: the physical findings are caused by abuse; because the findings exist, there must have been abuse; the abuse caused the physical findings. Drawing such conclusions based on unfounded assumptions defies the scientific method.

A differential diagnosis based upon a potential cause that has not been reliably "ruled in" is flawed and inadmissible.

2. A differential etiology is not the same as a differential diagnosis.

A differential etiology is not the same as a differential diagnosis. A differential diagnosis focuses on the diagnosis and treatment of disease, not on the legal determination of the cause or etiology of the disease. The "diagnosis" of SBS/AHT is not, in fact, a differential diagnosis, but rather, a differential etiology. The term "differential etiology" is used "to describe the investigation and reasoning that leads to the determination of external causation, sometimes more specifically

described by the witness or court as a process of identifying external causes by a process of elimination."[68]

Courts in other jurisdictions have been unwilling to conflate differential diagnoses with determinations about etiology. "It is too easy to gloss over these two definitions and conclude that they amount to a distinction without a difference * * *. The distinction is more than semantic; it involves an important difference."[69] In *Bowers v. Norfolk S. Corp.*, the federal district court in Georgia explained that "[t]he differential diagnosis method has an inherent reliability; the differential etiology method does not."[70] The *Bowers* court noted, for example, that when diagnosing a patient for ***treatment*** purposes, the doctor has special incentives that provide assurances of accuracy: misdiagnosis can lead to catastrophic failure for the patient, even death, from failure to prescribe the correct treatment. And that error can in turn lead to medical malpractice liability.[71] When a physician opines that a child's brain injuries were caused by abuse, however, she is not diagnosing the patient for ***treatment*** purposes. The diagnosis is intracranial injury, and it is that injury that is treated. There is no particular medical ***treatment*** for abuse. The treatment of a head

---

[68] *McClain*, 401 F3d at 1252 (citing Mary Sue Henifin et al., *Reference Guide on Medical Testimony,* in *Reference Manual on Scientific Evidence* 439, 481 (Federal Judicial Center, 2d ed 2000)).
[69] *Bowers v. Norfolk S. Corp.*, 537 F Supp 2d 1343, 1360 (MD Ga 2007), *aff'd,* 300 F App'x 700 (11th Cir 2008).
[70] *Id.* at 1361.
[71] *Id*.

injury does not change based on how it was sustained. Whether an injury was inflicted or accidentally sustained has no bearing on the way a patient is treated medically. There is no surgical technique, treatment, or medication that is prescribed based on the intent of an alleged abuser. If, for example, a patient has bleeding within the protective coverings of the brain, that blood can cause damage and may require surgery. This does not change based on whether the blood is there because of accident, abuse, or some other medical cause.

The reality of medical practice further undermines the reliability of the differential etiology. Experience can be a valuable part of any expertise, if it is the sort of experience from which the expert can learn. The true differential diagnosis—diagnosing a patient's medical illness or condition for purposes of prescribing treatment—at least has the potential for enabling the doctor to learn by experience, and hence improving reliability. If the doctor misdiagnoses an illness or condition, the treatment will likely fail, and the doctor will adjust the treatment accordingly. But because there is no treatment for abuse, judgments about causation (etiology) do not offer similar opportunities for feedback and learning to ensure experience-based reliability. Medical professionals have recognized this challenge even in the context of a true diagnosis. Doctors Eta S. Berner & Mark L. Graber, for example, have observed that, where feedback is absent or minimal, overconfidence by the physician can be a significant source of diagnostic error: "[F]eedback that is delayed or absent

may not be recognized for what it is, and the perception that 'misdiagnosis is not a big problem' remains unchallenged. That is, in the absence of information that the diagnosis is wrong, it is assumed to be correct * * *."[72] And Dr. Gordon Schiff has explained how the absence of feedback can undermine reliability, even in the true diagnosis context:

> An open-loop system (also called a 'nonfeedback controlled' system) is one that makes decisions based solely on preprogrammed criteria and the preexisting model of the system. This approach does not use feedback to calibrate its output or determine if the desired goal is achieved. * * * [Such a system] cannot engage in learning.[73]

