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Challenging SCRAM Continuous Alcohol Monitor Evidence as Unreliable and Insufficient

Every defense lawyer taking DUI cases likely knows the SCRAM Continuous Alcohol Monitor. It is an electronic monitoring device worn on the ankle 24 hours a day that samples the wearer's sweat to determine whether the person has consumed alcohol. Forty-eight states currently use it, making it the most widely used alcohol monitor of its kind. The SCRAM Systems corporation even recently celebrated "the accomplishment of 100 million days of client monitoring" and announced its expansion to England, Wales, and the Netherlands.[1]

Individuals charged with DUIs often take "SCRAM pleas," where they promise, as a condition of their release, not to drink alcohol and to wear the SCRAM bracelet to prove it. If the SCRAM bracelet alerts that the individuals have consumed alcohol, courts can find that they have violated their no-drinking condition and impose increased sanctions, potentially including jail time. The court may hold a hearing on the violation, but those hearings usually have relaxed evidentiary rules, making SCRAM evidence more difficult to challenge on reliability grounds than, for example, DNA evidence sought to be introduced at trial.

Defense attorneys often report, however, that their clients insist they did not drink, even though the SCRAM monitor says they did. There is reason to believe these clients. Based on publicly available information, it appears that water, atmospheric alcoholic compounds, and temperature can all interfere with the SCRAM bracelet's ethanol reading.[2] Proper calibration of the device is also key, but prosecutors seldom provide proper documentation of calibration, and it is unclear whether adequate calibration is happening in practice.

Despite the procedural hurdles, more defense attorneys should be regularly asking for discovery and challenging alleged SCRAM violations on unreliability and insufficiency grounds. But doing so requires an understanding of the technology and its many potential problems. This article explains some of the challenges defense attorneys might bring to alleged SCRAM violations.

SCRAM Technology

The SCRAM Continuous Alcohol Monitor is an ankle bracelet with an attached monitor that weighs approximately eight ounces. The device fits around the wearer's ankle but with a gap between the skin and the monitor. Inside the monitor casing is, among other things, a fuel cell. The fuel cell is like an Oreo, with conductors on either side and a hydrated membrane in the middle. When the wearer sweats on his or her ankle, it creates a vapor. Protons from that vapor are then drawn across the fuel cell membrane in the device, while electrons are drawn on a wire from one conductor to the other. This produces an electrical signal that is used to extrapolate the presence of ethanol content in the wearer's sweat.[3]

BY JULIANA DEVRIES

SCRAM refers to this ethanol content extrapolation as Transdermal Alcohol Concentration (TAC). Prosecutors will typically provide in discovery the SCRAM company's non-compliance report, allegedly showing a drinking event. That report includes a graph showing TAC over time as measured by the device. The graph also includes temperature and infrared readings taken from additional sensors inside the device. Unlike the fuel cell TAC reading, the temperature and infrared readings are meant to detect whether the wearer has tampered with the device, not whether the person has consumed alcohol. The ankle bracelet also contains a digital signal processing compartment that transmits the collected data to an in-home modem, which uploads the data to the SCRAM company for its analysis.[4]

Deciding that the TAC reading reflected in the graph shows that the wearer consumed alcohol requires a series of assumptions. It assumes any ethanol in the sweat is there because the wearer consumed alcohol rather than, for example, used a product that contains an alcoholic compound. It assumes any ethanol picked up by the device comes from the wearer's skin rather than from the air. It assumes there is nothing significant about the wearer's skin properties or body chemistry that might throw off the correlation between the reaction in the fuel cell and the concentration of alcohol in the person's body. It assumes, of course, that the device is working properly. And it assumes the correlations the SCRAM company uses between the electrical signal and its TAC determination are correct and properly applied. Each of these assumptions — and likely others — provides a way to challenge the TAC reading's reliability and adequacy as a basis for imposing increased punishment.

SCRAM Problems

The exact standard for assessing the reliability of evidence will vary based on the jurisdiction. But whether a given jurisdiction uses *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, *Frye v. United States*,[5] or a different standard to assess SCRAM violation evidence, there are likely challenges defense attorneys can make based on the facts of their cases.

