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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ARIZONA
TUCSON DIVISION

Jane Doe, by her next friend and parents Helen Doe and James Doe; and Megan Roe, by her next friend and parents, Kate Roe and Robert Roe,

Plaintiffs,

v.

Thomas C. Horne in his official capacity as State Superintendent of Public Instruction; Laura Toenjes, in her official capacity as Superintendent of the Kyrene School District; Kyrene School District; The Gregory School; and Arizona Interscholastic Association Inc.,

Defendants.

Case No. 4:23-cv-00185-JGZ

PLAINTIFFS' UPDATED EXHIBIT LIST FOR PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION

Plaintiffs submit the following list of exhibits, along with copies of exhibits not already filed on the docket, pursuant to the Court's June 14, 2023 Order (ECF No. 80). Plaintiffs respectfully reserve the right to amend this exhibit list in advance of the hearing.

Ex. No.	Description	Location
1	Declaration of Jane Doe	ECF No. 6
2	Declaration of Helen Doe	ECF No. 7
3	Second Declaration of Helen Doe	ECF No. 78
4	Declaration of Megan Roe	ECF No. 8
5	Declaration of Kate Roe	ECF No. 9
6	Declaration of Stephanie Budge, Ph.D.	ECF No. 4
7	Rebuttal Declaration of Stephanie Budge, Ph.D.	ECF No. 65-1
8	Declaration of Daniel Shumer, M.D., MPH	ECF No. 5

9	Rebuttal Declaration of Daniel Shumer, M.D., MPH	ECF No. 65-2
10	AIA's Constitution, Bylaws, Policies, and Procedures 2022-2023, Transgender Policy	ECF No. 51-1
11	Photographs of the Doe Family (*filed under seal*)	ECF No. 108
12	Photographs of the Roe Family (*filed under seal*)	ECF No. 108
13	Jane Doe's Name Change Court Order (*filed under seal*)	ECF No. 108
14	Megan Roe's Name and Gender Change Court Order (*filed under seal*)	ECF No. 108
15	Jane Doe's Passport (*filed under seal*)	ECF No. 108
16	Megan Roe's Passport (*filed under seal*)	ECF No. 108
17	Consideration of Bills: Hearing on S.B. 1165 Before S. Comm. on Judiciary, Jan. 20, 2022, 55th Leg., 2nd Reg. Sess., 00:08:08–01:30:05 (*filed as a non-electronic exhibit*)	ECF No. 88-1
18	David Handelsman, et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39 Endocrine Revs. 803 (2018)	ECF No. 88-2
19	David Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 Clinical Endocrinology 68 (2017)	ECF No. 88-2
20	Jonathon W. Senefeld et al., *Sex Differences in Youth Elite Swimming*, 14 PLOS ONE 1 (2019)	ECF No. 88-2
21	Joanna Harper, *Race Times for Transgender Athletes*, 6 J. Sporting Cultures & Identities 1 (2015)	ECF No. 88-2
22	Marnee McKay & Joshua Burns, *When it Comes to Sport, Boys "Play Like a Girl,"* The Conversation (Aug. 3, 2017), https://theconversation.com/when-it-comes-to-sport-boys-play-like-a-girl-80328	ECF No. 88-3
23	Marnee McKay, et al., *Normative Reference Values for Strength and Flexibility of 1,000 Children and Adults*, Neurology, 88 (1) (2017)	ECF No. 88-3
24	World Rugby Transgender Women's Guidelines (2020), https://www.world.rugby/the-game/player-welfare/guidelines/transgender/women	ECF No. 88-3
25	Governor Douglas A. Ducey's Letter to Arizona Secretary of State re: Senate Bill 1138 and 1165	ECF No. 88-3
26	Second Declaration of Helen Doe	ECF No. 109
27	Second Rebuttal Declaration of Daniel Shumer, M.D., MPH	Attached

Respectfully submitted this 7th day of July, 2023.

/s/ Colin M. Proksel

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**Admitted pro hac vice.*

Exhibit 27

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ARIZONA
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Jane Doe, by her next friend and parents Helen Doe and James Doe; and Megan Roe, by her next friend and parents, Kate Roe and Robert Roe,

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Thomas C. Horne in his official capacity as State Superintendent of Public Instruction; Laura Toenjes, in her official capacity as Superintendent of the Kyrene School District; Kyrene School District; The Gregory School; and Arizona Interscholastic Association Inc.,

Defendants.

Case No. 4:23-cv-00185-JGZ

SECOND REBUTTAL DECLARATION OF DANIEL SHUMER, M.D., IN FURTHER SUPPORT OF MOTION FOR PRELIMINARY INJUNCTION

I, Daniel Shumer, declare as follows:

1. I submit this expert declaration based on my personal knowledge.

2. If called to testify, I would testify truthfully based on my expert opinion.

3. In preparing this declaration, I reviewed the expert declarations submitted by Dr. Emma Hilton ("Hilton Decl.") and Dr. Linda Blade ("Blade Decl.") in support of Defendant Horne's Opposition to Plaintiffs' Motion for Preliminary Injunction. I also reviewed the rebuttal declarations by Dr. Gregory Brown ("Brown Rebuttal Decl."), Dr. Chad Carlson ("Carlson Rebuttal Decl."), and Dr. James Cantor ("Cantor Rebuttal Decl.") that the Intervenors submitted in support of their Opposition to Plaintiffs' Motion for Preliminary Injunction. As with my prior expert declaration, I relied on my scientific education and training, my research experience, and my knowledge of the scientific literature in the pertinent fields. The materials I have relied on in preparing this declaration are the same types of materials that experts in my field of study regularly rely on when forming opinions on these subjects. I may wish to supplement these opinions or the bases for them as a result of new scientific research or publications or in response to statements and issues that may arise in my area of expertise.

Dr. Hilton's Declaration

I. There Is No Evidence Linking In Utero Development or Minipuberty to Athletic Performance and No Credible Medical Reason to Posit Any Such Connection.

4. There is no scientific basis for Dr. Hilton's claim that boys gain an athletic advantage over girls based on exposure to testosterone in utero or during minipuberty. (Hilton Decl. ¶¶ 5.3–5.5.)

5. In a male fetus, testosterone production peaks around 11–14 weeks of gestation (in the first trimester of pregnancy), then declines until it is completely suppressed at birth. Testosterone is necessary during this time for normal development of the genitals. *See, e.g.*, Marianne Becker & Volker Hesse, *Minipuberty: Why Does it*

Happen?, 93 Hormone Rsch. Paediatrics 76 (2020).

6. Male babies also experience an elevation of testosterone after birth, with levels peaking between one to two months old, and returning to prepubertal levels before six months of age. As with the in utero elevation of testosterone, a rise in testosterone during minipuberty correlates positively with growth of the male genitals. *Id.* at 78–79.

7. Contrary to Dr. Hilton's testimony, minipuberty does not result in clinically visible physical changes, other than a possible transient increase in testicular volume.