Again, because opining about the etiology of a child's brain injuries—an opinion that entails legal conclusions about not only what some external actor did, but also what that person's mental state was (abuse typically requires intent or recklessness)—provides no feedback mechanism, the exercise is unreliable. Without the feedback required to "engage in learning," the purported expert's opinions based on clinical judgment amount to nothing more than *ipse dixit*, which courts in Oregon and around the country specifically prohibit.[74]

---

[72] Eta S. Berner & Mark L. Graber, *Overconfidence as a Cause of Diagnostic Error in Medicine*, 121 AM J MED (5 Suppl) S2 (2008).

[73] Gordon D. Schiff, *Minimizing Diagnostic Error: The importance of Follow-up and Feedback*, 121 AM J MED S38 (2008) (emphasis added).

[74] *See General Electric Co. v. Joiner,* 522 US 136, 146, 118 S Ct 512, 139 L Ed 2d 508 (1997) ("Nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert."); *Henderson v. United Pac. R. Co.*, 189 Or 145, 167, 219 P2d 170 (1950) ("It is the rule in this state, as elsewhere, that 'an expert,

Legal scholars have long observed that scientific expert testimony creates tensions with the legal system, and "the problems are most salient when scientists are called upon to offer opinions on causation."[75] Dr. Douglas Weed, an epidemiologist with the National Cancer Institute, has explained why causal claims are much less reliable than other types of medical assessments:

> [T]he causal claim itself—that this type of virus caused that sort of cancer—does not have this same sort of connection back to some unique event that can be documented, verified, and directly observed. The causal claim is a scientific hypothesis and we cannot ever know if it is true in the same sense as the existence of the virus, the cancer, and its author. The hypothesis can be well supported or not by the available evidence. It can be more or less certain, more or less proven, but it cannot ever be true. The reason is remarkably straightforward. Causation cannot be seen. Causation cannot be proven. And the evidence for causation always underdetermines our capacity to choose between the causal hypothesis of interest and its various alternatives.[76]

None of this means that the differential etiology method has ***no*** merit; but it does mean "that courts, when dealing with matters of reliability, should consider opinions based on the differential etiology method with more caution. It also means

---

though thoroughly qualified as a witness, cannot be permitted to give an opinion upon facts known to him, and not communicated to the jury'; that 'no allegation can be proven by the *ipse dixit* opinion of any expert unless the facts or phenomena upon which he bases his opinion are disclosed either by his own testimony or that of other witnesses.'") (citations omitted).

[75] Margaret A. Berger & Lawrence M. Solan, *The Uneasy Relationship Between Science and Law: An Essay and Introduction*, 73 BROOK L REV 847, 849 (2008).

[76] Douglas L. Weed, *Truth, Epidemiology, and General Causation*, 73 BROOK L REV 943, 949 (2008).

that courts should not conflate [differential etiology with differential diagnosis]."[77] Courts must not allow witnesses to avoid the reliability analysis by simply claiming to have performed a differential diagnosis.

> [S]imply claiming that an expert used the "differential diagnosis" method is not some incantation that opens the *Daubert* gate to allow an expert's opinions to be admitted at trial. Indeed, it can easily amount to nothing more than medico-legal sophistry used in an attempt to avoid the Court's reliability analysis.[78]

Oregon courts have yet to differentiate between a "differential diagnosis" and a "differential etiology."[79] They have historically admitted testimony from medical experts to determine the external cause of disease or symptoms, including under a "diagnosis" of child abuse.[80] They have, however, required that "a party seeking admission of a diagnosis of child abuse must identify the methodology and the specific steps that the expert used to arrive at a diagnosis of child abuse and demonstrate the scientific validity of each."[81]

Dr. Valvano, here, testified that Ariannah's injuries were caused by abuse and could not have been caused by a short fall or other accidental injury. He did not, however, follow a valid scientific methodology to support his opinion. The