Water

The TAC reading in a particular case could be inaccurate because of water damage to the fuel cell components. SCRAM Systems, the company that makes the SCRAM device, has disclosed this vulnerability in its own patent applications, which defense attorneys can use to assist courts in understanding how water damage may have skewed their clients' TAC readings.[6]

SCRAM Systems has acknowledged that "[c]ondensation of moisture into water droplets within an alcohol monitor can eventually damage internal components, thus reducing the service life of the alcohol monitor."[7] In other words, at least in the version of the device created before this patent issued in 2009, water coming into the device from the atmosphere had the potential to damage the SCRAM device's internal components and impact the TAC reading.

The patented invention attempted to solve this problem in part by taking "advantage of gravity, allowing any water droplets that form to flow out of [the device] while the subject is in an upright position (walking or standing)."[8] The issue with this so-called solution is obvious: to avoid water damage, the wearer must be walking or standing, which individuals do not do 24 hours a day. So there seems to be a potential reliability issue if the wearer was lying down when the device alerted to the presence of alcohol or if the person was lying down more than usual in the days or weeks before the alert.

Given that the prosecution has the burden to prove a violation, defense attorneys should be pushing courts to require evidence that the device worn incorporated the patented invention and that the patented invention fixes the water problem under the client's specific circumstances. It is particularly important to raise this issue when the SCRAM bracelet worn has been in use for a long time because the water damage problem shortens the device's service life.[9]

In addition to SCRAM Systems' own patent acknowledgements, scientific papers have noted water problems with SCRAM. The National Highway Traffic Safety Administration funded a study testing SCRAM's reliability for detecting alcohol consumption. It tracked 22 subjects, who wore both the SCRAM device and another competing device, for a combined total of 96 weeks. The subjects participated in controlled drinking in a lab setting and drank alcohol on their own.

The study found that SCRAM correctly detected 79 percent of drinking events but reported that the "devices were more accurate earlier than later in the trials and may have had problems with water accumulation that reduced sensitivity."[10] That study did not find, however, that the water accumulation problem created false positives but instead that it produced "false negatives and/or … unreadable data."[11] "Actual false positives among the subjects" in that study "were rare, and when false positives did occur it was attributable to an undetected external source of alcohol."[12] The National Highway Traffic Safety Administration acknowledged that the tested device was "replaced by a device with less dead airspace for holding water, and this has reportedly solved the problem of water accumulation," but the agency said it had "no evaluation data on this newer version."[13]

Independent researchers Dr. Joseph Anderson and Dr. Michael P. Hlastala have also expressed concern that water concentration can affect the TAC reading in the SCRAM device. In a peer-reviewed study for the *Journal of Applied Physiology*, they presented a mathematical model of how ethanol travels through the skin as opposed to in the blood to investigate factors that might impact ethanol content in the sweat and therefore TAC readings. Their results "suggest[ed] the water content and temperature of the stratum corneum along with the volume and flow rate of gas above the skin need to be closely controlled to ensure accurate measurements."[14] In other words, water (and temperature) can affect the TAC reading. There is an effect on the TAC reading because hydration impacts the kinetics of how ethanol will pass through a person's skin and therefore alters the concentration of ethanol in the person's sweat. A SCRAM wearer who is unusually hydrated may therefore have a different TAC reading than a person with dry skin, even though both people drank the same amount of alcohol over the same time period.

It may be that SCRAM has updated its technology to incorporate a fix for its previously acknowledged water problem, but it must ultimately fall on the prosecution to prove that this has occurred under the specific circumstances of a given case. It may also be that the newer and older versions of the device have water-accumulation problems but that they create false negatives rather than false positives. But given the stakes for the client, the water problems identified in multiple sources, and the lack of publicly available, neutral evidence showing that all the SCRAM devices in circulation produce no false positives based on water accumulation, defense attorneys should be demanding discovery on this issue and holding the prosecution to its burden.

