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IN THE DISTRICT COURT, DEPARTMENT IN AND FOR THE COUNTY OF , STATE OF UTAH

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| THE STATE OF UTAH,  Plaintiff,  -vs-  [DEFENDANT],  Defendant, | **STATE’S MOTION IN LIMINE RE: TESTIMONY OF BIOMECHANICAL ENGINEER KENNETH MONSON**  Case No. 141900316  Judge [JUDGE] |

The State of Utah, through [PROSECUTING ATTORNEY], Deputy District Attorney, moves this Court to exclude the proposed defense witness Dr. Kenneth L. Monson. Based upon the proffered report of Dr. Monson, the testimony is inadmissible under Rule 702 and is also excludable under Rule 403 of the Utah Rules of Evidence. For that reason, the State argues that the Court must act as “gatekeeper” for expert opinion evidence and exclude the proffered opinions unless it is shown the underlying basis of those opinions pass muster under Rule 702 and Rule 403.

# INTRODUCTION AND SUMMARY OF ARGUMENT

Dr. Monson is a biomechanical engineer whose expertise is primarily in designing and testing anthropomorphic models for the purpose of improving safety for humans in auto accidents and other dangerous situations. As cases throughout the United States have recognized, a biomechanical engineer does not see and treat living children in his/her professional practice, is not a medical doctor, and thus is not competent to render opinions as to the likely cause and timing of injuries to a particular child. In addition, biomechanical

experimentation from all sources does not present a valid and scientifically reliable basis for any biomechanical engineer to offer opinions as to whether a particular child’s collection of injuries could or could not have been caused by any particular circumstance. The State also objects to certain scientifically unsupported opinions set out in Dr. Monson’s report relating to assumptions he makes about what medical experts called as witnesses by the State will say or “believe”. Further, Dr. Monson makes several statements which do not adequately reflect the literature in even his own field of expertise, but instead amount to “cherry-picking” that literature and citing only the literature which conforms to his preconceived biases concerning inflicted head injuries in young children. Finally, many of Dr. Monson’s proposed opinions misstate or exaggerate the findings of biomechanical experimentation and research, fail to disclose the complete truth as to that body of science, and amount to polemic statements about issues that are not even relevant to the issues to be determined by a trier of fact in this criminal case.

The section of Dr. Monson’s report entitled *Shaking as An Injury Mechanism* is a good example of unscientific or flawed scientific conclusions drawn by Dr. Monson based on a bias that is clear from his involvement as a professional witness solely for those accused of some form of child abuse. Most significantly, none of the State’s experts are expected to testify that [VICTIM] entire set of injuries could only have been produced by “shaking” without the contribution of other possible causes of head injury, so that this is not a case involving “shaking alone” as a theory. Dr. Monson’s claims that brain injury from rotational force could not occur without neck injury is a scientifically flawed theory, based on multiple extrapolations from experiments that had nothing to do with applying rotational forces and similar static loads to human infants’ heads, and upon a widely criticized study by Dr. Bandak which was infected by a math error that invalidated any possible conclusion from the study (something Dr. Monson doesn’t even mention in his report or his citation to Bandak). See Margulies et al., Letter to the Editor responding to article by Bandak, *Shaken baby syndrome: A*

*flawed biomechanical analysis*, Forensic 2

Science International 164 (2006), 278-279 – showing that due to the errors, Bandak’s strident conclusions that head injuries could not be caused by shaking without first causing neck injury were invalid. Also, his claim that “recent data” show a one foot drop onto concrete produces “accelerations” similar to shaking in infants is similarly full of flaws, failure to disclose the limitations of such a polemic statement, and assumes that the only variable that is significant is “accelerations.” See Pierce, M and Bertocci, G (2008) – cited below – stating that “no quantitative head injury tolerance data exists specifically for children” and suggesting that biomechanical experimentation was often misrepresented in court to “exonerate caregivers accused of abusing a child” without adequate scientific basis. If this is an indication of the proposed and allegedly scientifically-based opinions that Dr. Monson will be asked at trial, most of his testimony is inadmissible under Rule 702 but also excludable under Rule 403 of the Utah Rules of Evidence, as it is virtually impossible to educate a jury of laypersons in the few days allowed for a trial about such complex scientific principles and to put exaggerated or misleading claims in appropriate context. For that reason, the State suggests that this is a good example of the need for the Court to act as “gatekeeper” for expert opinion and to allow the opinions advanced to be offered to a jury only if they pass Rule 702 and Rule 403 muster.