---

[77] *Bowers*, 537 F Supp 2d at 1361.
[78] *Id*. at 1360.
[79] *Marcum*, 345 Or at 247 n 9.
[80] *State v. Beauvais*, 261 Or App 837, 843-44, 322 P3d 1116 (2014).
[81] *State v. Sanchez-Alfonso*, 352 Or 790, 801 n 10, 293 P3d 1011 (2012) (citing *State v. Southard*, 347 Or 127, 133, 218 P3d 104 (2009)).

conclusion that Ariannah suffered from SBS/AHT is unreliable under OEC 702 and misleading under OEC 403. It is, furthermore, highly prejudicial because judges and jurors are inclined to err on the side of caution to protect the youngest and most vulnerable members of our community. Caution is laudable, but misplaced when there is no evidence of abuse and the expert's unreliable conclusions lead to the breakup of a family and possibly a wrongful conviction.

3. A medical expert on SBS/AHT cannot avoid the reliability analysis by creating a label that includes the inadmissible opinion on causation.

The diagnosis of "shaken baby syndrome" or "abusive head trauma," as was used in this case, includes the expert's opinion on causation in the very title of the diagnosis. The label is misleading given that the expert cannot reliably conclude that the injuries were caused by shaking or abuse. Although a medical expert may be able to testify to physical findings on examination, that expert should not be able to give those findings a label that sneaks in his opinion of causation that would otherwise be inadmissible.

Dr. Guthkelch, the neurosurgeon credited with the "discovery" of SBS/AHT, recognized the misleading character of the name in his 2012 article criticizing the manner in which the diagnosis has been used.[82] Dr. Guthkelch properly recognized that "the appellation shaken baby syndrome (SBS) asserts a unique etiology

---

[82] Guthkelch, *supra* n 6, at 202.

(shaking)."[83] The term "also implies intent since it is difficult to 'accidentally' shake a baby."[84] In addition, Dr. Guthkelch recognized that the "newer term, abusive head trauma (AHT), implies both mechanism (trauma) and intent (abusive)."[85] Dr. Guthkelch identified the problem with a title that presumes causation: "Since subdural and retinal hemorrhages (with or without cerebral edema) may also be observed in accidental or natural settings, I suggest that the elements of the classic triad of retinal hemorrhage, subdural hemorrhage and cerebral edema would be better defined in terms of their medical features."[86]

This court should exclude the diagnosis of "shaken baby syndrome" or "abusive head trauma" in absence of (1) corroborating evidence that reliably rules in abuse and (2) a differential diagnosis that reliably rules out accidental or nontraumatic injury.

C. Courts around the country have reversed convictions based on SBS/AHT diagnoses by medical experts.

No one knows the error rate in the diagnosis of SBS/AHT, although errors indisputably exist.[87] In 2015, The Washington Post reported that 16 convictions in

---

[83] *Id.*
[84] *Id.*
[85] *Id.*
[86] *Id.*
[87] Dr. Valvano testified that he is "not aware of a known error rate" for diagnosing traumatic nonaccidental brain injuries. (P Tr 50).

SBS/AHT cases have been overturned since 2001, and the paper identified 200 more in which charges were dropped or defendants were found not guilty.[88]

In 2008, the Wisconsin Court of Appeals ordered a new trial for a defendant convicted in an SBS/AHT case solely on the basis of medical expert testimony, holding that newly discovered evidence undermined the validity of the SBS/AHT hypothesis.[89] The court found that "there has been a shift in mainstream medical opinion since the time of [defendant's] trial as to the causes of the types of trauma [the infant] exhibited."[90] Citing the "emergence of a legitimate and significant dispute within the medical community" regarding the SBS/AHT hypothesis, the court found that a jury might have reasonable doubt as to the defendant's guilt.[91]

The Wisconsin Court of Appeals revisited this issue three years later, affirming a lower court's decision to grant a new trial in the interest of justice to a defendant convicted on the basis of medical testimony regarding the SBS/AHT hypothesis.[92]