Outside Alcohol Sources

Alcohol sources other than drinking can also interfere with the TAC reading. Recall that there is a gap between the SCRAM alcohol monitor and the wearer's skin; this means the device may be picking up on alcohol in the air rather than just from the wearer's sweat. In addition to this potential atmospheric alcohol interference, wearers may be absorbing alcohol compounds into their bodies, which then show up as an ethanol concentration in their sweat and cause an electrical signal in the fuel cell — all without their having consumed alcohol.

Take, for example, the case of Angel Carrillo. Ms. Carrillo was accused of violating a no-drinking condition based on a "SCRAM System Non-Compliance Report" alleging she drank alcohol. At the hearing on the alleged violation, prosecution witnesses testified that Ms. Carrillo's SCRAM device was properly calibrated and working correctly at the time of the alert. The defense called Dr. Anderson, who testified that the TAC graph in Ms. Carrillo's non-compliance report showed a saw-toothed pattern inconsistent with alcohol consumption. The graph should have been smooth and continuous if it showed a true alcohol consumption event.

The defense also introduced evidence from an Ignition Interlock Device showing zero Blood Alcohol Content at the time when the SCRAM device showed an elevated TAC reading. Ms. Carrillo testified she had not drunk alcohol but that, at the time of the SCRAM alert, she had been hosting a birthday party for her son where a bottle of vodka broke. In cleaning up the mess, she spilled vodka on her skin. On these facts, the court found that the prosecution did not sustain its burden to prove by a preponderance of the evidence that Ms. Carrillo drank alcohol.[15]

Ms. Carrillo's case is at the extreme: she knew that vodka had spilled on her skin, and she happened to have Ignition Interlock Device evidence to support her explanation. But ample reason exists to believe that common sources of alcoholic compounds other than alcoholic beverages can interfere with the SCRAM device and create false positives in less extreme situations. Menthol, propanol, isopropanol, ethanol, and other similar compounds in the environment can create an elevated TAC reading because these compounds are in either the wearer's sweat or in the air.

Common beauty and household products contain alcoholic compounds that could create an elevated Transdermal Alcohol Concentration reading in the SCRAM device.

These alcoholic compounds are ever-present in daily life. It is therefore no answer to tell the SCRAM device wearer that they must simply avoid all potential sources of alcohol. Common beauty and household products, industrial products, foods, and medicines all contain alcoholic compounds that could create an elevated TAC reading in the SCRAM device. Menthol is in, for example, breath mints and menthol cigarettes. Hand sanitizer is everywhere, especially since the COVID-19 pandemic, and typically contains at least 60% ethanol. Even a piece of decaying fruit releases ethanol into the atmosphere. These compounds are so ubiquitous that people accused of SCRAM non-compliance may not even know what created their false positive, even if they know they did not drink.

SCRAM Systems has, again, admitted this problem in a patent application: "An insensible skin perspiration sample may not be completely controlled and can contain interferents from an environmental source rather than the subject."[16] The company even identified various places where interferants are more likely: "Environmental interferents may be found in bars, bakeries, barber shops, hair salons, and other locations where menthol, propanol, isopropanol, ethanol, and other similar compounds are present. These gaseous compounds can cause Fuel Cell to react if they backflow into Transdermal Alcohol Monitor."[17] SCRAM wearers cannot reasonably be required to stop working in a barber shop or hair salon, but the company has admitted that doing so may create a false positive reading.

The patented invention attempts to address the interference problem by calibrating the device to "determin[e] the baseline value when no alcohol is present in the sample."[18] This means the prosecution needs to at least provide evidence to the court that the specific device worn was properly calibrated to determine this baseline value. And even if the prosecution proves this, there do not appear to be peer-reviewed, independent studies demonstrating that determining this baseline value fixes the acknowledged interference problem.