Generally, the problem with biomechanical engineers’ (BMEs) expert testimony, including the proposed testimony of Dr. Kenneth Monson in this case, is that BMEs claim they have the answers to many questions which are really nothing more than speculation and guesswork. No one has reliably established what happens to human infant brain tissue, eyes and surrounding ocular structures, or human infant vasculature in an extended static load scenario. While there are several BMEs engaged in such research, most acknowledge the limitations of their findings and continue to add incrementally to what is known about injury. Some, however, don’t adequately disclose the full truth about the limitations of the science. For instance, Dr. Monson talks of “injury thresholds” relating to human infants without further disclosing that those thresholds were derived from experimentation on

human adults and various animals, including adult primates, not thresholds based upon what occurs to the infant human head during trauma, as to which there have never been and never will be any actual experiments. While some BMEs speak in terms of “biofidelic” dummies, dolls or other representations of human infants, none are truly representative of exactly what happens inside the human infant head or eyes. Human infants are not just “scaled-down” versions of human adults, but some BMEs regularly assume that to be the case. See, e.g. Roth et al. , *Biofidelic child head FE model to simulate real world trauma*, (2009) – “a child head cannot be considered as a scaled adult head in terms of geometry and mechanical properties”; and Pierce and Bertocci, *Injury Biomechanics and Child Abuse*, (2008) – “Conclusions of whether or not it is possible for an injury to result from a specific mechanism cannot be based solely on biomechanical analysis, modeling, or experimental testing and the derived models for injury thresholds.”

Dr. Monson’s report contains a section discussing the results of crash-test dummy experimentation primarily related to vehicle safety experiments, as well as experiments with dummies in free fall situations. While the general forces can be estimated from various types of experiments, what cannot be determined is what amount and type of force would result in what types of injuries to a living human infant. Cadaver experiments have the same underlying scientific limitation, and even computer finite element experimentation is similarly compromised by the lack of knowledge about how human infants are affected by trauma. All such experimentation is based on assumptions and guesses as to the “threshold for injury” which would apply specifically to human infants. A deeper analysis of the biomechanical literature reveals such thresholds are based on animal or other experimentation on adults, not on human infants. Thus, all such assumptions of what forces would be required to result in brain bleeding, eye injuries, skull fractures (which XT did not have), or brain injury are not known and the analytical “gap” will likely always preclude exact determinations of the cause of particular injuries or collections of injuries in any given child. Even in the prolific world of experiments relating

to safety of people in car and other accident scenarios, none of that experimentation has focused on exactly what goes on inside the human infant head either macro- or microscopically. One of the most troubling speculations in Dr. Monson’s report for this case is that information about the cause of infant skull fractures can just be assumed to be the same for the cause of infant brain injuries. Not only is this assumption not based on valid science, it makes no common sense, since the skull functions to protect the intracranial contents and sacrifices itself through fracture in order to avoid or minimize brain injury or damage to intracranial structures, such as vessels and arteries. Thus, the State would submit that sections of Dr. Monson’s report which relate to experiments relating to the cause of skull fractures are not relevant to the cause of a closed-head injury such as [VICTIM] suffered.

Dr. Monson has become associated with a particular group of physicians and other experts who have been broadly characterized as “child abuse denialists”, and who offer their services to testify about alternative explanations for just about any form of inflicted injury but always on behalf of those accused of abuse. See Strouse, P. *Child abuse: we have problems*, Pediatr Radiol DOI 10.1007/s00247-016-3551-9 – “Child abuse denialism has as its base a very small number of physicians who perpetuate false science while ignoring the bulk of the scientific literature and the experience of the overwhelming majority.” [Copy will be efiled with this Motion]. Dr. Monson’s views on pediatric head injuries are not surprising, given that he did his primary education with one of the country’s leading critics of the shaken baby syndrome, Dr. Werner Goldsmith. Dr. Monson and Dr, Goldsmith have written articles together, one of which was not completed prior to the passing of Dr. Goldsmith. Dr. Monson has also co-authored articles with defense medical witnesses Dr. Patrick Barnes and Dr. Janice Ophoven, who are also identified with the network of child abuse denialists referred to in Dr. Strouse’s article. As with most scientifically-based expert witnesses, however, entertaining a preconceived bias may undercut the reliability of courtroom opinions, the validity of experimentation conducted,

and the reliability of the science underlying such opinions. A review of several cases from other jurisdictions, awareness of other cases where Dr. Monson has authored reports in Utah cases, and review of transcripts and reports prepared by Dr. Monson in other jurisdictions firmly establishes his bias and raises concerns about the opinions he proposes to express in the trial of this case.

