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Supreme Court of Kentucky

2013-SC-000059-DG

RICHARD C. OLIPHANT, M.D. AND
LOUISVILLE PHYSICIANS
FOR WOMEN, PLLC — APPELLANTS

V.

ON APPEAL FROM JEFFERSON CIRCUIT COURT
HONORABLE BARRY WILLETT, JUDGE
NO. 05-CI-002925

BILLY JO RIES, INDIVIDUALLY AND AS
FRIEND OF INFANT CHILD, LAUREN
ELIZABETH RIES AND KEVIN RIES,
INDIVIDUALLY AND AS FRIEND OF INFANT
CHILD, LAUREN ELIZABETH RIES — APPELLEES

OPINION OF THE COURT BY JUSTICE KELLER

REVERSING AND REMANDING

A Jefferson Circuit Court jury rendered a verdict in favor of the defendants in this medical negligence case, and the circuit court entered a judgment consistent with that verdict. The Court of Appeals reversed that judgment, holding that the trial court improperly admitted into evidence testimony from an expert that was not scientifically reliable under *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Before us, Dr. Richard C. Oliphant and Louisville Physicians for Women, PLLC (collectively Dr. Oliphant), [1] argue a number of issues; however, the majority of the issues arise

[1] Dr. Robinson and her practice group, Neonatal Associates, were parties to the appeal before the Court of Appeals. However, they entered into a settlement agreement with the Rieses after the Court of Appeals rendered its opinion and are no

from Dr. Oliphant's contention that the Court of Appeals erred by substituting its findings for the trial court's regarding the reliability of Dr. Goldsmith's testimony. In the alternative, Dr. Oliphant argues that any error by the trial court was harmless. The Rieses argue to the contrary.

I. BACKGROUND.

At approximately 5:00 a.m. on January 20, 1997, Billie Jo Ries, who was 36 weeks pregnant, noted that she was bleeding vaginally. The Rieses went to Baptist East Hospital (the Hospital), where Billie Jo delivered a daughter, Lauren, by C-section at 6:59 a.m. Due to the loss of approximately one-third of her blood, Lauren suffered multiple organ failure and brain damage. As a result, Lauren, who was thirteen years old at the time of trial, is unable to care for herself. The Rieses cared for Lauren for the first twelve years of her life but, prior to trial, they determined that they could no longer do so. Therefore, they placed Lauren in a residential care center, the Home of the Innocents.

The Rieses filed suit against the Hospital, Dr. Oliphant, who delivered Lauren, and Dr. Robinson, the neonatologist who treated Lauren after her birth. At trial, the Rieses argued the majority of Lauren's blood loss occurred after she arrived at the Hospital, and her injuries could have been prevented if she had been delivered earlier by Dr. Oliphant, or if she had received appropriate treatment from Dr. Robinson after delivery. The Hospital, Dr. Oliphant, and Dr. Robinson argued that they complied with their respective

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longer parties to this appeal. Furthermore, we note that the Rieses named Baptist East Hospital as a defendant. However, the Rieses and the Hospital entered into an agreed order of dismissal, and the Hospital is not a party to this appeal.

standards of care. Furthermore, they argued that the majority of Lauren's blood loss occurred before she arrived at the Hospital; therefore, they could not have prevented her injuries.

The expert witness whose opinion is the focus of the dispute herein is Dr. Jay Goldsmith, a neonatologist retained to testify on behalf of Dr. Robinson. Dr. Goldsmith testified twice by deposition before trial and live at trial. We summarize Dr. Goldsmith's relevant testimony below.

During his first deposition, Dr. Goldsmith testified that, following a loss of blood, the cardio-vascular system takes fluids from other parts of the body to increase blood volume, a process known as equilibration. The fluids incorporated into the cardio-vascular system through equilibration do not contain red blood cells; therefore, when equilibration occurs, the percentage of red blood cells in proportion to total blood volume decreases. According to Dr. Goldsmith, it takes two to four hours for blood volume to normalize through equilibration.

Based on his review of the medical records and a mathematical formula he devised, Dr. Goldsmith opined that Lauren lost approximately one-third of her blood volume at 5:00 a.m. In reaching that conclusion, Dr. Goldsmith relied on a report in the medical records that Billie Jo noticed a "gush" of blood at 5:00 a.m.; the absence of any report of significant bleeding in the medical records after Billie Jo arrived at the Hospital; his estimation of Lauren's blood volume at birth; his estimation of her blood volume at 7:40 a.m.; the proportion of red blood cells relative to Lauren's total blood volume at 7:40 a.m. compared

to what that proportion should have been; and the time it takes to equilibrate. When questioned about the rate of equilibration, Dr. Goldsmith admitted that there were no studies on intrauterine human fetuses; however, there were studies involving animals and post-partum children and adults. At the request of the Rieses' counsel, Dr. Goldsmith stated that he would attempt to find studies to support his mathematical formula. By agreement, the parties suspended Dr. Goldsmith's deposition so that he could do so.