There are, on the other hand, scientific studies recognizing that outside alcohol sources can create false positive SCRAM TAC readings. As one study put it, "transdermal vapor-based alcohol sensors [such as SCRAM] may yield false signals, rising from external alcohol-containing vapors (i.e., bar scenario, paint, etc.) as well as from alternate components found in insensible sweat due to the non-specific nature of the electrochemical detection method (i.e., non-specific oxidation at the sensing electrode, particularly non-enzymatic platinum-based sensors)."[19] The National Highway Traffic Safety Administration study similarly attributed the false positives it found to "an undetected external source of alcohol," such as shaving cream or perfume.[20]

Skin Properties

Yet another source of potential inaccuracy comes from differences in the properties of SCRAM device-wearers' skin. When a person drinks alcohol, the person's liver metabolizes most of the ethanol, but approximately one percent exits the body through the skin in perspiration.[21] Variation in the person's body chemistry and skin affect how the person metabolizes that one percent.

Drs. Anderson and Hlastala's mathematical model of the kinetics of ethanol across the skin, for instance, shows that the solubility, diffusivity, and thickness of the stratum corneum, or outer layer of skin, significantly impacts the presence of ethanol in the sweat. Each of these three factors — solubility, diffusivity, and thickness — in turn depends on the temperature and hydration of the skin.[22] Temperature and hydration can therefore impact the SCRAM TAC reading. And environmental conditions, age, and sex can all influence the temperature or hydration of the skin.[23]

It is also possible that differences in skin tone impact the SCRAM device's operation. Recall that, in addition to the TAC reading, the monitor measures temperature and takes an infrared reading. The graphs turned

over in discovery typically include all three measurements (TAC, temperature, and infrared) over time. Infrared sensors in other devices worn close to the skin have recently faced criticism for their inherent racial bias. The pulse oximeter, for example, is a compact medical device that clips onto the fingertip and measures blood oxygenation; it has played a key role in COVID-19 care. The pulse oximeter detects oxygenation in part by shining an infrared light through the wearer's skin. Recent studies of the device found that skin tone affects the device's oxygenation readings, apparently because the infrared reading depends on color sensing through the skin.[24]

Like the pulse oximeter, the SCRAM device uses an infrared reading taken against the skin. It is therefore plausible that skin tone may affect the infrared reading in the SCRAM device, which is used to allege tampering with the device. There do not appear to be any studies that have assessed whether the SCRAM infrared reading is subject to racial bias. But there may be room for defense attorneys to request discovery related to this topic, such as to request that a defense expert be given access to the device used in the case to determine whether skin tone variability might have impacted the client's infrared reading. This issue would be most relevant when the client has an elevated infrared reading that the prosecutor is using as a basis for alleging a violation rather than in a case in which only the TAC reading is at issue.

General Malfunction

As the defense expert testified in the *Carrillo* case, a TAC graph showing true alcohol beverage consumption over time would be smooth and continuous rather than jagged with multiple peaks.[25] The TAC graph in that case was not smooth or continuous, but the SCRAM company still claimed it showed a drinking event.[26]

The *Carrillo* case is not the only one in which the TAC graph was peculiar. In a case in Michigan, the accused individual's TAC graph claimed to detect drinking for a full 63 hours. The prosecution's expert witness believed the defendant had consumed alcohol multiple times during the 63 hours, leading to the extended elevated TAC reading. But the expert witness for the defense testified this was not a drinking episode at all — given the inordinate length of time and the fairly constant, elevated TAC reading — and that there was instead likely a malfunction or calibration issue with the device. Such a lengthy and consistent TAC reading was, the defense expert testified, a "biological impossibility."[27]

After the fuel cell in the SCRAM device transmits its data to the SCRAM company, some kind of analysis must be done to decide that a given reading shows a drinking event. These cases demonstrate that SCRAM's methodology for performing this analysis may be inaccurate in some instances.