8. In fact, although Dr. Hilton cites Becker & Hesse's article for the proposition that testosterone levels cause an increase in babies' growth velocity and body weight (Hilton Decl. ¶ 5.5), the article describes the opposite. Becker & Hesse found that testosterone and luteinizing hormone (the hormone that stimulates testosterone production) concentrations "during minipuberty correlate *negatively* with body weight and body mass index [BMI] until the age of 6 years." *Id.* at 80 (emphasis added). A negative correlation between testosterone level and body weight or BMI contradicts Dr. Hilton's assertion that minipuberty in males causes competitive athletic advantage later in life. In addition, the article found that "[d]ata on the influence of minipuberty on growth velocity are conflicting." *Id.*

9. No research has linked this brief exposure to elevated testosterone during minipuberty to any lasting physiological impact, much less to an increase in athletic ability. Nor is there any credible medical basis even to hypothesize such an impact.

II. There Also Is No Evidence Linking Gene Expression to Athletic Performance and No Credible Medical Reason to Posit Any Such Connection.

10. There also is no scientific basis for Dr. Hilton's speculation that boys gain an athletic advantage over girls based on sex-specific genetic architecture that results in approximately 6,500 differences in gene expression. (Hilton Decl. ¶ 5.2.) Dr. Hilton fails to cite any research to connect any differences in gene expression between the sexes to the purported athletic advantage of transgender girls who do not undergo male puberty.

11. Contrary to Dr. Hilton's testimony and as I have previously discussed, there is an overwhelming scientific consensus that the biological cause of average differences in athletic performance between men and women is the rise in circulating levels of testosterone beginning in endogenous male puberty. As Handelsman states, "evidence makes it highly likely that the sex difference in circulating testosterone of adults explains most, if not all, of the sex differences in sporting performance." *See* David J. Handelsman et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39 Endocrine Revs. 803, 823 (2018) (summarizing evidence rejecting the hypothesis that physiological characteristics are driven by the Y chromosome).

III. Any Height Differences Among Male and Female Babies Are Negligible and, in Any Event, Largely Disappear Around the Age of Six or Seven.

12. Dr. Hilton's claim that growth charts reveal that "[m]ales are consistently 1-2 cm taller than females between 0-10 years old" (Hilton Decl. ¶ 4.4) is false.

13. Growth charts show that babies' heights are heavily overlapped, with only negligible differences between boys and girls, which differences almost disappear around 6 to 8 years of age, and do not begin diverging again until puberty (see attached full growth charts at **Exhibit A**):

6– 36 months old:

	6 Months		24 Months		36 Months	
Percentile	Boys	Girls	Boys	Girls	Boys	Girls
95th	72 cm	69.5 cm	93 cm	91.5 cm	102.5 cm	101.25 cm
50th	**67 cm**	**65.25 cm**	**87.25 cm**	**86 cm**	**95.75 cm**	**94.75 cm**
5th	63 cm	61 cm	81.5 cm	80 cm	89.75 cm	88.25 cm

7–12 years old:

	7 Years		8 Years		12 Years	
Percentile	Boys	Girls	Boys	Girls	Boys	Girls
95th	130.75 cm	130.75 cm	137.5 cm	137.75 cm	161.5	163 cm
50th	**121.5 cm**	**121.5 cm**	**128 cm**	**128 cm**	**149 cm**	**151 cm**
5th	113 cm	113 cm	118.5 cm	118.25 cm	137 cm	139 cm

14. The numbers begin to diverge again after around 10 years of age, with girls overtaking males in height and weight for a few years because they typically go through the puberty-related growth spurt around two years earlier than males. *See* Charles Brook, *Mechanism of Puberty*, 3 Hormone Rsch. 52, 53 (1999).

15. Moreover, while post-pubertal boys are taller, on average, than post-pubertal girls, the height ranges for boys and girls continue to be overlapping. Ctrs. for Disease Control & Prevention, *Clinical Growth Charts: Children 2 to 20 Years (5th–95th Percentile)*, https://www.cdc.gov/growthcharts/clinical_charts.htm.

IV. There Is No Evidence That Prepubertal Boys Have a Biological Athletic Advantage Over Prepubertal Girls.

16. Contrary to Dr. Hilton's testimony and as I discussed in my prior declarations in this case, there is a well-established scientific consensus that, before puberty, there are no significant differences in athletic performance between boys and girls. *See, e.g.*, Marnee McKay & Joshua Burns, *When it Comes to Sport, Boys "Play Like a Girl"*, The Conversation (Aug. 3, 2017), https://theconversation.com/when-it-comes-to-sport-boys-play-like-a-girl-80328 (discussing results of research published in American Academy of Neurology Journal).

17. While some studies have found small differences between the performance

of boys and girls with respect to some discrete activities, these studies did not control for other factors, particularly age, location, or athletic experience or exposure. *Id.*

18. When research has controlled for those factors by using representative data, researchers have found that "[a]cross all measures of physical performance, there was one consistent finding. There was no statistical difference in the capabilities of girls and boys until high-school age (commonly age 12)." *Id.* These tests included long jump, muscle strength, walking, jumping, and balancing. *Id.*

19. This finding has been replicated in many other studies, and there is a clear scientific consensus that athletic ability does not diverge significantly until puberty. *See, e.g.*, David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 Clin. Endocrinol. 68, 70–71 (2017) ("The gender divergence in athletic performance begins at the age of 12-13 years"); Jonathon W. Senefeld et al., *Sex Differences in Youth Elite Swimming*, 14 PLoS ONE 1, 1–2 (2019) (studying child and youth swimmers and concluding that the data suggests "girls are faster, or at least not slower, than boys prior to the performance-enhancing effects of puberty").

20. In support of her contention that boys have at least some biological advantages in athletic performance over girls before puberty, Dr. Hilton relies primarily on data from physical fitness tests or international track and field event records. The data Dr. Hilton relies on in fact shows several areas where pre-pubertal girls outperform pre-pubertal boys. (Hilton Decl. ¶¶ 7.6, 7.9.)

21. Otherwise, the data Dr. Hilton relies on shows that there is a small difference in performance between prepubertal non-transgender boys and prepubertal non-transgender girls.[1] This data merely observes phenomena across a population sample in isolated areas and does not determine a cause for whatever is observed. There is no

[1] Two of the studies cited by Dr. Hilton are also cited in paragraph 6 of the legislative findings of Arizona's statute. *See* S.B. 1165, 55th Leg., 2d Reg. Sess. (Ariz. 2022), § 6.

reliable basis for Dr. Hilton to attribute those small differences to physiology or anatomy instead of other factors, such as greater societal encouragement of athleticism in boys, greater opportunities for boys to play sports, or different preferences of the boys and girls surveyed. David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 Clin. Endocrinol. 68 (2017).