Dr. Monson’s qualifications and the scientific underpinnings of his field of science do not provide a reliable basis for the “conclusions” stated in his report, including that “it is my opinion that the described fall could have resulted in the observed injuries.” What Dr. Monson fails to acknowledge in his report is that in all biomechanical experimentation and research, there is no perfect model that represents exactly what happens in the human infant head in various injurious scenarios. As such, experiments with cadavers, crash-test dummies, animals, and even computer finite element analysis always involve an analytical “gap” between the results of the testing or data and what happens in real life situations to living human infants subjected to injurious forces. Thus, it is debatable whether the BMEs testimony is even “helpful” to the trier of fact when all that can be offered are general calculations of the forces involved in an event, without being able to tie those results to what would actually cause different types of injuries to a human infant. In the absence of showing scientifically reliable facts and data upon which this second part of a BME opinion must be based to be admissible, the State avers that Dr. Monson’s testimony should be excluded from the trial of this case as not being of assistance to the trier of fact, as being without a reliable scientific basis, and as being unduly confusing to a jury.

# STATE’S MOTION FOR ADDITIONAL DISCOVERY

In addition, Dr. Monson’s report provided in this case references communications with “Guy Yoshikawa” and a ‘report’ of “Guy Yoshikawa” apparently concerning measurements or possibly testing of a hypothetical scenario, but no such report nor information from Mr. Yoshikawa has been provided to the State. Pursuant to Utah Code Annotated §77-17-13(2), the State hereby requests discovery from the Defendant as to:

“results of any tests or specialized data” upon which Dr. Monson will rely in his proposed expert testimony, to include any testing, measurements, experimentation, or any other information used by Dr. Monson in forming opinions about [VICTIM] or the circumstances surrounding the infant’s injuries. If the Defendant demonstrated an alleged “fall” of X.T., as apparently he did, the “described fall” and all information relating to that described fall provided by the Defendant to Dr. Monson should be produced in discovery under the statute. If, for instance, the Defendant reenacted the “described fall” in any way using a doll or other surrogate for the victim, that reenactment should be provided to the State whether it was videotaped or not. In addition, much more detailed information should be provided as to the Defendant’s description of the alleged fall or drop of the baby, since there is nothing stated in terms of where on the baby’s head the impact with the floor allegedly occurred, whether there was any additional acceleration of the baby during the drop/fall (as opposed to a straight fall where the only contribution was gravity), the position of the rest of the baby’s body when the impact occurred, what happened to the rest of the baby’s body after the head impacted, and the baby’s behavior immediately following the alleged drop or fall. To the extent this information was shared with expert witnesses, and incorporated into the expert’s opinions, the Defendant has waived any privilege related to that information. **STATEMENT OF THE CASE**

[BRIEF SUMMARY OF CASE]

The Defendant’s notice of expert witnesses included notice of an intent to call biomechanical engineer Dr. Kenneth Monson, Dr. Monson’s CV, and a report from Dr. Monson relating to this case, discussed in detail above. For the reasons stated above and in the Argument section of the State’s Memorandum, the State contends that Dr. Monson’s opinions offered in this case should be severely limited by the Court to only those opinions for which the Defendant can establish (1) a reliable underlying scientific basis, (2) that Dr. Monson is qualified to offer such opinions , and (3) that Dr. Monson’s opinions constitute a reliable application of the underlying science to the facts of this case and that his proposed opinions are also admissible under the standards established by Rule 403 of the Utah Rules of Evidence. Based upon the argument below, the State submits that Dr. Monson’s testimony should be severely circumscribed or held to be inadmissible.

# ARGUMENT

**UNDER RULE 702, DR. KENNETH MONSON IS NOT QUALIFIED TO TESTIFY AS AN EXPERT AS TO THE CAUSE OF [VICTIM]’S HEAD AND EYE INJURIES**

Rule 702 of the Utah Rules of Evidence provides that:

1. Subject to the limitations in paragraph (b), a witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if the expert’s scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue.
2. Scientific, technical or other specialized knowledge may serve as the basis of expert testimony only if there is a threshold showing that the principles or methods that are underlying in the testimony
   1. are reliable;
   2. are based upon sufficient facts or data; and
   3. have been reliably applied to the facts
3. The threshold showing required by paragraph (b) is satisfied if the underlying principles or methods, including the sufficiency of facts or data and the manner of their application to the facts of the case, are generally accepted by the relevant expert community.