Fitting the Science Into the Case Law

Despite the SCRAM bracelet's problems, multiple courts have held that SCRAM technology is reliable. In *Mogg v. State*, for example, the Court of Appeals of Indiana held that the trial court did not abuse its discretion by "determining the SCRAM readings were sufficiently reliable to be admissible as evidence of Mogg's alcohol consumption for purposes of a probation revocation."[28] The prosecution offered expert testimony as well as three studies: an internal SCRAM Systems study, the oft-cited Sakai study (also funded by SCRAM Systems),[29] and the aforementioned report from the National Highway Traffic Safety Administration. The defense did not

present any expert testimony, but Ms. Mogg testified she did not drink alcohol on the relevant days; an acquaintance testified she did not see Ms. Mogg drink alcohol; and the defense introduced two articles criticizing SCRAM, though neither were scientific studies.[30]

Indiana uses the *Daubert* standard for trial evidence but only requires that probation revocation evidence bear "some substantial indicia of reliability."[31] In declining to reverse the trial court's finding that the SCRAM evidence met this test, the court of appeals relied heavily on its deferential abuse of discretion review standard and cautioned that its conclusion was "not to be read for the proposition that SCRAM data are admissible in any type of proceeding or for purposes other than to prove the subject consumed alcohol."[32]

The record in the *Mogg* case, for example, "would not support a finding that SCRAM data are reliable for purposes of showing a person's intoxication."[33] This is an important point. Even those who claim that the SCRAM device can tell if a person has consumed alcohol do not claim that it can reliably detect how much alcohol the person drank.[34] But even if SCRAM Systems is only claiming that it can distinguish drinking from no-drinking, it still must set a threshold ethanol content level to make this claim. And setting and adhering to this threshold requires that the SCRAM device be able to reliably detect levels of intoxication.

The *Mogg* court further "caution[ed] trial courts against admitting SCRAM data absent a sufficient foundation to show the system functioned reliably in a particular case … or upon affidavit without opportunity for cross-examination of the expert who analyzed the data and based a finding of consumption thereon."[35] And because its conclusion was based on "expert testimony that was largely uncontroverted by Ms. Mogg," the court left "for another day whether the result would be different upon a different record where the indicia of the SCRAM system's reliability were more closely disputed."[36] This case demonstrates how vital it is for defense attorneys to vigorously challenge SCRAM evidence and to insist on proof of proper calibration of the specific SCRAM device worn.

In *State v. Lemler*, the Supreme Court of South Dakota found that the trial court did not abuse its discretion by admitting SCRAM evidence under the *Daubert* standard. The trial court had held a hearing on Mr. Lemler's alleged probation violation and credited the prosecution's expert witness. The expert witness testified that SCRAM was reliable in general and in the specific case despite Mr. Lemler's testimony that he did not drink and that interferants from his occupation as a farmer must have caused his elevated TAC readings.[37]

The defense called Dr. Hlastala as an expert witness, who testified that the SCRAM fuel cell is non-specific for ethanol and that contamination from interferants was possible, even if the shape of the TAC curve looks similar to one where the wearer drank alcohol.[38] But the Supreme Court of South Dakota affirmed, concluding that the possibility of an interferant was a "factual variable[] argued to the factfinder" and "that a trial court does not abuse its discretion in admitting the scientific evidence and then letting the factfinder resolve the factual dispute."[39]

Although these courts accepted the reliability of SCRAM — at least on deferential appellate review — these opinions leave open many possibilities for challenging SCRAM evidence, both as to its general unreliability and based on the specific facts of the case. In jurisdictions where a probation violation hearing uses a lower reliability standard, as in *Mogg*, attorneys still can often make Due Process or statutory-based reliability arguments. And even in a jurisdiction that has accepted the general reliability of SCRAM, there may be an as-applied unreliability issue. In the *Carrillo* case, the defense won on a sufficiency-of-the-evidence theory, which may prove more successful, depending on the facts and the jurisdiction.

Some cases may even lend themselves to arguments outside the reliability or sufficiency realm entirely. Discovery litigation may arise. There may be Equal Protection issues to raise if it appears, for example, that the client's skin tone, sex, or age affected the reading. The fact that the device monitors the person's body chemistry through sweat 24 hours a day may raise privacy concerns cognizable under the Fourth Amendment, state constitution privacy provisions, or privacy statutes.