During his second deposition, Dr. Goldsmith testified that he had neither looked for nor found any studies indicating what the rate of equilibration is in an intrauterine human fetus. However, he stated that the rate of equilibration post birth in humans is a well-known and accepted medical fact. Dr. Goldsmith did admit that a faster intrauterine equilibration rate would mean that Lauren's blood loss occurred closer in time to her birth than 5:00 a.m. Furthermore, he admitted that Lauren may have been able to take some blood from the placenta, but he believed that amount would have been negligible and would have had no impact.

At the final pre-trial conference the Rieses noted that Dr. Robinson, who had retained Dr. Goldsmith, had not disclosed Dr. Goldsmith's mathematical formula or the opinions he reached based on that formula prior to his first deposition. Therefore, the Rieses moved to exclude any testimony by Dr. Goldsmith about his mathematical formula and any conclusions he had reached based on that formula. The Rieses did not bring a *Daubert* challenge regarding the reliability of Dr. Goldsmith's mathematical formula, although

they reserved the right to do so at trial. The trial court overruled the Rieses' motion, finding that, pursuant to *Daubert*, "all proposed expert opinion testimony is reliable and relevant."

Prior to Dr. Goldsmith's testimony at trial, which came on the fourteenth day of trial, the Rieses moved the court for a *Daubert* hearing regarding the reliability of Dr. Goldsmith's mathematical formula. The Rieses argued that Dr. Goldsmith had never produced any studies or literature to support his opinion that the equilibration rate in intrauterine human fetuses is the same as it is after birth. Therefore, his mathematical formula did not meet the *Daubert* standard.

In response, Dr. Robinson argued that it was too late in the litigation to raise this issue. Furthermore, Dr. Robinson filed studies[2] involving the equilibration rate in intrauterine sheep fetuses, which she argued were consistent with Dr. Goldsmith's testimony. The Rieses argued that these studies could not be relied on because they had not been produced before trial, even though Dr. Goldsmith's first deposition had been suspended so that he could find support for his formula.

The court agreed with Dr. Robinson that the Rieses' motion for a *Daubert* hearing was not timely. Furthermore, the court stated that, based on the

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[2] In her response, Dr. Robinson noted that four of the studies were reported in articles in the *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology,* which she stated is a peer-reviewed journal.

arguments and the materials reviewed,[3] Dr. Goldsmith's testimony was "appropriate" and the Rieses' arguments went to the weight rather than the admissibility of Dr. Goldsmith's opinions. Therefore, the court denied the Rieses' motion. The court then granted the Rieses' follow-up motion to exclude testimony by Dr. Goldsmith regarding any articles that had not been previously disclosed. Finally, the court granted the defendants' motion to exclude any argument by the Rieses that Dr. Goldsmith's mathematical formula was not supported by any scientific literature.

At trial, Dr. Goldsmith's testimony was consistent with his deposition testimony regarding equilibration and the timing of Lauren's blood loss. He also testified that Lauren's kidney function tests, her decreased heart rate when she arrived at the Hospital and placental pathology findings supported his opinion that her blood loss occurred before she arrived at the Hospital.

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[3] The court had the following available for review: the Rieses' motions in *limine* and for a *Daubert* hearing; the responses to those motions filed by the defendants; the transcripts from both of Dr. Goldsmith's depositions; and the transcript of the deposition of Dr. Phalen (the Rieses' expert on neucleated red blood cells), who testified that he disagreed with Dr. Goldsmith's formula. The court also had available for review the transcripts of the depositions of: Dr. Oliphant; Nancy Hamilton, R.N. (labor and delivery nurse at the Hospital); Beverly Clark, R.N. (nursery and post-partum nurse at the Hospital); Dr. Puri (Lauren's treating physician); Billie Jo and Kevin Ries (Lauren's parents); Katherine O'Connell, M.N., R.N. (the Rieses' nursing care expert); Dr. Bendon (the perinatal pathologist); Dr. Robinson; Karen Bennett Spillman, R.N. (nursery nurse at the Hospital); Laurie Bliven (blood bank supervisor at the Hospital); Sherry Grant McGrath, R.N. (labor and delivery nurse at the Hospital); Anna Kaelin (OB technician at the Hospital); David Gibson (the Rieses' vocational expert); Dr. Koontz (an OB/GYN expert witness for Dr. Oliphant); Wanda Henry (Lauren's grandmother); Dr. Crawford (the Rieses' neonatology expert); and Dr. Barnes (Dr. Robinson's expert pediatric neurologist). Finally, the court had the vantage point of having sat through thirteen days of trial testimony.