Utah R.Evid. 702 (2011). The Advisory Committee notes to the Rule explains the reasons for the changes, including the fact that trial judges remain the gatekeeper for expert evidence and should exercise rational skepticism. “This degree of scrutiny is not so rigorous as to be satisfied only by scientific or other specialized principles or methods that are free of controversy or that meet any fixed set of criteria fashioned to test reliability.” The State thus avers that both the *Daubert* factors and those previously set out in Utah under *Rimmasch* have been modified by the adoption of the newer version of Rule 702 in Utah. Both *Daubert* and *Rimmasch*, however, continue to provide valuable assistance in the analysis of expert opinion evidence, as explained in the Utah cases below.

Recent Utah appellate caselaw has solidified the role of the trial court as the “gatekeeper” of expert opinion testimony, and although the 2007 amendment to Rule 702 and the commentary to the Rule makes clear the standard for admissibility is not that set by *Daubert* or *Rimmasch*’s “novel” science, the proponent of expert testimony still has to show either general acceptance in the relevant scientific field or otherwise establish a threshold showing of reliability under Rule 702. In *State v. Shepard*, 2015 UT App 208,

the Utah Court of Appeals offered a helpful analysis of expert testimony admissibility in the context of a boating “expert” whose testimony was based on his experience as much as any particular science. The first step in the analysis is whether the expert testimony is helpful to the trier of fact, since unreliable testimony by definition cannot be of assistance. The second step is whether the expert is qualified to offer the opinions. Next, the question under Rule 702(b) is whether the principles or methods relied upon by the expert are “reliable”, whether they are based on “sufficient facts or data (702(b)(2), and finally, whether the methods were “reliably applied to the facts of the case to result in an admissible opinion (Rule 702(b)(3)). The Court of Appeals explained the difference between the new Rule 702 enacted in 2007 and the former *Rimmasch* standard in *State v. Sheehan*, 273 P.2d 417, 2012 UT App 62. In that case, the Court further clarified that the trial court makes an initial legal determination of scientific reliability of the proffered opinions, then if admitted, the jury makes the ultimate determination of reliability in their determination of what weight to give the expert opinion. In *Sheehan*, the trial court’s decision to exclude the defense expert without a full examination and analysis of the reliability of the expert’s opinions was reversible error. The most recent decision from the Utah Supreme Court on experts is *State v. Guard*, 2015 UT 96. The Court clarified the trial court’s gatekeeping role is “to screen out unreliable expert testimony” and reminded that judges are to approach that role with “rational skepticism”. *Id.* ¶ 62. After discussing the threshold showing that is necessary, the Court found that even after a full evidentiary hearing, the trial court and prosecution were still left to guess as to what opinions the proffered eyewitness expert would actually testify to at trial since the expert had not indicated how he would apply the factors relating to eyewitness identification to the facts of the case. Based on that, the

Supreme Court upheld the trial court’s decision to exclude the expert for failure to meet the threshold of reliability of the opinions.

In this case, the proposed testimony of Dr. Kenneth L. Monson presents problems with each level of Rule 702(b) and (c). Because the report of Dr. Monson is fairly broad, the State is requesting that the Court prohibit Dr. Monson from offering the proffered opinions, but if necessary to clarify the issues, the State requests that there be an evidentiary hearing to test the scientific underpinnings of the proposed opinions by Dr. Monson and whether there are sufficient “facts or data” upon which he can reliably state an opinion of any nature in this case. In addition, there is nothing in Dr. Monson’s report or the Notice of Expert provided by the defense that addresses whether his proposed opinions fit subsection (c) of Rule 702 and the State submits that his opinions are not subject to judicial notice.

# Dr. Monson should not be allowed to express any opinions concerning whether the head and eye injuries suffered by [VICTIM] were or could have been caused by the alleged fall/drop which is now apparently being claimed by the Defendant

Case law throughout the United States makes clear in many different contexts that a biomechanical engineer is not a competent witness to express opinions as to whether a particular patient’s injuries could or could not have resulted from a particular event. Instead, such opinions are the province of medical doctors, who are trained and authorized to examine patients, identify their injuries, make a diagnosis and express opinions as to the likely cause of those injuries. In *Hankla v. Jackson*, 699 S.E.2d 610 (Ga. App. 2010), the Georgia Court of Appeal considered whether a biomechanical engineer should be allowed to testify whether a particular plaintiff’s birth-related injuries were caused by a particular event. The Court stated:

“biomechanical engineers typically are found to be qualified to render an opinion as to the forces generated in a particular accident and the general types of injuries those forces may generate. However, biomechanical engineers ordinarily are not permitted to give opinions about the precise cause of a particular injury. This is because biomechanical engineers lack the medical training necessary to identify the different tolerance levels and pre-existing medical conditions of individuals, both of which could have an effect on what injuries resulted from an accident.”