22. Dr. Hilton's statement that the "performance gap in international and national track and field records evident before puberty, somewhat controls for this sociali[z]ation effect, given that one might expect engaged sporty girls to be as well-trained as their male peers" (Hilton Decl. ¶ 7.22) is pure conjecture and lacks any reliable factual basis to support it.

23. Dr. Hilton also discusses the outcomes of two individual middle school track and field competitions held at the Kyrene Aprende Middle School in the last year. (Hilton Decl. ¶¶ 7.17–7.20.) It is my understanding from Plaintiffs' counsel that one of the Plaintiffs in this case will begin attending Kyrene Aprende Middle School this month and that she wishes to participate and compete on the girls' cross-country, soccer, and basketball teams, not the track and field team. Moreover, given the age ranges of the children who attend middle school, this data likely includes some males who have undergone male puberty. It is my understanding from Plaintiffs' counsel that the Plaintiff who will be attending Kyrene Aprende Middle School will not undergo male puberty because she will be taking puberty suppressing medication, which I have discussed in more detail in my prior declarations in this case. Therefore, this data is not relevant to this litigation.

24. In any event, as previously discussed, this data does not determine a cause for the observed differences. Even if this data included only prepubertal boys and girls, there is no reliable basis for Dr. Hilton to attribute the differences observed to physiology or anatomy instead of other factors, such as greater societal encouragement of athleticism in boys, greater opportunities for boys to play sports, or different preferences of the boys

and girls surveyed.

V. Transgender Girls Who Receive Puberty Suppressing Medication at the Onset of Puberty Have No Athletic Advantage Over Other Girls.

25. Dr. Hilton incorrectly asserts that the administration of puberty suppressing medication (also sometimes referred to as puberty blocking medication) to transgender girls does not eliminate the athletic advantage that men and adolescent boys have over women and adolescent girls.[2] (Hilton Decl. ¶ 9.5.)

26. As I have discussed previously, Tanner staging (also called Sexual Maturity Rating) is used to document and track the development and sequence of secondary sex characteristics of children during puberty. Under current standards of care, transgender adolescents are eligible to receive puberty blockers when they reach Tanner Stage 2, at the first onset of puberty, and long before the development of increased muscle mass and strength associated with later stages of male puberty. *See* Wylie C. Hembree et al., *Endocrine Treatment of Gender-Dysphoric/Gender-Incongruent Persons: An Endocrine Society Clinical Practice Guideline*, 102 J. Clinical Endocrinology & Metabolism 3869–903 (2017).

27. Following the administration of puberty blockers, transgender girls will also receive hormone replacement therapy to allow them to go through puberty consistent with their female gender identity. As a result, these transgender girls will develop many of the same physiological and anatomical characteristics of non-transgender girls, including bone size, skeletal structure, and distinctive aspects of the female pelvis geometry that cut against athletic performance. Thus, a transgender girl who received

[2] Dr. Hilton also briefly discusses the medical treatment of transgender girls and states that many children reporting gender dysphoria desist and that puberty blocking medication is harmful and has uncertain outcomes. (Hilton Decl. ¶¶ 9.3-9.4.) These conclusions are contrary to my experience treating over 600 patients with gender dysphoria. Dr. Hilton is not a medical doctor or mental health professional nor does it appear that she has ever treated a transgender patient. Moreover, Dr. Hilton does not explain how any of her criticisms are relevant to the issue of whether transgender girls should be able to participate on female sports teams. In any event, as discussed in detail in my prior declarations in this case, these criticisms are not well-founded.

puberty suppressing medication followed by hormone replacement therapy does not have the same physiology as a prepubertal non-transgender boy.

28. Because such girls do not undergo male puberty, they do not gain the increased muscle mass or strength that accounts for why post-pubertal boys as a group have an advantage over post-pubertal girls as a group.

29. For that reason, studies on transgender women who have undergone testosterone suppression as adults are almost meaningless when assessing the athletic abilities of transgender girls who have received pubertal suppression beginning at the onset of puberty. The women in those studies did not transition until well after puberty and experienced exposure to testosterone over an extended time, allowing their muscles to keep developing. In sharp contrast, transgender girls who receive Gonadotropin-releasing hormone agonist ("GnRHa") do not go through male puberty and are not exposed to the heightened level of testosterone associated with male puberty.

30. Even so, those studies of adult transgender women show that testosterone suppression resulted in significant mitigation of muscle mass and development in adult transgender women.

31. For example, the only study directly examining the effects of hormone therapy on the athletic performance of transgender female athletes is a small study of eight long-distance runners. The study showed that after undergoing medical interventions, which included lowering their testosterone levels, the athletes' performance had reduced so that relative to non-transgender women their performance was now proportionally the same as it had been relative to non-transgender men prior to any medical treatment. In other words, a transgender woman who performed at about 80% as well as the best performer among men of that age before transition would also perform at about 80% as well as the best performer among women of that age after transition. *See* Joanna Harper, *Race Times for Transgender Athletes*, 6 J. Sporting

Cultures & Identities 1 (2015).[3] Given that adolescent transgender girls who receive puberty suppressing medication do not go through male puberty, there is no medical basis to expect that transgender girls receiving such medications would have an athletic advantage.

32. Dr. Hilton cites two studies that she claims show that transgender girls have an athletic advantage over other girls even when they are receiving puberty blocking medication or hormone therapy; however, neither study supports Dr. Hilton's claim.

33. Dr. Hilton cites to Maartje Klaver et al., *Early Hormonal Treatment Affects Body Composition and Body Shape in Young Transgender Adolescents*, 15 J. Sexual Med. 251 (2018). (Hilton Decl. ¶ 11.3.) Contrary to Dr. Hilton's claim, however, the primary finding of the Klaver study is that receiving puberty blockers and hormone therapy bring the body composition of young transgender women much closer to their non-transgender female peers than their non-transgender male peers. Those results are more pronounced the earlier a transgender girl starts puberty blockers. *Id*. at 255 (finding that "compared with adult transgender persons treated with CHT, larger changes in body shape and body composition are seen in transgender persons who start in adolescence"). It should also be noted that the transgender women participants in the Klaver study started GnRHa at an average age of 14.5 years, and none started prior to age 12. This is because the original Dutch protocol did not provide GnRHa prior to age 12 regardless of whether puberty started at a younger age. The participants in the study by definition had much more testosterone exposure than transgender girls treated with modern protocols,

[3] The legislative findings of the Arizona statute incorrectly state that for transgender women who go through male puberty (unlike the plaintiffs here), the benefit conferred by testosterone "is not diminished through the use of testosterone suppression." *See* S.B. 1165, 55th Leg., 2d Reg. Sess. (Ariz. 2022), § 13. While that statement conflicts with available evidence, which shows that hormone therapy significantly reduces muscle mass and strength, it is also irrelevant to the situation of the plaintiffs in this case who have not undergone male puberty and thus are not in the position of having to mitigate the increased muscle mass and strength caused by male puberty. Notably, the legislative findings do not state that transgender girls who receive puberty suppressing medication at the onset of puberty have any conceivable athletic advantage, nor do they cite any evidence that would support that claim.

which initiate GnRHa based on pubertal stage unrelated to age.