In addition to Dr. Goldsmith, the defendants presented testimony at trial from Drs. Elliott, Ferrara, Puri, Bendon, Carter, and Barnes that Lauren's blood loss occurred at home. Dr. Elliott stated that, based on his review of the medical records and the depositions, three velamentous blood vessels ruptured, the first rupturing at 5:00 a.m. when Billie Jo noticed vaginal bleeding containing bright red blood. According to Dr. Elliott, the fact that the blood was bright red indicated it was fetal, not maternal blood, and if the ruptured vessel had continued to bleed, Lauren would have bled to death before she got to the Hospital. Therefore, he theorized that Lauren shifted in the womb and inadvertently put sufficient pressure on the ruptured vessel to stop the bleeding. Dr. Elliott stated that he believed the other two vessels ruptured during birth but that the damage to Lauren had already been done by that time. In support of his theory that the first vessel ruptured before Billie Jo got to the hospital, Dr. Elliott noted that one of the ruptured vessels had evidence of neutrophils, which take at least 20 to 40 minutes to appear following a rupture. Dr. Elliott recognized that equilibration takes place but, based on a ruling by the court, did not make any inferences regarding when Lauren's bleeding occurred based on equilibration.

Dr. Ferrara, a defense expert neonatologist called by the Hospital, testified primarily regarding the standard of care for the Hospital. However, he

also testified that he was more than 90% certain Lauren's blood loss occurred at home. [4]

Dr. Puri testified that he believed Lauren suffered some blood loss and injury at home. However, he did not attempt to quantify when the majority of the blood loss occurred.

Dr. Bendon, the pathologist who examined the placenta and umbilical cord, testified that he found evidence of "mural neutrophils" which indicate that Lauren had a ruptured vessel and began to bleed before delivery. He could not state with precision when the rupture occurred. However, he testified that:

> [I]n order to get dilution, in order to get a low hematocrit, there has to be time for the baby to bring in more blood volume, more salt water, protein, whatever, from mom's circulation to make up the blood volume, and that takes a period of time. In the fetal sheep, it will be, in most situations, completely reconstituted within six hours.
>
> But if you bleed very, very suddenly, your hematocrit is going to be normal, your blood volume, your total volume of blood in your blood vessels will be decreased, but the percentage that are red cells compared to the percentage that is serum will be the same because - - if you bleed rapidly.

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[4] We do not have Dr. Ferrara's deposition transcript or his direct testimony from trial in the record. From what we have in the record, it appears that Dr. Ferrara testified at trial on the morning of September 21, 2010. The video from September 21, 2010 starts at 9:00:42 with the parties and the court discussing coverage by the press and various objections. That segment ends at 9:13:54. The video then skips to 11:16:46 with Dr. Robinson's counsel beginning his examination of Dr. Ferrara. Presumably, Dr. Ferrara's testimony on direct examination took place between 9:14 and 11:16. Based on a question by counsel for Dr. Robinson, Dr. Ferrara gave several reasons for his opinion that Lauren's bleed occurred before she arrived at the Hospital during direct examination by counsel for the Hospital. Furthermore, based on an objection during Dr. Ferrara's testimony on re-direct, it appears that Dr. Ferrara based his opinion, at least in part, on Dr. Bendon's testimony.

> So if somebody had had a serious trauma, cut an artery, and you take their hematocrit at that point, it will look normal even though they may have almost no blood. Then, if you give them fluid back, particularly Ringers lactate or something that will stay in the vascular system, then their hematocrit will fall because you've diluted it and their blood volume has come back up to its volume, but now it has fewer red cells in that volume, so the hematocrit is lower.
>
> In this particular baby, there was some of both. There was constriction of almost all the large stem vessels, suggesting the total volume, at least in the placenta - - of course, I can't see the baby - - in the placenta was decreased; yet in other areas there was evidence that the hematocrit was decreased, that some fluid had come from the placenta to the baby. So this wasn't something that probably occurred minutes prior to delivery.
>
> On the other hand, I really can't tell you any precise timing except that it's within those minutes to those six hours.

Dr. Carter, an expert retained by Dr. Robinson, testified that he believed that Lauren began bleeding at home at 5:00 a.m. as a result of a velamentous vessel tear. He stated that Lauren survived by getting blood from the placenta; however, he also stated that the umbilical cord was prolapsed, which impeded the exchange of blood from Billie Jo to Lauren. According to Dr. Carter, the placenta retained some reserve of blood until approximately five minutes before birth because Lauren would have died in utero otherwise. Dr. Carter noted that the medical records, the pathology findings, and Lauren's decreased hemoglobin, which indicated that she had suffered a 30% decrease in blood volume, supported his opinion regarding when Lauren began to bleed.