In 2012, the Texas Court of Criminal Appeals remanded a capital conviction for a new trial after experts testified that the type of injuries the infant suffered

---

[88] Debbie Cenziper, *Shaken Science: A Disputed Diagnosis Imprisons Parents*, Washington Post, March 20, 2015 (available at: http://www.washingtonpost.com/graphics/investigations/shaken-baby-syndrome/).
[89] *Wisconsin v. Edmunds*, 746 NW2d 590, 599 (Wis Ct App 2008).
[90] *Id.*
[91] *Id.*
[92] *State v. Louis*, 2011 WL 867677, at *5 (Wis Ct App, Mar 15, 2011).

could have been caused by an accidental short fall onto concrete, rather than by abuse.[93] The medical examiner in that case originally testified at trial that the infant's injuries could not result from an accidental fall and could be caused only by abuse. [94] That same medical examiner testified years later that, based on more recent scientific advances, he could no longer state to a reasonable degree of medical certainty whether the child's injuries resulted from an intentional act of abuse or an accidental fall.[95] In concurring opinions, the judges found that "[c]hanging science has cast doubt on the accuracy of the original jury verdict"[96] and a new trial should be had based on the "inadvertent use of false evidence" by the state.[97]

In January 2014, the Northern District of Illinois found that newly discovered evidence discrediting the SBS/AHT hypothesis demonstrated the actual innocence of Jennifer Del Prete, a woman convicted on the basis of an SBS diagnosis in 2005.[98] During an evidentiary hearing on Del Prete's writ of habeas corpus, the court considered experts from both sides who testified regarding the SBS/AHT hypothesis.[99] The court evaluated the testimony to "determine whether

---

[93] *Ex Parte Henderson*, 384 SW 3d 833, 834 (Tex Ct App 2012).
[94] *Id*. at 838 (Cochran, J., concurring).
[95] *Id.* at 839 (Cochran, J., concurring).
[96] *Id.* at 837 (Cochran, J., concurring).
[97] *Id.* at 834 (Price, J., concurring).
[98] *Del Prete v. Thompson*, 10 F Supp 3d 907, 958 (ND Ill 2014).
[99] *Id.* at 955.

any reasonable juror who heard all of [the evidence] could find Del Prete guilty beyond a reasonable doubt."[100] The court concluded that "[t]he answer to that question is a rather resounding no."[101] The court found that the evidence presented by the defense "gives rise to abundant doubt, not merely reasonable doubt, regarding Del Prete's guilt."[102] The court concluded that recent scientific developments "arguably suggest[ ] that a claim of shaken baby syndrome is more an article of faith than a proposition of science."[103]

In 2015, prosecutors in Middlesex County, Massachusetts dismissed charges against child care provider Aisling McCarthy when medical examiners reconsidered their opinions regarding a child's death. McCarthy's case was the second case in Middlesex County in 2015 in which medical examiners corrected a misdiagnosis of AHT, concluding after additional investigation that medical conditions, rather than abuse, caused the findings.[104]

Several United States Supreme Court Justices have voiced concerns about the diagnosis of SBS/AHT. In a dissenting opinion written in 2011, Justice

---

[100] *Id.*
[101] *Id.*
[102] *Id.* at 957.
[103] *Id.* at 957 n 10.
[104] Peter Schworm et. al., *In Stunning Reversal, Nanny's Murder Case Dropped*, Boston Globe, August 31, 2015 (available at: http://www.bostonglobe.com/metro/2015/08/31/state-medical-examiner-office-changes-finding-finds-homicide-infant-death/yQSNRpNQwWw5Ha29Bhqs4H/story.html?event=event25).