34. Dr. Hilton also cites Lloyd J.W. Tack et al., *Proandrogenic and Antiandrogenic Progestins in Transgender Youth: Differential Effects on Body Composition and Bone Metabolism*, 103 J. Clinical Endocrinology & Metabolism 2147 (2018), for the proposition that transgender girls who receive medical treatments purportedly maintain greater grip strength than transgender boys. (Hilton Decl. ¶ 11.3.) But the medication administered in this study is not used in the U.S. and does not have nearly the same impact as puberty blockers and hormone therapy for transgender girls or as testosterone for transgender boys. The medications administered to the study participants did not fully block puberty for either transgender girls or transgender boys. Even with this less effective medication, the study found that transgender girls "showed a significant increase in fat mass and decrease in lean mass, resulting in an increased body fat percentage" and did not experience any increase in grip strength. *Id*. at 2153–54. If anything, this study shows that even with a less effective medication, the physiological impact of medically treating transgender girls in adolescence, rather than when they are adults, is profound.

35. At the beginning of her declaration, Dr. Hilton discusses her involvement with the World Rugby Transgender Guidelines. (Hilton Decl. ¶ 1.13.) However, even these guidelines allow transgender girls and women to participate in women's rugby if they did not experience endogenous puberty, stating: "Transgender women who transitioned pre-puberty and have not experienced the biological effects of testosterone during puberty and adolescence can play women's rugby." World Rugby, *Transgender Women Guidelines* (2019), https://www.world.rugby/the-game/player-welfare/guidelines/transgender/women.

36. In sum, there is no evidence that transgender girls on puberty suppression medication or hormone therapy have an athletic advantage over other girls. There are no studies that have documented any such advantage, and there is no medical reason to posit

that any such advantage would exist.

37. In my clinical practice, I have provided medical care to more than 300 adolescent transgender girls. None of the transgender girls I have treated with the above medical interventions appeared to have any athletic advantage over other girls.

VI. From a Medical Perspective, Menstruation Does Not Provide a Basis to Conclude That Transgender Girls Have an Athletic Advantage Over Other Girls.

38. In her declaration, Dr. Hilton claims that female athletes have an athletic disadvantage because they "must typically deal with the effects of the menstrual cycle," which may affect "training capacity and performance," and that, as a result, transgender girls have an athletic advantage because they do not menstruate. (Hilton Decl. ¶ 6.5.) This conclusion does not have a sound medical or scientific basis because not all adolescent girls menstruate or suffer any athletic disadvantage if they do menstruate.

39. For example, girls with certain medical conditions do not menstruate, and some adolescent girls may take birth control to prevent menstruation or for other medical reasons. In addition, not all adolescent girls who do menstruate suffer any adverse impacts on their training capacity or performance.

VII. Permitting Transgender Girls to Play on Girls' Teams Does Not Pose a Safety Risk to Other Girls.

40. In her declaration, Dr. Hilton testifies that transgender girls who play on girls' teams somehow pose a threat to the safety of other girls because, she asserts, girls have "delicate brain structures" that make them more prone to injury. (Hilton Decl. ¶ 6.6.) While research has found that girls suffer more sports-related concussions than boys, the cause of that differential is unknown, including whether it is cultural or biological or both. *See* William T. Tsushima et al., *Incidence and Risk of Concussions in Youth Athletes: Comparisons of Age, Sex, Concussion History, Sport, and Football Position*, 34 Archives Clinical Neuropsych. 60, 66 (2019). In any event, however, there

is no scientific evidence that girls have more "delicate brain structures" than boys. If a researcher were to view an MRI of a human brain, there would be no way to identify whether it was the brain of a male or a female other than average size. Lise Eliot et al., *Dump the "Dimorphism": Comprehensive Synthesis of Human Brain Studies Reveals Few Male-Female Differences Beyond Size*, 125 Neurosci. & Biobehav. Rev. 667, 668 (2021).

41. Some researchers have theorized that girls may suffer more sports-related concussions because, on average, adolescent girls have weaker neck muscles than post-pubertal adolescent boys. *See* Abigail C. Bretzin et al., *Association of Sex with Adolescent Soccer Concussion Incidence and Characteristics*, 4 JAMA Network Open 4, 6 (2021); Ryan T. Tierney et al., *Gender Differences in Head-Neck Segment Dynamic Stabilization During Head Acceleration*, 37 Med. & Sci. Sports & Exercise 272, 272 (2005). If that accounts for girls' higher rates of concussions (which is unknown), transgender girls on puberty blockers or hormone therapy would be at the same or similar risk for such injury as non-transgender girls. There is no evidence, and no medical reason to believe, that their participation on girls' teams would pose any increased threat of such injuries to other girls.

42. More generally, transgender girls do not present any unique safety risks to other girls. Transgender girls' physical characteristics (in terms of height, weight, and strength) overlap with those of other girls. For example, while some transgender girls may be taller than average, so are some non-transgender girls, and many transgender girls are simply average.

43. There is no more reason to exclude a tall transgender girl for safety reasons than there would be to exclude any other girl for that reason. While some transgender girls may (or may not) have larger skeletons than some non-transgender girls, there is no medical reason to conclude that that physical characteristic poses any elevated safety concerns when not accompanied by high levels of testosterone and corresponding skeletal

muscle. After a transgender adolescent suppresses her level of testosterone, there is no inherent medical reason why her physiological characteristics related to athletic performance should be treated differently from the physiological characteristics of other girls.

Dr. Blade's Declaration

44. Dr. Blade is not a medical doctor, nor does it appear that she has ever treated a transgender patient; in contrast, I have experience treating over 600 hundred patients with gender dysphoria. From a medical perspective, the terms "biological sex," "biological male," and "biological female" are imprecise terms that can cause confusion. A person's sex encompasses several different biological attributes, including sex chromosomes, certain genes, gonads, sex hormone levels, internal and external genitalia, other secondary sex characteristics, and gender identity. Those attributes are not always aligned in the same direction. *See* Joshua D. Safer, *Care of Transgender Persons*, 381 N. Engl. J. Med. 2451 (2019).

45. Contrary to Dr. Blade's testimony and as I have previously discussed, there is an overwhelming scientific consensus that the biological cause of average differences in athletic performance between men and women is the rise in circulating levels of testosterone beginning in endogenous male puberty.

46. Dr. Blade discusses data from physical fitness tests in children to demonstrate that transgender girls have an athletic advantage over other girls before puberty. (Blade Decl. at 7–9.) This data merely observes phenomena across a population sample in isolated areas and does not determine a cause for whatever is observed. As I have discussed previously, there is no reliable basis for Dr. Blade to attribute any small differences between boys and girls to physiology or anatomy instead of other factors, such as greater societal encouragement of athleticism in boys, greater opportunities for boys to play sports, or different preferences of the boys and girls surveyed.