Dr. Barnes, who testified on behalf of Dr. Robinson, testified that Lauren suffered an acute blood loss and subsequent brain damage before she arrived at the Hospital. He based his opinion regarding the timing of the blood loss on

Lauren's brain scans, which were consistent with an acute rather than prolonged blood loss; Lauren's low postpartum hematocrit; Lauren's significantly decreased heart rate when Billie Jo arrived at the Hospital; and Billie Jo's statement in the medical records that there was a "gush" of blood at home. Although he did not rely on it, Dr. Barnes noted the equilibration process can contribute to replacing lost blood volume.

On the other hand, the Rieses' experts, Drs. Crawford, Phalen, and Brown, testified that Lauren's blood loss had to have occurred either after she arrived at the Hospital or during delivery. According to Dr. Brown, Lauren would have died before she got to the Hospital if she had lost a significant amount of blood at home. Furthermore, he noted that Billie Jo stated that Lauren was moving when they got to the Hospital, which Lauren would not have been able to do following a significant blood loss at home. Dr. Brown also noted that the fetal monitor indicated at 6:05 that Lauren was not in significant distress, a finding he would not have expected if Lauren had lost 30% of her blood volume one hour earlier.

Dr. Crawford testified that Lauren's blood loss occurred after she arrived at the Hospital, either just before or during birth. According to Dr. Crawford, if Lauren had lost 30% or more of her blood volume at 5:00 a.m., she would not have been moving when Billie Jo arrived at the Hospital. Furthermore, Dr. Crawford noted that Lauren's heart rate as measured by the fetal monitor was low when she arrived at the hospital and then improved. That would not have occurred and Lauren would not have responded to chest compressions if she

had lost 30% of her blood volume before arriving at the Hospital. As to the bleeding Billie Jo experienced at home, Dr. Crawford believed that was maternal not fetal blood.

Dr. Phalen testified that Lauren had 15% nucleated red blood cells at birth, which indicated to him that Lauren's blood loss occurred after she arrived at the Hospital. According to Dr. Phalen, if the blood loss had occurred at 5:00 a.m. he would have anticipated Lauren's nucleated red blood cell percentage to have been twenty-five or more. In his deposition, but not at trial, Dr. Phalen testified that he disagreed with Dr. Goldsmith's formula and noted that there are no known studies regarding intrauterine fetal blood loss and equilibration.

As previously noted, based on the preceding evidence, as well as testimony from nurses and the Rieses, the jury rendered a defense verdict. The Rieses appealed to the Court of Appeals, which reversed. In doing so, the Court of Appeals held that the trial court erred in admitting Dr. Goldsmith's testimony about the rate of equilibration because "[t]here is simply no evidentiary objective source in the record to support the trial court's finding that [Dr.] Goldsmith's assumption and, thus, his mathematical formula were reliable." *Ries v. Oliphant,* 2011-CA-000100-MR, *12, 2012 WL 6632511 (Ky. App. December 21, 2012). The Court then determined that the error mandated reversal because "there exists a reasonable possibility that the jury verdict would have been different absent [Dr.] Goldsmith's testimony concerning his mathematical formula." *Id.* at *14.

As noted above, Dr. Oliphant appealed arguing the Court of Appeals impermissibly substituted its findings for the trial court's regarding the reliability of Dr. Goldsmith's testimony and the Court of Appeals erroneously determined that the error mandated reversal. We address each issue below.

II. STANDARD OF REVIEW.

In making the decision to admit or exclude expert testimony under *Daubert* the trial court must decide whether the testimony is reliable, a factual determination, and whether the testimony will assist the trier of fact in understanding or determining a fact in issue, an admissibility determination. *Miller v. Eldridge,* 146 S.W.3d 909, 915 (Ky. 2004). These two decisions are reviewed under different standards. *Id.* We review the trial court's factual findings regarding reliability for clear error, while we review the trial court's decision regarding admissibility for abuse of discretion. *Id.* A factual finding is clearly erroneous if it is not supported by "'evidence of substance and relevant consequence having the fitness to induce conviction in the minds of reasonable [persons].'" *City of Fort Thomas v. Cincinnati Enquirer,* 406 S.W.3d 842, 854 (Ky. 2013) (*citing Owens–Corning Fiberglas Corporation v. Golightly,* 976 S.W.2d 409, 414 (Ky.1998)). However, a trial court abuses its discretion only if its decision "'was arbitrary, unreasonable, unfair, or unsupported by sound legal principles.'" *Miller,* 164 S.W.3d at 914 (footnote omitted). Finally, if the trial court committed error, we must determine whether that error was harmless. The standard for reviewing non-constitutional evidentiary errors is whether "the reviewing court can say with fair assurance that the judgment was not

substantially swayed by the error." *Hashmi v. Kelly*, 379 S.W.3d 108, 115 (Ky. 2012), *quoting Winstead v. Commonwealth*, 283 S.W.3d 678, 688–89 (Ky. 2009). With these standards in mind, we address the issues raised on appeal.