Id. at p. 615. The Court reasoned that biomechanical engineers do not diagnose and treat human physical ailments, conditions, diseases, pain and infirmities. Thus, the proposed witness in that case was properly allowed to testify about general principles and forces, but that it was error for the trial court to permit the biomechanical engineer to provide testimony concerning medical diagnosis or treatment. To the same effect is the case of *Kelly v. McHaddon*, 2001 WL 209858 (Del.Super.), in which the Court determined that a biomechanical engineer can testify regarding the general forces created by an impact and the general effects on the human body from application of those forces, but “The expert may not testify regarding the cause of the plaintiff’s particular medical problems,” because the expert was not a doctor. Id. at p. 2. In another civil case from the State of Florida, *Stockwell v. Drake*, 901 So.2d 974 (Dist. Ct. App. Fla. 4 Dist. 2005), the appellate court found that the trial court had properly ruled the plaintiff could not rely on the opinion of a biomechanical engineer that her head injuries resulted from the car accident because “it was beyond this type of expert’s competence to testify to the *extent* of injuries which occurred.” Id. at p. 976, emphasis in original.

The clear majority rule in this country as to physical injuries which are the subject of a civil litigation seems to be that although biomechanical engineers can offer general information about the forces involved in a particular accident (almost

all cases involve auto accidents, which have been extensively studied by those in the field of biomechanics) and even the *general* effects on a human body of the application of such forces, such an expert is not qualified to express opinions as to whether a particular event could or could not have resulted in a particular person’s injuries. *Baerwald v. Flores*, 930 P.2d 816 (N. Mex. App. 1997) – biomechanical engineer in automobile accident case limited to stating the general effects of forces on the human body but not allowed to opine about the cause of the specific injury suffered by the plaintiff. See also *C.B. Hollingsworth v. Norfolk Southern Railway Company*, 689 S.E.2d 651 (Va. 2010) – the question of causation of a human injury is a component part of a medical diagnosis, and therefore is a part of the practice of medicine; *Suda v. Harmon*, 2008 Mont. Dist. LEXIS 493 – BMEs are qualified to offer opinion as to the forces generated and general types of injuries that may be generated, but not permitted to opine about the precise cause of a specific injury.

Even in the civil context, the State has not found any Utah appellate case that directly raises the issue of what a biomechanical engineer can or can’t testify about. In *Patey v. Leinhart*, 977 P.2d 1193 (Utah 1999), the Utah Supreme Court addressed whether a plaintiff’s claim that all of her teeth had been injured in an auto accident, which led to extensive dental work two years later, was supported by sufficient expert evidence. The Supreme Court held that the opinions of a properly qualified dentist who had treated the plaintiff was sufficient to prove the medical causation aspect of the case. The Court noted that that even with medical causation opinions, there must be sufficient foundation laid that there are sufficient facts upon which the causation opinion of the medical expert is based, and in that case the foundation included the

fact the dentist had treated the patient for most of her life and was familiar with the particularities of that patient. The closest Utah case which deals with the issue is *Chadwick v. Nielsen*, 763 P.2d 817 (Ut. App. 1988) where the Utah Court of Appeals held that a plaintiff in a medical malpractice action had failed to introduce sufficient evidence of medical causation, specifically that her leg injuries were proximately caused by the doctor’s negligence. Of interest to this case is this passage:

“Chadwick asserts that the trial court should have permitted Chadwick’s father, an electrical engineer with expertise in fluid mechanics, to give expert testimony as to the hydraulic principles of venous blood transportation. We think the trial court properly excluded this testimony. It may be that many general scientific principles apply to both fluid mechanics and the human circulatory system. Nonetheless, we think it is sound policy to limit expert testimony in medical malpractice cases to that which is within the doctor’s specific field of practice.”

Id. at p. 822.