47. Dr. Blade also asserts that because prepubertal boys have a greater lung volume and other enhanced capabilities throughout the oxygen transport system, they do better in endurance tests and the 1500m run. (Blade Decl. at 9.) In fact, any such difference between boys and girls is small and has no documented impact on athletic performance. If this small average difference in lung capacity had a significant causal relationship to athletic advantage, we would see significant differences in the athletic performance of prepubescent boys and girls, but we do not.

48. Dr. Blade posits that transgender girls' participation in girls' sports causes psychosocial risks to other girls. (Blade Decl. at 11–12.) Dr. Blade's assertion is based on a misunderstanding regarding transgender girls. As discussed in my prior declarations in this case, a transgender girl is a girl. Moreover, there is no reason to assume a transgender girl's identity would be discernible to other girls, particularly when a transgender girl transitions socially and medically. Lastly, Dr. Blade supports her assertion with mere anecdotes rather than scientific research on the topic. As discussed above, the scientific research demonstrates there is no athletic advantage between transgender girls who have not undergone male puberty and other girls.

Dr. Brown's Rebuttal Declaration

49. Dr. Brown cites a hodge-podge of studies, but none support his view that prepubertal boys have a significant group-based advantage over prepubertal girls, which is contrary to the overwhelming weight of medical evidence and consensus on this issue.

50. For example, although Dr. Brown claims that Handelman's research supports Dr. Brown's position, Handelman himself disagrees, as Dr. Brown concedes.

51. The studies cited by Dr. Brown do not support his thesis for a variety of reasons. First, several of the studies include post-pubertal as well as pubertal children. (*See*, *e.g.*, Brown Rebuttal Decl. ¶¶ 9–10 (citing data that includes children from the ages of 9 to 16).) Second, some of the studies show small physiological differences between prepubertal boys and girls, but do not purport to establish any causal link between those

small differences and athletic ability or establishing only a speculative or hypothetical link. (*See, e.g.*, Brown Rebuttal Decl. ¶ 12 (citing data showing that girls have a slightly higher resting heart rate).) And third, even with respect to those small physiological differences between prepubertal boys and girls, unlike the post-pubertal production of testosterone, those differences exist on an overlapping spectrum. For example, while it is true that there is some evidence that prepubertal boys on average may have slightly less body fat than girls,[4] there are some girls who have less body fat than some boys, and some boys who have more body fat than some girls. In contrast, apart from girls with certain intersex conditions or other health conditions, there are no post-pubertal girls with more testosterone than post-pubertal boys; generally speaking, testosterone levels in post-pubertal boys and girls do not overlap.

52. Notably, Dr. Brown agrees that there is no basis for alleging that minipuberty has any impact on athletic ability. (Brown Rebuttal Decl. ¶ 37 (stating "At no point in my declaration are the male athletic advantages differences ascribed to 'minipuberty' (indeed, the term 'minipuberty' is not found within my expert report.")).

Dr. Carlson's Rebuttal Declaration

53. Dr. Carlson acknowledges that the only studies finding small differences in athletic performance between prepubertal boys and girls are cross-sectional studies that, as such, do not "assign causation to any measured differences, such as biology vs. sociological effect." (Carlson Rebuttal Decl. ¶ 6.) In addition, the small differences found by these studies relate to discrete activities, not to strength or athletic performance across the board, and do not rise anywhere close to the level of the broad, clear, and significant group-based differences caused by exposure over time to the elevated levels of testosterone associated with male puberty.

54. Dr. Carlson attempts to rebut the conclusion of McKay's study that there

[4] As noted in my prior declaration, and as Dr. Brown acknowledges (Brown Rebuttal Decl. ¶ 17), this research is not conclusive; some studies have found no differences and have criticized other studies for failing to consider factors such as age, maturational status and obesity status. (Shumer Rebuttal Decl. ¶ 6)

are no significant differences in athletic ability between prepubertal boys and girls, but his analysis is not persuasive. As Dr. Carlson acknowledges, McKay found no significant differences in strength based on sex in children ages 3 through 9—i.e., in prepubertal children, and found such differences only in post-pubertal children. (Carlson Decl. ¶ 9).

55. Dr. Carlson's suggestion that the two girls who are Plaintiffs in this case would have been grouped with the 10 to 19 year olds (Carlson Rebuttal Decl. ¶¶ 10–11) has no logical relevance to the import of McKay's study: significant athletic differences between boys and girls are linked to puberty. The Plaintiffs in this case are receiving puberty suppressing medication, which prevents them from undergoing male puberty and thus from gaining the potential athletic advantage associated with exposure to post pubertal levels of testosterone.

56. Dr. Carlson acknowledges that the studies he cites "carry with them the limitations of cross-sectional comparisons" (Carlson Rebuttal Decl. ¶ 15), and thus cannot establish any causal link between physiology and athletic performance in prepubertal children for the reasons explained above.

57. Dr. Carlson offers no evidence for his assumption that the enactment of Title IX means that prepubertal boys and girls now receive equal coaching and skill training, nor does any such evidence exist. (Carlson Rebuttal Decl. ¶ 19) To the contrary, as discussed below, research shows that girls receive far less opportunities for participation than boys.

58. Relatedly, Dr. Carlson relies heavily on a single article by Lombardo, which in turn rests upon speculative and subjective hypotheses about how boys and girls are treated in various cultures, including, for example, a presumption that Aboriginal boys and girls are equally encouraged to hunt and that German boys "do not throw much and do not have U.S.-like cultural support or encouragement for throwing." (Carlson Rebuttal Decl. ¶ 19(citing Michael P. Lombardo et al., *On the Evolution of the Sex*

Differences in Throwing: Throwing is a Male Adaptation in Humans, 93 Q.Rev. Biology 91 (2018))). Such speculative research based on broad sociological generalizations about other cultures does not provide a valid evidentiary basis to conclude that the small differences in athletic performance found in some cross-sectional studies of prepubertal boys and girls are based on physiology rather than culture, much less that such small differences have any applicability to individual transgender girls or warrant excluding all transgender girls from playing on girls' teams.

59. Research that is more carefully and objectively designed has found that differences in skills training and practice—not innate gender-based differences—account for many specific sex-based differences in athletic performance. For example, a 2019 study of spatiotemporal coordination in throwing found that sex-based differences "only arose from age 20 years onwards and that in individuals with throwing practice, performance disparities leveled out." Dena Crozier et al., *Gender Differences in Throwing Revisited: Sensorimotor Coordination in a Virtual Ball Aiming Task*, 13 Frontiers Hum. Neurosci. 231 (2019).