III. ANALYSIS.

Pursuant to Kentucky Rule of Evidence (KRE) 702, expert witness testimony is admissible if it:

> will assist the trier of fact to understand the evidence or to determine a fact in issue, [and then] a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if:
>
> (1) The testimony is based upon sufficient facts or data;
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> (2) The testimony is the product of reliable principles and methods; and
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> (3) The witness has applied the principles and methods reliably to the facts of the case.

The trial court, without making specific findings of fact or law, determined that Dr. Goldsmith's testimony about his mathematical formula was reliable and thus admissible under *Daubert*. The Court of Appeals determined that the trial court clearly erred when it found Dr. Goldsmith's testimony reliable because the Court of Appeals could find no evidence in the record to support that finding of reliability. The Court of Appeals's opinion, in pertinent part, is set forth below:

> In this case, the record reveals that the Rieses filed a motion for a *Daubert* hearing regarding the admissibility of Goldsmith's expert testimony concerning his "mathematical model and equilibration theory." Therein, the Rieses argued that Goldsmith's mathematical formula was scientifically flawed because he utilized an incorrect equilibration rate for a human fetus in utero. Specifically, the Rieses pointed out that Goldsmith improperly utilized an

equilibration rate of a human adult or child in his mathematical formula timing Lauren's bleed between 5:00 a.m. and 5:15 a.m. Because the equilibration rate was an essential factor in Goldsmith's mathematical formula, the Rieses claim that Goldsmith's mathematical formula was scientifically flawed and unreliable.

In his depositional testimony, Goldsmith readily admitted to having no knowledge of any scientific study or of other objective source directly setting forth the equilibration rate of a human fetus in utero. While the rate of equilibration in an adult and child has been scientifically established, it was flatly admitted that the equilibration rate of a human fetus in utero is "impossible for medical science to determine." Robinson's Brief at 19.

As a result, Goldsmith assumed that the equilibration rate of a human fetus in utero was identical to the equilibration rate of a human adult/child and utilized the rate of equilibration in a human adult/child in his mathematical formula. In his deposition, Goldsmith based his assumption equating the rate of equilibration in a human fetus in utero to that of a human adult/child upon the scientific fact that equilibration occurs in humans and upon sundry studies concerning the equilibration rate of animal fetuses in utero. Thus, Goldsmith's assumption was not based upon his own independent research of the rate of equilibration of a fetus.

When an expert witness bases his opinion upon something other than his own independent research, such expert opinion may be still scientifically reliable "if supported by objective sources." *Burton v. CSX Transp., Inc.*, 269 S.W.3d 1, 9 (Ky. 2008). Succinctly stated, to be reliable under *Daubert*, expert scientific testimony must be supported by "objective sources" if not based upon the expert's own research. *Burton*, 269 S.W.3d at 9.

As hereinbefore pointed out, Goldsmith based his assumption that the rates of equilibration in a human fetus in utero and in a human adult/child were identical upon: (1) the general scientific fact that equilibration occurs in humans and (2) published studies concerning the equilibration rate of animal fetuses in utero. We address each seriatim.

The scientific fact that equilibration occurs in humans cannot serve as a basis of Goldsmith's assumption equating the rates of equilibration in a human fetus in utero to that of a human adult/child. The scientific fact that equilibration occurs in humans is simply inconsequential to determining the rate of such

equilibration for a fetus. There was no scientific foundation presented by Goldsmith to determine the rate of equilibration of a human fetus in utero that served as a basis of Goldsmith's mathematical formula timing Lauren's bleed.

As to the animal studies supporting Goldsmith's assumption equating the rates of equilibration in a human fetus in utero to that of a human adult/child, Goldsmith only generally referred to such studies in his depositions and never put forth a particular study he used as support. Thus, no animal studies were ever specifically cited as a basis for Goldsmith's assumption as to the rate of equilibration in a human fetus in utero. In response to the Rieses' motion for a *Daubert* hearing, appellees cited to four scientific studies appearing in sundry medical journals. However, no medical expert offered an opinion as to the significance of these studies or whether these studies supported Goldsmith's assumption. In fact, Goldsmith never stated that he utilized the proffered studies and never rendered an opinion upon such studies.

