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SJC-12528

COMMONWEALTH vs. DAMION LINTON.

Middlesex. December 3, 2018. - September 26, 2019.

Present: Gants, C.J., Lenk, Gaziano, Lowy, Budd, Cypher, & Kafker, JJ.

Deoxyribonucleic Acid. Practice, Criminal, Postconviction relief. Evidence, Scientific test.

Indictment found and returned in the Superior Court Department on March 22, 2005.

Following review by this court, 456 Mass. 534 (2010), a motion for postconviction access to evidence and forensic analysis, filed on December 24, 2014, was heard by Peter M. Lauriat, J.

A request for leave to appeal was allowed by Gaziano, J., in the Supreme Judicial Court for the county of Suffolk.

Ira L. Gant, Committee for Public Counsel Services, for the defendant.

Jessica Langsam, Assistant District Attorney, for the Commonwealth.

GAZIANO, J. We are called upon to consider issues raised by the defendant's motion for access to evidence and scientific and forensic testing pursuant to G. L. c. 278A.

In 2006, a Superior Court jury convicted the defendant of murder in the first degree on a theory of extreme atrocity or cruelty in the death of his wife, Andrea Harvey, by strangulation. We affirmed his conviction. See Commonwealth v. Linton, 456 Mass. 534, 561 (2010). In 2014, following the enactment of G. L. c. 278A, the defendant sought deoxyribonucleic acid (DNA) testing of nine items of evidence. A few of those items, including a cellular telephone, a drinking glass, and a hair collected at autopsy, have not been tested for DNA. Other items -- swabs taken from various areas of the victim's body, including two swabs from the right side of the victim's neck that corresponded to fingernail marks left by the killer -- had been tested for Y-chromosome short tandem repeat (Y-STR) DNA prior to trial and had produced exculpatory results showing no male DNA was present. In his motion for forensic testing, the defendant sought permission to test the evidence using newer and more discriminating Y-STR test kits that had not existed at the time of his conviction. He also sought

permission to conduct mitochondrial DNA (mtDNA)¹ testing on the hair.

After an evidentiary hearing pursuant to G. L. c. 278A, § 7 (b), the trial judge denied the defendant's motion. He determined that the neck swabs no longer existed; three of the items had not been stored in a manner that was likely to yield probative DNA evidence; a reasonably effective attorney would not have sought DNA testing of the hair; the requested DNA testing did not have the potential to produce evidence material to the defendant's identification as the perpetrator; and newer Y-STR tests did not offer a material improvement over previously conducted Y-STR testing. See G. L. c. 278A, § 7 (b) (1)-(4). The defendant sought leave to appeal to the full court pursuant to the gatekeeper provision of G. L. c. 278, § 33E, and a single justice of this court allowed his petition.

¹ "A DNA profile for an individual is that combination of alleles, or versions of genes, possessed by the individual at the loci tested." Commonwealth v. DiCicco, 470 Mass. 720, 721 n.2 (2015), quoting Commonwealth v. Gaynor, 443 Mass. 245, 248 n.1 (2005). Except for identical twins, no two individuals share precisely the same DNA profile. Commonwealth v. Kostka, 471 Mass. 656, 658 (2015), citing Commonwealth v. Dixon, 458 Mass. 446, 448 n.6 (2010). Y-STR DNA can identify only all individuals within a patrilineal lineage. Commonwealth v. Lally, 473 Mass. 693, 699 (2016). Nuclear DNA, by contrast, contains both male and female components and allows a full profile that may be capable of identifying an individual. Commonwealth v. Carnes, 457 Mass. 812, 841-842 & n.17 (2010).

We conclude that the judge did not abuse his discretion in denying the defendant's motion based on the evidence that was presented at the motion hearing.

1. Background. We summarize the facts presented at the hearing on the motion for forensic testing, which included relevant trial transcripts and exhibits.

a. Crime scene and collection of evidence. The victim's parents discovered the body of their daughter in her apartment, lying on the bedroom floor. Near her head were a drinking glass containing a clear liquid and her cellular telephone. In his closing argument, the prosecutor suggested that the defendant placed the drinking glass and the telephone near the victim in an attempt to make it appear that she had committed suicide. While arguing that the crime scene had been staged, the prosecutor asked the jury, "How in the world was that cup of water not spilled if there was a struggle?"