There are also potential fines and fees issues in jurisdictions where wearers must fund their own SCRAM devices. In *People v. Hakes*, for example, the Court of Appeals of New York held that requiring a probationer to pay the costs associated with a SCRAM bracelet is not per se unreasonable but that courts cannot impose a SCRAM condition if the probationer cannot feasibly pay for it.[40]

Conclusion

Defense attorneys can and should be challenging alleged SCRAM violations and holding the prosecution to its burden. As explained in the previous paragraphs, there are many potential ways to challenge SCRAM evidence depending on the facts of the client's case.

What makes sense strategically in a given case — including whether to advise a client to take a SCRAM plea in the first place — will involve considerations specific to that client. Sometimes defense attorneys and clients believe it is better to agree to SCRAM monitoring to stay out of custody, especially when alternative non-custodial options, such as losing a driver's license, are unavailable or worse. But even if taking a SCRAM plea is the correct decision for a particular client, that decision cannot be made properly without an understanding of the risk that a SCRAM monitor may claim that the client consumed alcohol when the client did not.

On a society-wide basis, the unreliability of the SCRAM device — combined with its widespread use — illustrates concerns others have raised about mass surveillance of probationers. Electronic monitoring, sometimes called e-carceration, has increased dramatically in recent years.[41] While proponents praise elec-

tronic monitoring as an alternative to incarceration, critics argue[42] that it feeds rather than curtails mass incarceration; that there are racial disparities in who is subjected to supervision and how probation conditions are enforced; and that electronic monitoring is simply a way to control individuals struggling with economic and health challenges without addressing their underlying issues.[43] When the monitoring device itself is inaccurate, additional fairness and innocence concerns are at play.

The SCRAM monitor is one e-carceration device that is riddled with potential inaccuracies. Among other problems, it can be subject to water damage, it takes in outside alcohol sources, and it can fail to account for differences in wearers' skin properties. It is up to defense attorneys to bring these issues to courts' attention and request relevant discovery so they can try to protect their clients from incarceration based on a false alert from a faulty device.

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Notes

1. SCRAM Systems, *About Us*, https://www.scramsystems.com/our-company/about-us/ (last visited May 20, 2021).

2. *See infra* notes 6, 9, 13, 16, 18, 19.

3. Paul R. Marques & A. Scott McKnight, *Evaluating Transdermal Alcohol Measuring Devices*, Nat'l Highway Traffic Safety Admin., 8 (Nov. 2007); Joseph T. Sakai et al., *Validity of Transdermal Alcohol Monitoring: Fixed and Self-Regulated Dosing*, 30 Alcoholism Clinical and Experimental Rsch. 6, 27 (Jan. 2006); Kenneth I. Ozoemana et al., *Fuel Cell-Based Breath-Alcohol Sensors: Innovation-Hungry Old Electrochemistry*, 10 Innovative Methods in Electrochemistry 82, 84 (May 2018).

4. Alan S. Campbell et al., *Wearable Electrochemical Alcohol Biosensors*, Current Op. in Electrochemistry, Author Manuscript, 6 (Aug. 2018).

5. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

6. Links to the patents and other resources to challenge SCRAM evidence are available on the UC Berkeley, School of Law, Samuelson Law, Technology & Public Policy Clinic website: https://www.law.berkeley.edu/case-project/challenging-scram-bracelets/.

7. U.S. Patent No. 20,090,182,216A1, 4 (issued July 16, 2009).

8. *Id.*

9. *Id.*

10. Marques & McKnight, *supra* note 3, at i.

11. *Id.* at 2.

12. *Id.* at 20.

13. *Id.*

14. Joseph C. Anderson & Michael P. Hlastala, *The Kinetics of Transdermal Ethanol Exchange*, 100 J. of Applied Physiology 649, 655 (Oct. 20, 2005).

15. *People v. Carrillo*, No. 17-090113, 2017CR-194, 5 (Scarsdale Village Ct., N.Y., Aug. 14, 2019) (order).

16. U.S. Patent No. 8,165,824B2, abstract (issued Apr. 24, 2012).

17. *Id.* at 9.