Upon examination of the record, there simply existed no "objective sources" of record supporting Goldsmith's assumption that the rate of equilibration in a human fetus in utero is identical to the rate in a human adult/child. *Burton*, 269 S.W.3d at 9. Without an underlying objective basis, it is virtually impossible to determine the reliability of Goldsmith's assumption and, thus, the reliability of his mathematical formula timing Lauren's bleed.

Additionally, as to the traditional *Daubert* factors, Goldsmith's assumption equating the rate of equilibration in a human fetus in utero to that of a human adult/child admittedly has not been directly tested and has not been subject to peer review though publication. *See Toyota Motor Corp.*, 136 S.W.3d 35. Also, the record plainly establishes that Goldsmith's assumption as to the equilibration rate of a human fetus in utero was rejected by some of his peers and, thus, raises a grave question as to its general acceptance by the scientific community.

This Court is ever cognizant of its limited role in reviewing a trial court's ruling on a *Daubert* motion and concomitantly of the trial court's unique position to determine both the reliability and relevance of expert testimony. Nevertheless, evidentiary boundaries do exist.

> In this case, the admission of Goldsmith's expert assumption that the equilibration rate of a human fetus in utero was identical to the rate of a human adult/child transgressed those boundaries. There is simply no evidentiary objective source in the record to support the trial court's finding that Goldsmith's assumption and, thus, his mathematical formula were reliable. *See Burton*, 269 S.W.3d 1. And, Goldsmith's assumption equating the equilibration rate of a human fetus in utero to that of a human adult/child is also lacking in scientific reliability when measured against the traditional *Daubert* factors. *See Toyota Motor Corp.*, 136 S.W.3d at 40. Consequently, we are constrained to conclude that the trial court erred by finding Goldsmith's testimony concerning his assumption as to the equilibration rate of a human fetus in utero reliable under *Daubert*. *See Lukjan*, 358 S.W.3d 33. Because the equilibration rate of an in utero human fetus was a critical factor in his mathematical formula timing Lauren's bleed, the admission of Goldsmith's testimony surrounding his mathematical formula constituted error.

As set forth above, the trial court must make two basic determinations regarding the admissibility of expert testimony whether the testimony will assist the jury in determining a fact that is at issue; and whether the testimony is reliable. The parties presented a significant amount of evidence to establish when Lauren's blood loss occurred. The defendants argued and presented evidence that Lauren's blood loss occurred before the Rieses arrived at the hospital and that by the time the Rieses arrived at the hospital all of the damage to Lauren had been done. The Rieses argued the blood loss occurred after they arrived at the hospital and the damage to Lauren could have been prevented. As evidenced by the amount of proof taken on the issue, when Lauren's blood loss occurred was a crucial fact at issue. Therefore, Dr. Goldman's testimony was testimony that would assist the trier of fact in making that factual finding.

The second basic determination, whether Dr. Goldman's testimony was reliable, is a more difficult issue. As the Court of Appeals correctly noted, *Daubert* sets forth a

> non-exclusive list of factors to be considered by the trial court when determining the admissibility of an expert's proffered testimony:
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> (1) whether the theory or technique can be and has been tested;
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> (2) whether the theory or technique has been subjected to peer review and publication;
>
> (3) the known or potential rate of error in using a particular scientific technique and the existence and maintenance of standards controlling the technique's operation; and
>
> (4) whether the theory or technique has been generally accepted in the particular field.

See Toyota Motor Corp. v. Gregory, 136 S.W.3d 35, 39-40 (Ky. 2004), as amended (June 14, 2004). A court may consider some or all of those factors or other relevant factors in making the determination to admit or exclude expert testimony. *Id.* at 40.

The trial court did not set forth which of the above factors or which other factors it relied on in making the determination to admit Dr. Goldsmith's testimony.

> While this Court would prefer trial courts to include findings of fact in their *Daubert* rulings, "failure to include those findings and conclusions is not automatically indicative of arbitrariness, unreasonableness, unfairness, or application of the wrong legal standard[,]" and "is not grounds for reversal." *Miller v. Eldridge,* 146 S.W.3d 909, 921–22 (Ky. 2004). "[T]he proper appellate approach when the trial court fails to make express findings of fact is to engage in a clear error review by looking at the record to see if

> the trial court's ruling is supported by substantial evidence." *Id.* at 922.

Hyman & Armstrong, P.S.C. v. Gunderson, 279 S.W.3d 93, 101 (Ky. 2008), as modified on reh'g (Nov. 26, 2008). The Court of Appeals undertook that approach and concluded that the trial court's ruling was not supported by substantial evidence. We disagree.

Initially we note that Dr. Goldsmith's theory regarding the rate of equilibration in a human fetus does not fit neatly within any of the above listed *Daubert* factors. As Dr. Goldsmith readily admitted, his theory regarding the rate of equilibration in human fetuses has not been and cannot be tested on human fetuses because doing so would result in the death or significant disability of the test subjects. However, that does not, as the Court of Appeals held, mean Dr. Goldsmith's theory must automatically be excluded.