One of the best discussions of the reliability of biomechanical engineering expert testimony in a civil setting is found in *Eskin v. Carden*, 842 A.2d 1222 (Del. 2004). In *Eskin*, the Delaware Supreme Court held that in an appropriate circumstance a biomechanical expert could express an opinion in an auto accident case concerning the physical forces involved in accidents and the general effects of such forces on the human body, however, the Court discussed at great length whether that opinion can “bridge the analytical gap” between application of “the norm” from general physical principles and whether a particular individual’s injuries could have been caused from that particular accident. The Supreme Court upheld the trial court’s granting of a Motion in Limine to exclude the testimony of the proffered biomechanical expert primarily because that expert, Dr. Lawrence Thibault (a very

well-respected biomechanical expert) was going to testify that the forces involved in the auto accident *could not have resulted in the plaintiff’s injuries.* The opinion analyzes at great length the problem of extrapolation from generalized experimentation with crash test dummies and cadavers to what occurs with real people in actual accidents. Ultimately, the Supreme Court agreed with the trial court’s exclusion of the expert because of lack of foundation to support the proffered opinion. The bottom-line problem was the same one we have in this case – bridging the gap between general principles of physics and how any particular event will affect a particular person.

In *Eskin*, the focus was on a unique plaintiff with pre-existing medical conditions. In this case, the focus must be on recognition there are no experiments on living children and what would happen to them in various types of falls. Any experimentation with animals, anthropomorphic dummies, or cadavers, while it does provide some information, simply does not bridge the gap of what would occur in a real-world incident involving a real human child.

Several criminal cases involving admission of biomechanical engineering testimony reach a very similar result as the civil case law. In *Stanul v. State*, 870 S.W.2d 329 (Tex. App. 1994), the Texas Court of Appeal considered a case involving the murder of an 8 month-old boy caused by his father. The prosecution’s medical experts testified that given the nature of the trauma to the victim’s brain and the subdural hemorrhages, his head had been impacted against some hard surface with a great deal of force. Each of them testified the injuries were not consistent with an adult falling while holding the child. The father’s story at the trial was that he had

found the baby not breathing in his crib, had turned to run from the room with the baby in his arms and had tripped and fallen, hitting the floor with the baby underneath him. The defense called a biomechanical engineer and a designer of sports medicine equipment that they had videotaped the father reenacting the fall with the baby and the biomechanical engineer’s analysis of the videotaped reenactment indicated there was sufficient force in that described fall to explain the victim’s injuries. In reviewing an insufficiency of the evidence claim on appeal, the Court of Appeal noted that all the medical witnesses agreed that the described fall could not have caused the baby’s fatal injuries:

“In this cause, the defense witnesses with expertise in biomechanics testified that the injury to the child’s head could have been caused in the manner suggested by appellant. These witnesses, however, were not physicians and did not claim to have expertise with respect to the causes of brain trauma in infants.”

Id. at p. 332. Given the fact that all the medically trained witnesses unanimously agreed that the injuries were not consistent with being caused by the fall, the Court of Appeal found that the evidence was sufficient to support the murder verdict.

The Ohio case of *State v. Calise*, 2012 Ohio 4797, 2012 Ohio App LEXIS 4195 involved a case of inflicted head injury where a babysitter was convicted of murder of a 23 month-old child in her care. The trial court had excluded testimony by Dr. John Lloyd, a biomechanical engineer, as to proffered opinions concerning whether a fall in a bathtub could have resulted in the child’s fatal head injuries under Ohio’s version of Rule 702 of the rules of evidence. Dr. Lloyd had designed an experiment with a mannequin (crash test dummy) intended to represent the victim and possible falls in the bathtub. The trial court had excluded the testimony because

(1) since Dr. Lloyd was not a medical doctor, he was not qualified to express opinions concerning the causation of the child’s brain injuries, and, (2) the bathtub experiment was not shown to be reliable. The Court of Appeals discussed the “analytical gap” between the biomechanical literature, conclusions based upon nebulous “injury thresholds”, and the ability of Dr. Lloyd to express opinions as to the actual injuries to the victim in that case and upheld the trial court’s determination that Dr. Lloyd’s testimony was not reliable under Rule 702(c) and that Dr. Lloyd was not qualified under Rule 702(b) to provide a specific opinion as to whether the assumed fall could have resulted in the child’s brain injuries. As the Court states: “[T]he courtroom is not the place for scientific guesswork, even of the inspired sort. Law lags science, it does not lead it.” *Id.* ¶ 24.