18. *Id.* at abstract.

19. Campbell, *supra* note 4, at 7; *see also* Michael P. Hlastala, *Limitations in Transdermal Alcohol Monitoring*, DWI J.: L. & Science 1, 2 (Aug. 2009) (the "methodology used by [SCRAM Systems] cannot separate ethanol from other contaminating alcohols and therefore is not a reliable method.").

20. Marques & McKnight, *supra* note 3, at 20.

21. Campbell, *supra* note 4, at 6.

22. Anderson & Hlastala, *supra* note 14, at 654–55.

23. *See, e.g.*, S. Rahrovan et al., *Male Versus Female Skin: What Dermatologists and Cosmeticians Should Know*, 4 Internat'l J. Women's Dermatology 3, 122–130 (Sept. 2012); Zhen Wang et al., *Aging-Associated Alterations in Epidermal Function and Their Clinical Significance*, 12 Aging (Albany NY) 6, 5551–65 (Mar. 31, 2020).

24. Amy Moran-Thomas, *How a Popular Medical Device Encodes Racial Bias*, Boston Rev. (Aug. 5, 2020), http://bostonreview.net/science-nature-race/amy-moran-thomas-how-popular-medical-device-encodes-racial-bias.

25. *Carrillo*, No. 17-090113 at *5.

26. *Id.* at *3.

27. Hon. Dennis N. Powers & Daniel Glad, *The SCRAM Tether as Seen Through the Eyes of Davis-Frye and Daubert*, Mich. Bar J. 36, 37 (June 2006).

28. *Mogg v. State*, 918 N.E.2d 750, 752–53 (Ind. Ct. App. 2009).

29. Sakai, *supra* note 3.

30. *Mogg*, 918 N.E.2d at 755.

31. *Id.* at 756.

32. *Id.* at 758.

33. *Id.*

34. *People v. Dorcent*, 909 N.Y.S.2d 618, 622 (Crim. Ct. 2010) ("TAC does not quantify the amount of alcohol consumed, but can identify whether a small, moderate or large amount was used ….").

35. *Mogg*, 918 N.E.2d at 758.

36. *Id.* at 759.

37. *State v. Lemler*, 774 N.W.2d 272, 277–88 (S.D. 2009).

38. *Id.* at 278.

39. *Id.* at 285; *see also Dorcent*, 909 N.Y.S.2d at 625 (holding that SCRAM device meets *Frye* standard but in case that only included tampering allegations).

40. *People v. Hakes*, 32 N.Y.3d 624, 631–32 (2018). If the court finds that the person cannot pay for SCRAM, it must then "attempt to fashion a reasonable alternative to incarceration." *Id.* at 633.

41. Kate Weisburd, *Sentenced to Surveillance: Fourth Amendment Limits on Electronic Monitoring*, 98 N.C. L. Rev. 717, 719–20 (2020).

42. *See, e.g.*, Weisburd, *supra* note 41, at 759–70; Michelle Alexander, *The Newest Jim Crow: Recent Criminal Justice Reforms Contain the Seeds of a Frightening System of 'E-Carceration,'"* N.Y. Times (Nov. 8, 2018), https://www.nytimes.com/2018/11/08/opinion/sunday/criminal-justice-reforms-race-technology.html; Human Rights Watch & American Civil Liberties Union, *Revoked: How Probation and Parole Feed Mass Incarceration in the United States* (2020), https://www.hrw.org/report/2020/07/31/revoked/how-probation-and-parole-feed-mass-incarceration-united-states.

43. This list of criticisms is non-exhaustive. ■

About the Author

Juliana DeVries is an Associate in the Supreme Court and Appellate Group at Akin Gump Strauss Hauer & Feld LLP. Her previous positions include serving as a Clinical Teaching Fellow at UC Berkeley, School of Law and as an Assistant Federal Public Defender.

Juliana DeVries
Akin Gump Strauss Hauer & Feld LLP
Washington, DC
Email juliana.c.devries@gmail.com