Because Dr. Goldsmith's theory does not fall neatly within the factors set out in *Daubert*, we look to whether the reliability of that theory is otherwise supported by the evidence. In his depositions, Dr. Goldsmith testified that the rate at which equilibration occurs in human adults and children is a well established fact. The Rieses' experts did not dispute this. The only part of Dr. Goldsmith's theory they disputed is whether the rate of equilibration is the same in a human fetus. In support of his theory, Dr. Goldsmith noted that studies involving sheep fetuses reveal a similar rate of equilibration, as did Dr. Bendon. Furthermore, Dr. Robinson attached articles to her response to the Rieses's motion for a *Daubert* hearing which address the rate of equilibration in

fetal sheep. The trial court took that evidence, the experts' deposition transcripts, and thirteen days of trial testimony into consideration when it concluded that Dr. Goldsmith's theory was sufficiently reliable to present to the jury.

The Court of Appeals stated that any reliance on the articles attached to the response to the motion for a *Daubert* hearing was misplaced because no medical expert offered an opinion regarding the significance of the articles. That is not completely accurate. It is true that no medical expert directly addressed the four articles in question. Furthermore, while the court could have held an evidentiary hearing regarding those articles, it was not required to do so. If the record before the trial court is "complete enough to measure the proffered testimony against the proper standards of reliability and relevance," a hearing is not required. *Commonwealth v. Christie*, 98 S.W.3d 485, 488 (Ky. 2002) (quoting *Jahn v. Equine Services, P.S.C.*, 233 F.3d 382, 393 (6th Cir. 2000)). Dr. Goldsmith and Dr. Bendon testified that studies of equilibration in fetal sheep exist and those studies show the rate at which equilibration occurs. The court could read the articles submitted by Dr. Robinson and determine for itself whether they supported Dr. Goldsmith's theory. It did not need expert testimony directly addressing the articles. The record regarding the articles was sufficiently developed; therefore, the court was not required to hold an evidentiary hearing regarding the significance of the articles.

The Court of Appeals also stated that "no 'objective sources'" support Dr. Goldsmith's theory, meaning that no test results on human fetuses exist. That

is true. However, as noted above, no such objective sources could exist because causing fetal bleeding to test the rate of equilibration in a human fetus would not only be unethical and immoral but criminal. The fact that a theory cannot be tested directly on a human fetus does not mean that it lacks reliability. Because Dr. Goldsmith took what is known - the rate of equilibration in human adults and children and the rate of equilibration in sheep fetuses - and extrapolated that to human fetuses, his theory may be subject to question, but it does not mean that his theory is automatically unreliable. In fact, if we take the Court of Appeals's opinion to its logical conclusion, no scientific theory regarding living humans would be reliable absent testing on living humans. If that is true, any and all automobile crash test results based on data collected from a crash-test dummy would be automatically unreliable. However, that is not the case. We do not require engineers to strap live humans into an automobile and run that automobile into a wall to determine what is likely to happen to live humans in that situation. We permit scientists, using scientific principles, to extrapolate from the data they obtain from crash-test dummies and to post opinions about what would happen to a live human.

Third, the Court of Appeals states that Dr. Goldsmith's theory is unreliable because "some of his peers" rejected it. Unanimity of opinion is not required in order for an expert's opinion to be reliable. If that were the case, the court would have had to reject most, if not all, of the expert testimony herein and in nearly every other case with expert testimony. Disagreement by

some, or even most, experts about the accuracy of a theory does not automatically render it unreliable. *See Burton v. CSX Transp., Inc.*, 269 S.W.3d 1 (2008) (holding that an expert's opinion may be deemed reliable if there is some objective source showing the expert's conclusions are not totally inconsistent with the scientific method).

Therefore, we hold the trial court's finding that Dr. Goldsmith's theory was sufficiently reliable to submit to the jury was supported by evidence of substance, and the trial court did not abuse its discretion by admitting Dr. Goldsmith's testimony.

Finally, we note that, even if the trial court had erred by admitting Dr. Goldsmith's testimony, any such error was harmless.

> No error in either the admission or the exclusion of evidence and no error or defect in any ruling or order or in anything done or omitted by the court or by any of the parties is ground for granting a new trial or for setting aside a verdict or for vacating, modifying, or otherwise disturbing a judgment or order, unless refusal to take such action appears to the court inconsistent with substantial justice. The court at every stage of the proceeding must disregard any error or defect in the proceeding which does not affect the substantial rights of the parties.

Kentucky Rule of Civil Procedure (CR) 61.01.