60. Given the far greater social encouragement and skills training provided to boys than to girls, it is not surprising, as Dr. Carlson notes (Carlson Rebuttal Decl. ¶ 21), that boys have the highest-ranking performances in USA Track & Field. Contrary to Dr. Carlson's suggestion that our society promotes "equal opportunities for boys and girls to participate," the reality is much different. Across the board, girls have far fewer opportunities to play sports and therefore far less coaching and skill training than boys in every age group. *See* U.S. Dep't Health & Hum. Servs., *The National Youth Sports Strategy*, 35–37 (2019), https://health.gov/sites/default/files/2019-10/National_Youth_Sports_Strategy.pdf; Aspen. Inst. Project Play, *Youth Sports Facts: Participation Rates*, https://www.aspenprojectplay.org/youth-sports/facts/participation-rates. For example, during the 2018–2019 year, fifty-seven percent of high school athletics participation opportunities went to boys, with only forty-three percent going to

girls, translating into over one million more opportunities for boys than girls. Ellen J. Staurowsky et al., Women's Sports Found., *50 Years of Title IX: We're Not Done Yet*, 30 (2022), https://www.womenssportsfoundation.org/wp-content/uploads/2022/05/Title-IX-at-50-Report-FINALC-v2-.pdf.

61. Dr. Carlson acknowledges that even the highly restrictive World Rugby policy permits transgender girls who receive puberty suppressing medication to play. (Carlson Rebuttal Decl. ¶¶ 23–24.) Dr. Carlson contends that this exception is not "grounded in scientific review of relevant data," but there is no data showing that such girls have any athletic advantage over other girls, nor is there any medically reasonable basis for assuming that they do. (Carlson Rebuttal Decl. ¶ 24.)

62. Dr. Carlson's suggestion (Carlson Rebuttal Decl. ¶ 25) that puberty suppressing medication fails to suppress the heightened levels of testosterone associated with male puberty in 25 to 49 percent of cases has no medical basis. The article he cites to support that erroneous claim is about the use of testosterone suppressant by adult transgender women who went through male puberty; it has no bearing on the efficacy of puberty suppression for transgender girls, which is highly effective and prevents transgender girls from producing the elevated levels of testosterone associated with male puberty.

63. The Klaver study does not support Dr. Carlson's claim that transgender girls who received puberty suppressing medication have an athletic advantage over other girls (Carlson Rebuttal Decl. ¶¶ 31–32) for the reasons stated in paragraph 33 above. It is not appropriate to use the Klaver article to presume that transgender girls may have more lean body mass on average than other girls because, as noted above, Klaver participants started GnRHa at much older ages than modern protocols would dictate. The findings of the study are not generalizable across decades and not relevant to the question at hand.

64. For the reasons explained in paragraphs 40 through 43 above, Dr. Carlson's claim that transgender girls "are more likely to cause concussions than other competitors"

(Carlson Rebuttal Decl. ¶ 33) has no medical basis. It is particularly unwarranted for transgender girls, like the Plaintiffs in this case, who receive puberty suppressing medication and thus do not go through male puberty.

Dr. Cantor's Supplemental Declaration

65. Dr. Cantor acknowledges that his views place him at odds with the standards of care and practice guidelines developed by the World Professional Association of Transgender Health ("WPATH") and the Endocrine Society, and which have been endorsed by a long list of major medical professional associations, including the American Medical Association, the American Academy of Pediatrics, the American Psychological Association, and many others.

66. Contrary to Dr. Cantor's unsupported claims, which implausibly cast aspersions on the integrity of our nation's leading professional medical organizations, the standards of care and practice guidelines relied upon by medical and mental health professionals who specialize in the treatment of gender dysphoria in adolescents have a sound evidentiary basis. The evidence-based methodology used to generate these guidelines is described in detail in both the WPATH Standards of Care and the Practice Guidelines promulgated by the Endocrine Society and is comparable to that used to generate similar clinical practice guidelines for other medical conditions.

67. Dr. Cantor's views, which seek to cast doubt on the existence of gender identity as a facet of human identity and to advocate the use of therapeutic techniques to discourage or prevent minors from identifying as transgender, do not have a sound scientific foundation and are distinctly at odds with the overwhelming consensus of medical science, experts, and practitioners in this area.

68. Dr. Cantor does not diagnose or treat gender dysphoria in adolescents or adults and has no training or expertise in transgender mental health care or medicine. As such, his strong disagreement with the consensus of medical experts in this area appears to be based more on his personal opinions than on a scientific foundation.

I declare under criminal penalty under the laws of Arizona that the foregoing is true and correct. Signed on the 6th day of July, 2023, in Ann Arbor, Michigan.

Daniel Shumer, M.D.