Ginsburg, joined by Justices Breyer and Sotomayor, cited with approval an article in the American Journal of Forensic Medicine and Pathology concluding that, by the end of 1998, it had become apparent that "there was inadequate scientific evidence to come to a firm conclusion on most aspects of causation, diagnosis, treatment, or any other matters pertaining to SBS" and "the commonly held opinion that the finding of [subdural hemorrhage] and [retinal hemorrhage] in an infant was strong evidence of SBS was unsustainable."[105]

More wrongful convictions based on SBS/AHT are likely to come to light. Courts cannot ignore the very real scientific developments that have undermined the SBS/AHT hypothesis. Expert testimony that disregards those developments is unreliable and contrary to the scientific method.

IV. CONCLUSION

Expert testimony on SBS/AHT is unreliable in the absence of (1) corroborating evidence that reliably rules in abuse and (2) a differential diagnosis that reliably rules out accidental or non-traumatic injury. *Amicus* OIP requests that this court prevent the admission of such unreliable expert testimony under OEC 702 and OEC 403. *Amicus* OIP specifically requests that this court recognize that

---

[105] *Cavazos*, 132 S Ct at 10 (Ginsburg, J., dissenting) (citing Donohoe, *Evidence–Based Medicine and Shaken Baby Syndrome, Part I: Literature Review*, 1966–1998, 24 AM J FORENSIC MED & PATHOLOGY 239, 241 (2003)).

reliability under the Oregon Rules of Evidence cannot be determined by the trier of fact after a "battle of the experts." Because expert testimony is so compelling, and judges and jurors lack expertise to critically assess it, reliability is a threshold question that should force experts to follow the scientific method before offering their conclusions that have significant legal consequences. Experts who fail to follow the scientific method must be excluded.

Dated: January 12, 2016

Respectfully submitted,

OREGON INNOCENCE PROJECT

/s/Janis C. Puracal
Steven T. Wax (OSB #850120)
Email: wax@oregoninnocence.org
Aliza B. Kaplan (OSB #135523)
Email: kaplan@oregoninnocence.org
Janis C. Puracal (OSB #132288)
Email: puracal@oregoninnocence.org
P.O. Box 40588
Portland, OR 97240
(503) 944-2271

CERTIFICATE OF FILING

I certify that I directed the foregoing BRIEF OF *AMICUS CURIAE* to be filed with the Appellate Court Administrator, Appellate Courts Records Section, 1163 State Street, Salem, Oregon 97301, on January 12, 2016.

CERTIFICATE OF SERVICE

I certify that, upon receipt of the confirmation email stating that the document has been accepted by the eFiling system, the BRIEF OF *AMICUS CURIAE* will be eServed pursuant to ORAP 16.45 (regarding electronic service on registered eFilers) on:

Shannon Storey (OSB #034688) Chief Defender Juvenile Appellate Section Sarah Peterson (OSB #074897) Deputy Public Defender Juvenile Appellate Section Office of Public Defense Services 1175 Court Street NE Salem, OR 97301 Email: sarah.peterson@opds.state.or.us Phone: (503) 378-3349 Attorneys for Appellant K. A. H.	Ellen F. Rosenblum (OSB #753239) Attorney General Paul L. Smith (OSB #001870) Deputy Solicitor General Michael S. Shin (OSB #135966) Senior Assistant Attorney General 1162 Court Street NE Salem, OR 97301 Email:Michael.s.shin@doj.state.or.us Phone: (503) 378-4402 Attorneys for Respondent

/s/Janis C. Puracal
Janis C. Puracal (OSB #132288)
Email: puracal@oregoninnocence.org
Oregon Innocence Project
P.O. Box 40588
Portland, OR 97240
(503) 944-2271

CERTIFICATE OF COMPLIANCE

I certify that (1) BRIEF OF *AMICUS CURIAE* complies with the word count limitation in ORAP 5.05(2)(b) and (2) the word count of this brief, as described in ORAP 5.05(2)(a), is 8,900 words.

I certify that the size of the type in this brief is not smaller than 14 point for both the text of the brief and footnotes as required by ORAP 5.05(4)(f).

/s/Janis C. Puracal
Janis C. Puracal (OSB #132288)
Email: puracal@oregoninnocence.org
Oregon Innocence Project
P.O. Box 40588
Portland, OR 97240
(503) 944-2271