"A non-constitutional evidentiary error may be deemed harmless . . . if the reviewing court can say with fair assurance that the judgment was not substantially swayed by the error." *Winstead v. Com.*, 283 S.W.3d 678, 688-89 (Ky. 2009). In making that determination it is not whether there was other evidence sufficient to support the verdict, but whether the disputed evidence had a "substantial influence." *Id.* at 689.

As we previously noted, when Lauren began to bleed was a significant issue in this case, and Dr. Goldsmith based his opinion about when Lauren began to bleed on a mathematical formula. However, that was not the only basis for Dr. Goldsmith's opinion. He also noted that Lauren's decreased heart rate when she was admitted to the hospital, her kidney function test results, and the pathology findings supported his opinion. Furthermore, Dr. Goldsmith was not the only physician who opined that Lauren's bleed began at home. Dr. Elliott testified that Lauren began to bleed while at home based on Billie Jo's report that the vaginal bleeding she noticed at home contained bright red blood, an indication the blood was fetal, not maternal and on the biopsy results showing evidence of neutrophils, which take 20 to 40 minutes to form following a rupture. Dr. Elliott also recognized that equilibration takes place but, based on the court's ruling, could not give an opinion about when the bleeding occurred based on equilibration. Dr. Ferrara testified that he was more than 90% certain Lauren began to bleed at home. Dr. Puri, Lauren's treating physician, testified that, based on the type of damage Lauren suffered, she had to have suffered some blood loss at home. Dr. Bendon testified he could not specifically state when Lauren began to bleed but it "wasn't something that probably occurred minutes prior to delivery." He also testified about equilibration and that equilibration studies had been conducted on fetal sheep. Dr. Carter testified that he believed Lauren's blood loss began at home at approximately 5:00 a.m. based on the decrease in Lauren's blood volume, the pathology findings, and the medical records. Dr. Barnes believed that Lauren's

blood loss occurred at home based on Lauren's low decreased heart rate when Billie Jo arrived at the hospital, her brain scans, her postpartum hematocrit, and Billie Jo's statement in the medical records that she experienced a "gush" of blood at home. Furthermore, Dr. Barnes testified that equilibration can contribute to replacing blood volume. Finally, the medical records indicated that there was not a significant amount of blood, other than from Billie Jo's C-section, while she was in the hospital.

Thus, there was sufficient evidence other than Dr. Goldsmith's to support the jury's verdict. The Court of Appeals concluded that admission of Dr. Goldsmith's opinion was reversible error because Dr. Goldsmith used "mathematical certainty to resolve the complex factual issue of timing Lauren's massive bleed" and the impact of his testimony could not be "overstated." We disagree.

Dr. Goldsmith was not the only expert who based his opinion on a mathematical formula. Dr. Phalen, one of the Rieses' experts, calculated the percentage of Lauren's nucleated red blood cells at birth and based his opinion that Lauren's blood loss occurred at the hospital on that calculation. Furthermore, Dr. Goldsmith was but one of many experts who opined when Lauren's blood loss occurred and but one witness in a trial that went from August 21, 2010 to September 28, 2010. In light of all of the evidence regarding when Lauren's blood loss occurred, we cannot agree with the Court of Appeals that admission of Dr. Goldsmith's testimony, if error, amounted to anything more than harmless error.

The other issues raised by Dr. Oliphant are inexorably intertwined with and dependent on the admissibility of Dr. Goldsmith's testimony. Because we have held that there was no error in admitting Dr. Goldsmith's testimony, and if there was error, it was harmless, we need not address any of those issues. However, the Rieses raised an issue on appeal to the Court of Appeals that the Court of Appeals did not address. Therefore, we remand to the Court of Appeals so that it can consider that issue.

IV. CONCLUSION.

Having reviewed the record and the arguments of the parties, we reverse the Court of Appeals and remand so that the Court of Appeals can consider the other issue raised by the Rieses on appeal.

Minton, C.J.; Abramson, Cunningham, Keller, Noble and Venters, JJ., sitting. Minton, C.J.; Abramson, Cunningham and Noble, JJ., concur. Venters, J., concurs in result only by separate opinion.

VENTERS, J., CONCURS IN RESULT ONLY: I concur in the result reached by the Majority opinion but I disagree with its view regarding Dr. Goldsmith's testimony. I am persuaded by the post-trial analysis and argument that the validity of Dr. Goldsmith's mathematical model and equilibration theory was not adequately established pursuant to *Daubert* and KRS 702 so as to properly secure its admission into evidence. However, given the fact that it was not challenged on *Daubert* grounds until well into the trial, I cannot say that the trial court abused its discretion when it permitted the jury to hear Goldsmith's opinion testimony.

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