In another case where the prosecution tried unsuccessfully to qualify the testimony of a biomechanical engineer under the rules applicable in California for admission of expert testimony, *People v. Dellinger*, 163 Cal.App.3d 284, 209 Cal.Rptr.503 (1984), the California Court of Appeal applied that State’s *Kelly* test, which focused on the reliability of the underlying scientific opinion to find that the prosecution had not sufficiently met its burden. That case involved a situation somewhat similar to the facts of this case, where a two-year old child died while in the exclusive care of her stepfather and the stepfather said the fatal head injuries, which included global brain swelling and subdural hemorrhages, had been caused by a fall down stairs. The prosecution attempted to introduce the opinion of a biomedical engineer that through experiments with an anthropomorphic dummy modeled to simulate the victim, and based on the alleged point of impact of her head,

she could not have hit the fifth step without being pushed. She also applied a finite element computer program, based on “known injury criteria,” to input the data from the experimental fall with the dummy to confirm her results. The Court of Appeal held the prosecution had failed to meet their burden of establishing reliability, stating that dummy experiments and finite element testing was insufficient to provide the basis for scientifically reliable opinion concerning what would occur to a real child in the situation. Among other issues, the Court focused on the fact the proffered expert “had no medical background or experience with the variances attributable to the brain and skull of a child,” that extrapolating injury tolerance data from cadaver studies and animal studies to humans was highly controversial, and that her testimony of “general acceptance” was based solely on her own self-serving statements and not borne out by others in the field. The Court concluded: “However, without corroboration of the reliability of the techniques or the acceptability of the procedures, her application of general principles of biomechanics to this specific situation involving a child’s fall is insufficient for admissibility.” Id. at 295. The concerns expressed by the California Court of Appeal reflect those the State urges this Court to consider as to the proposed testimony of Dr. Monson in this case. However, in this case, it appears that Dr. Monson has not even conducted additional experimentation or testing as to the alleged stairway fall which would at least give some content to his proposed opinions. Instead, in this case, he purports to offer opinions based solely on cadaver studies and general biomechanical principles apparently applied to three different versions of an alleged event. The State submits

that such testimony does not meet the threshold of reliability required by Rule 702 of the Rules of Evidence.

There are some cases in the legal literature where Dr. Monson has been the biomechanical engineer subject to various rulings that limited his testimony. In *People v. Jackson*, 2007 WL 4262688 (Cal. App. 4 Dist.), the issue was whether a three month-old baby sustained head injuries, including subdural hemorrhages, from rolling off a couch or from inflicted injury. The prosecution’s experts testified the injuries were from shaking or slamming of the baby’s head against a soft surface. Dr. Monson, as a defense expert, testified that the alleged fall off the couch “could have caused the baby’s injuries.” In considering the issue of whether there was sufficient evidence to support the jury’s guilty verdict, the appellate court noted that because “Monson was not a medical doctor” and had to concede that the baby’s brain swelling was caused by subdural hemorrhage, which he admitted was a “medical issue”, Dr. Monson’s testimony did not prove that the prosecution’s evidence was insufficient. In every reported appellate case where Dr. Monson testified, he was offering opinions on behalf of the criminal defendant and his opinion was that whatever story offered by the defendant might have resulted in the child’s injuries. See also *People v. Granados*, 2009 Cal. App. Unpub. LEXIS 1390 – Dr. Monson testified that a fall from a bunk bed could have resulted in the child’s fatal head injuries; *State v. Ugalde*, 2013 MT 308; 372 Mont. 234; 311 P.3d 772; 2013 Mont. LEXIS 428 – Dr. Monson testified that a short fall from a crib to a carpeted floor could have caused the child’s serious head injuries.

In addition to the proffered opinions concerning the cause of [VICTIM]’s extensive and fatal head injuries, Dr. Monson states “It is also important to note that no experimental efforts have been able to confirm a link between eye injury and abuse.” Such an opinion isn’t even within the realm of his expertise, and appears to be just an editorial comment about the state of the medical literature. On the other hand, there has been extensive animal and finite element experimentation relating to the cause of eye injuries which Dr. Monson doesn’t even cite in his report, apparently because it doesn’t fit with his preconceived notions. Some of that experimentation is being done at the University of Utah by Dr. Brittany Coats, a colleague of Dr. Monson, so it is odd that he wouldn’t even mention that in his conclusory statement. The way his statement is phrased, however, is even more troubling because it assumes that there somehow must be an experimental link between eye injuries and “abuse” in order for *medical* opinions by qualified physicians to be relevant to a case. There’s no such requirement in any legal authority. Dr. Monson should be prohibited from offering any opinions relating to eye injuries in children in general, or the cause of [VICTIM]’s specific eye injuries, since that is not within his area of expertise, it would amount to commenting about the medical literature as to which he is not an expert, and just as with his unnecessary comments about the medical diagnosis of shaken baby syndrome, such polemic statements can’t appropriately be part of a biomechanical engineer’s expert witness testimony.