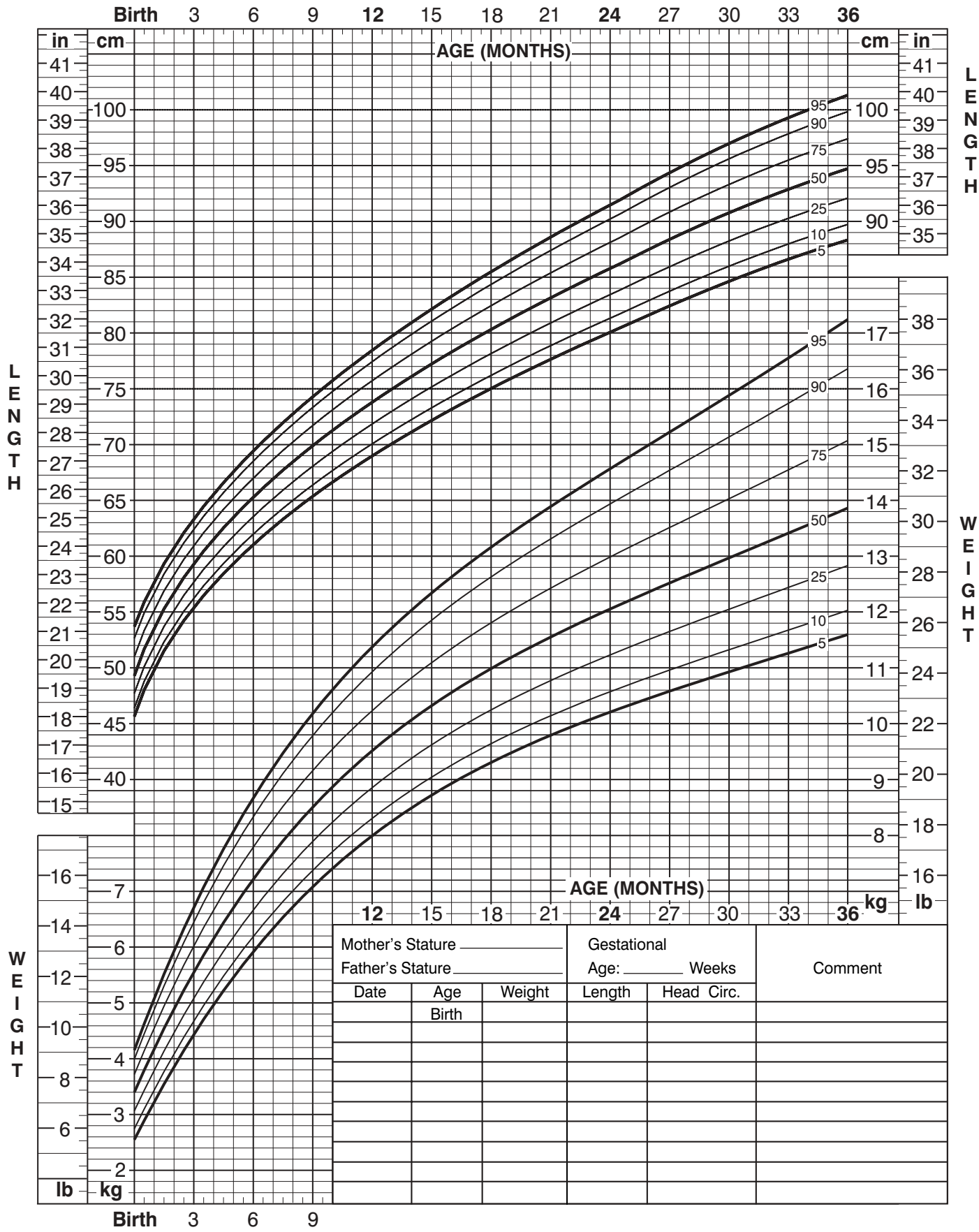
Exhibit A

CDC Growth Charts

Birth to 36 months: Girls
Length-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Published May 30, 2000 (modified 4/20/01).

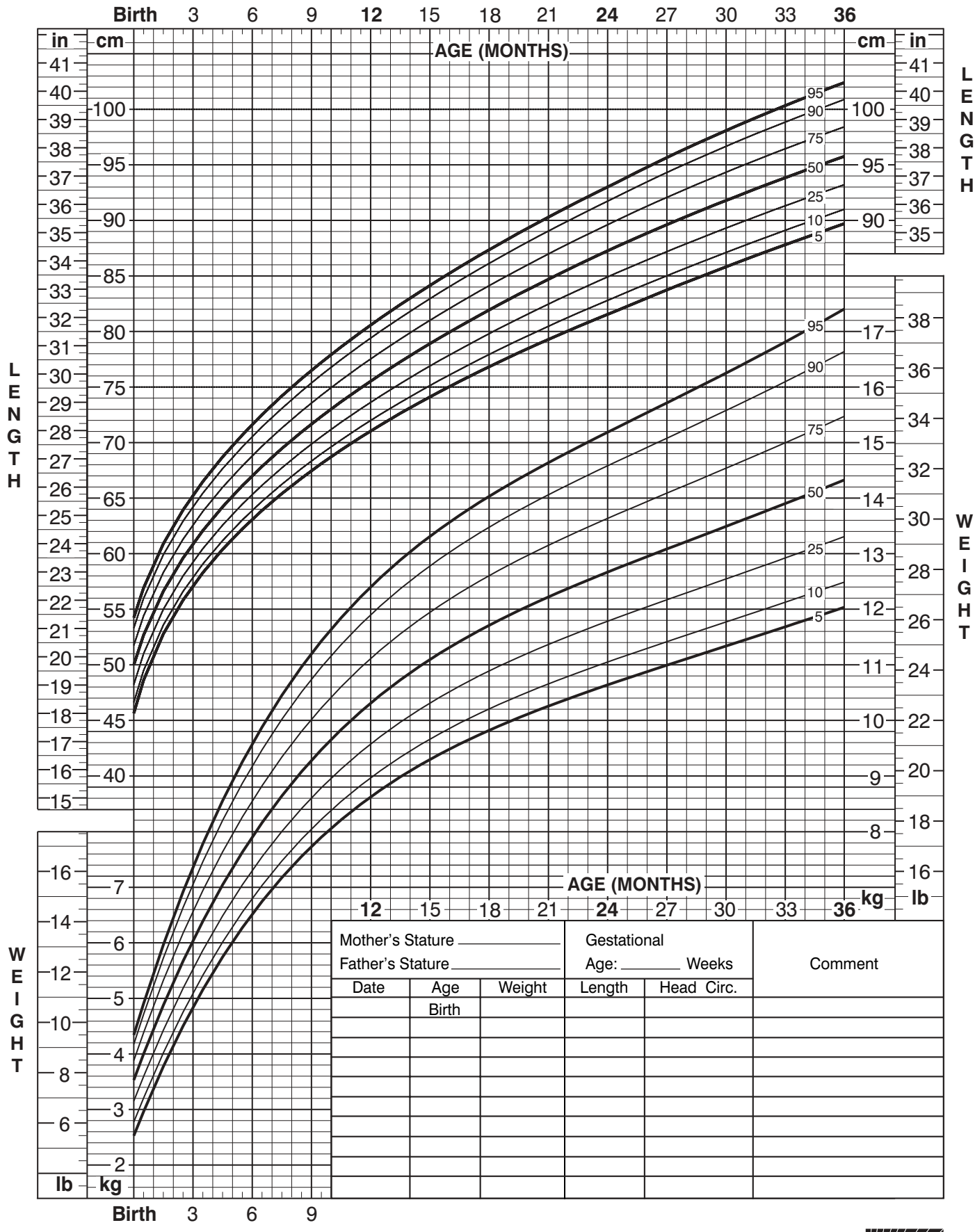
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

CDC
SAFER • HEALTHIER • PEOPLE™

Birth to 36 months: Boys
Length-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Published May 30, 2000 (modified 4/20/01).

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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2 to 20 years: Girls
Stature-for-age and Weight-for-age percentiles