This Court should find that Dr. Kenneth Monson cannot testify as to that part of the proffered opinions included in his report in which he states that the

injuries to [VICTIM] could have been caused by the Defendant’s account of a fall

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or drop of the baby.

Nothing has been advanced by the Defendant to bridge the analytical gap which would be necessary under the showing of reliability concerning the “facts or data” upon which the opinions are based. Thus, the opinions should be disallowed under Rule 702 of the Utah Rules of Evidence. Further, allowing Dr. Monson to express those opinions would involve a significant risk of confusing the issues the jury must decide in the case and the slight probative value (based on the lack of underlying scientific support for case-specific opinions such as this) is far outweighed by the danger of unfair prejudice under Rule 403 of the Utah Rules of Evidence.

# Although Dr. Monson may be a qualified expert in biomechanics, he has not proffered any reliable basis for his testimony that even general principles of biomechanics are relevant and of assistance to the trier of fact in this case

There is no proffer in the material provided by the Defendant to the State in this case which indicates that Dr. Kenneth Monson has performed any independent experiments or testing of anything related to this case upon which he could reliably base even general opinions as to the effects of various forces on a human being. No calculations have been offered as part of his report, nor has there been anything stated by Dr. Monson in terms of any experimentation he intends to rely upon as a basis for his opinions concerning the cause of [VICTIM] injuries

In addition, Dr. Monson would have to concede that there is no anthropomorphic dummy which exactly replicates what occurs when a living child suffers injuries, that there is no animal upon which experiments have been done that exactly replicates what happens to a human child, and that extrapolating from cadaver studies at least involves a gap between experimental results and what occurs to human infants in real-life injurious situations. Thus, at this stage of the

proceeding, there is no scientifically reliable proffer that would even allow Dr. Monson to express opinions as to what may *generally* result to a human child from *general* physical forces being applied to that child. Though some of the cases cited above would support such opinions by a biomechanical engineer, even those cases which permit such opinions require a valid, scientific underpinning for such an opinion. Under the *Daubert* line of cases as well as cases on expert witness testimony in Utah, it has always been the case that to qualify as an admissible expert opinion, the testimony of the expert must involve more than mere speculation or guesswork. See, e.g. *State v. Jarrell*, 608 P.2d 218, 231 (Utah 1980) – although expert opinion can’t be a “mere guess, speculation, or conjecture,” it should “at least be stated in terms of probability if not absolute certainty.” And see *State v. Merrill*, 269 P.3d 196 (Ut. App. 2012) reaffirming the rule of *Jarrell* and stating that a medical opinion need not reach the level of reasonable medical certainty to be admissible, but should represent the expert’s “best judgment” as to the probability that his/her opinion is what happened. “When the correlation between the predicate facts and conclusion is slight, then the inference is less reasonable, and at some point, the link between the facts and the conclusion becomes so tenuous that we call it speculation.” Id. at p. 202.

Finally, the State submits that such opinions would be inadmissible under Rule 403 of the Utah Rules of Evidence because, cloaked in the apparent credibility of a science, Dr. Monson’s proffered opinions would have the very real potential to confuse the issues the jury must determine in this case and to unfairly prejudice the State though the evidence has minimal, if any probative value.

# CONCLUSION

For the reasons discussed above, the State respectfully requests that Dr. Kenneth Monson be prohibited from offering any opinion testimony that the head and eye injuries suffered on [DATE OF INCIDENT] by [VICTIM] could have been caused by the fall or drop event because opinions as to medical causation are outside of Dr. Monson’s field of expertise and because the Defendant has not met the threshold showing of reliability which would establish the underlying scientific reliability of such an opinion. In addition, based on the proffers and reports of Dr. Monson, in this case, he should not be allowed to express opinions based on general principles of biomechanics because no relevance has been established as to such testimony. The State submits that based on the Notice of Expert Witness and the report of Dr. Kenneth Monson, such a ruling can be made by this Court without further evidence. If the proffered basis for Dr. Monson’s opinions changes or is supplemented such that there is support proffered for such opinions, the State would request an evidentiary hearing to test that underlying basis under Rule 702.

Deputy District Attorney

# CERTIFICATE OF DELIVERY

I hereby certify that a true and correct copy of the foregoing Motion in Limine re: Biomechanical Engineer Dr. Kenneth Monson and State’s Motion for Additional

Discovery was efiled this day of , and thus provided to Defendant’s counsel, .

\_/s/