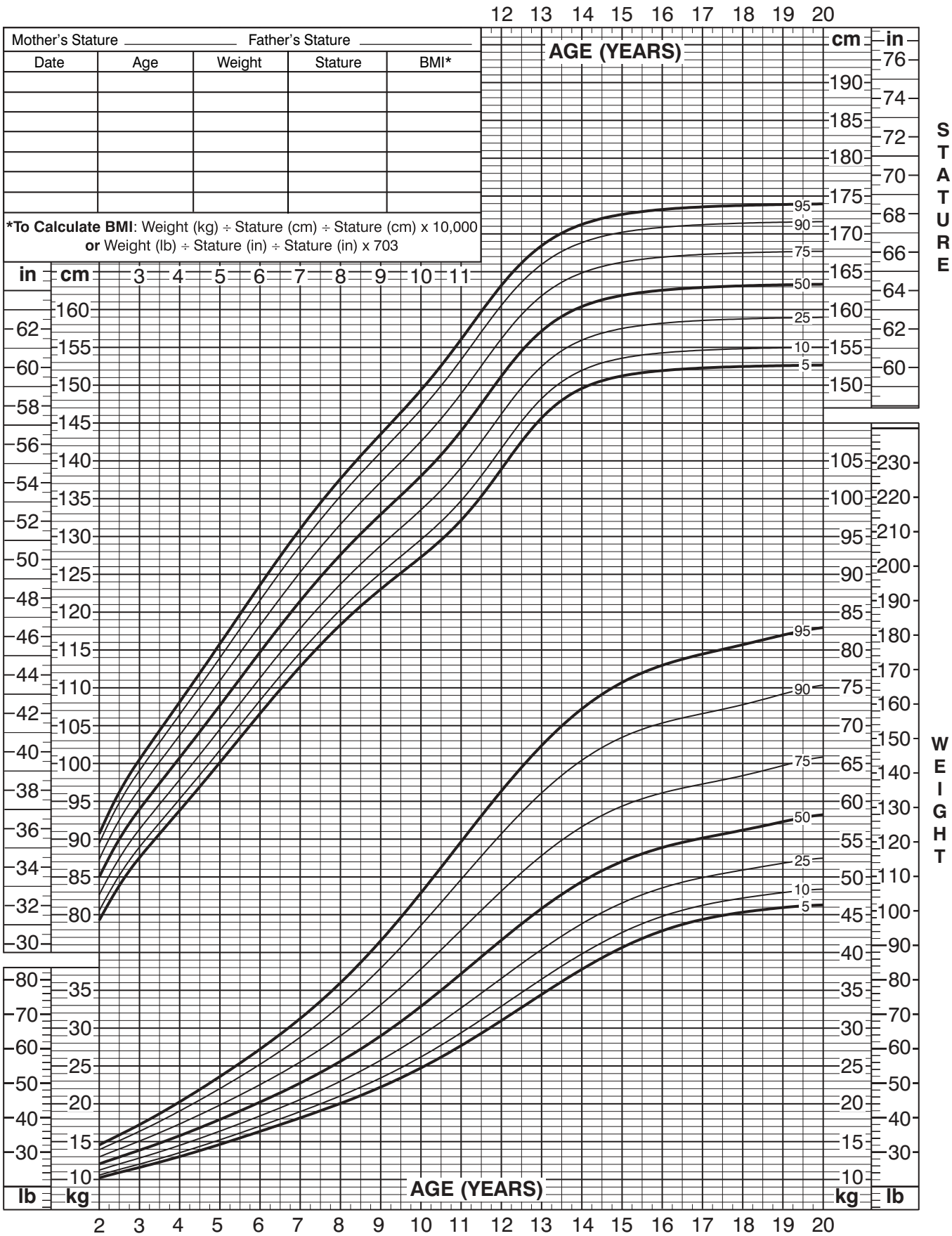
NAME _____

RECORD # _____

Mother's Stature _____ Father's Stature _____

Date	Age	Weight	Stature	BMI*

***To Calculate BMI**: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 11/21/00).

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2 to 20 years: Boys
Stature-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____

Mother's Stature _____ Father's Stature _____

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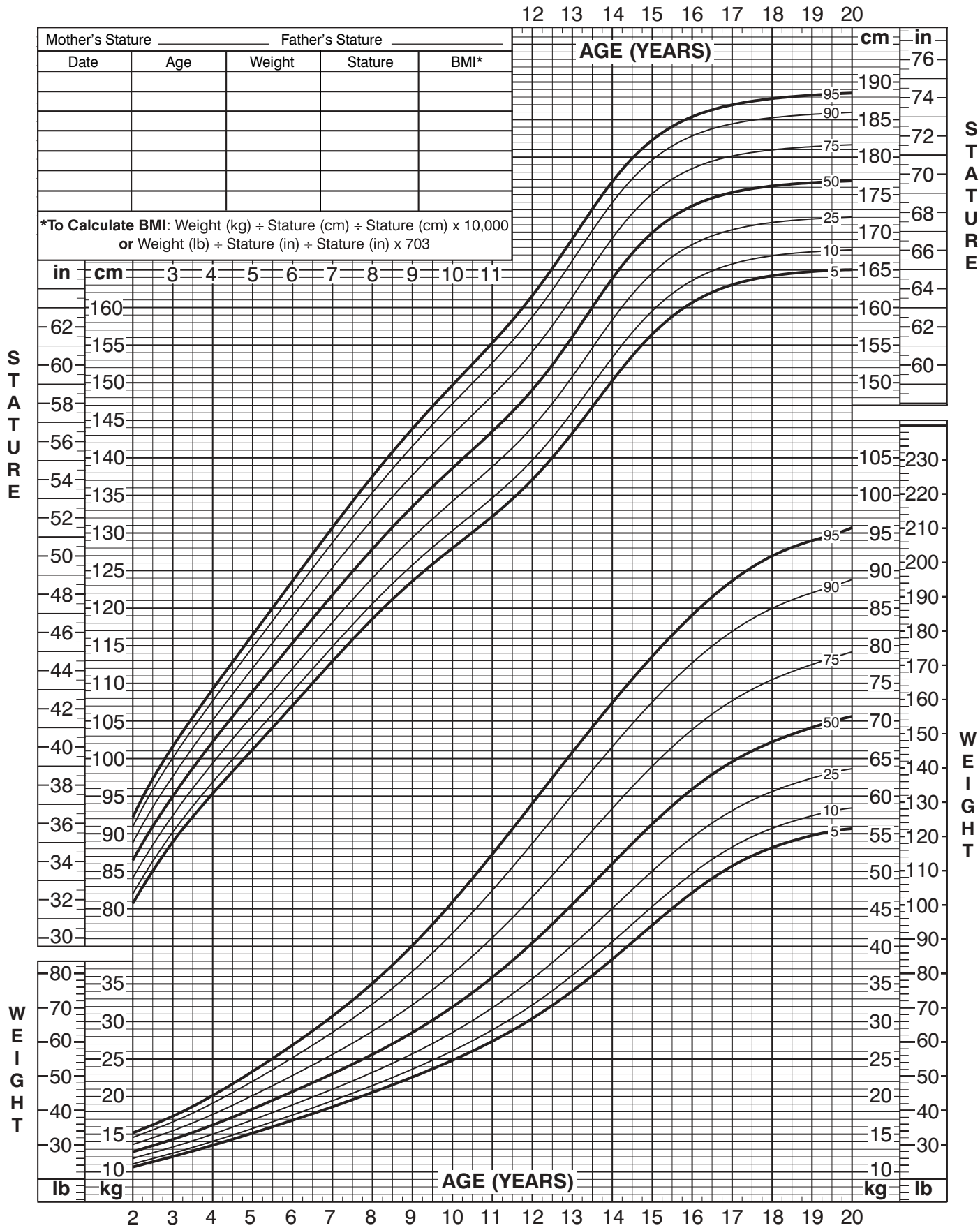
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 11/21/00).

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