The cause of death was manual strangulation. There were multiple abrasions consistent with fingernail marks on the right side of the victim's neck, hemorrhaging in both of her eyes, a detached hyoid bone inside her neck, and evidence that the perpetrator had kneeled on her chest, causing a large bruise. The medical examiner used a sexual assault evidence kit to collect evidence from the victim's body. This evidence included the following: head and pubic hair standards; a blood standard;

fingernail scrapings from both hands; vaginal swabs; external genital swabs; anorectal swabs; and oral swabs. At the autopsy, the State police collected the victim's clothing and a "questioned hair." It is unknown whether the police collected the hair from the victim's clothing or somewhere on her body.

In addition, the police swabbed the right side of the victim's neck in an attempt to identify the perpetrator's DNA. A State police crime laboratory (crime lab) chemist examined the two swabs from the victim's neck and found no visible stains. Because the police were searching for so-called "touch" or "handler" DNA, and this type of DNA is "considered limited," the chemist conducted no further testing.

The police also dusted the victim's neck with black fingerprint powder, and applied adhesive lift tape, in an attempt to recover latent fingerprints. The impressions from the lift tape were preserved by transferring them to latent lift paper. The police did not find any fingerprints, and the latent lift paper was not stored as evidence.

b. DNA testing. In May 2005, a Superior Court judge allowed, without objection, the Commonwealth's motion for authorization to conduct exhaustive testing of the fingernail scrapings and "item 3-2, swabs from the right side of [the victim's] neck."

In August 2005, the crime lab sent the following evidence to Orchid Cellmark (Cellmark), a private laboratory, for male Y-STR DNA testing: the swabs from the right side of the victim's neck; the fingernail scrapings; "cuttings" from the vaginal, external genital, and oral swabs; and the defendant's known saliva standard.² Cellmark "amplified" and "typed" DNA from the submitted samples utilizing the "Yfiler" Y-STR test kit, a kit manufactured by Applied Biosystems, Inc., that was released in 2004. The Yfiler test examines seventeen locations on the Y-chromosome; each location is known as a locus.

Although the two swabs from the right side of the victim's neck were consumed during testing, Cellmark had separated DNA from other cellular material, and tested a portion of the resulting "extract." The untested portion of this pure DNA extract remains, in evaporated form, in a test tube.

After testing, Cellmark returned the DNA evidence, including the test tube, to the crime lab, where it was secured in long-term storage.

c. Trial testimony. Cassie Johnson, a Cellmark forensic DNA analyst, testified to the results of the Y-STR DNA testing. She detected male DNA on the victim's left-hand fingernail

² The crime lab did not send the anorectal swab to Cellmark. The chemists believed that the anorectal swab would be unlikely to yield probative evidence because initial testing revealed no foreign biological evidence such as sperm cells or saliva.

scrapings with results appearing on thirteen of the seventeen loci that were tested. The defendant could not be excluded as a possible contributor to this partial DNA profile.

Johnson did not detect male DNA on the other samples. In particular, with respect to the swabs taken from the right side of the victim's neck, she testified, "We might not be able to detect male DNA because it simply isn't present, or else it could be that male DNA is present but it's below our level of detection. There's simply not enough there." She explained that Cellmark set its level of detection, based on internal validation studies, at "peaks . . . above [their] minimum threshold of one hundred." If a peak does not reach that height, Cellmark analysts "can't call that result."

Johnson testified in accordance with Cellmark's then-existing Y-STR testing guidelines. The guidelines provided, "A true allele is one that falls at or above the threshold value, is clearly above any background noise, and . . . has a distinctly shaped peak, as compared to artifacts which commonly appear as a spike or hump." The guidelines further provided, "Based on internal validation studies, the minimum threshold of detection for Y-STR loci is [one hundred] RFUs (relative fluorescence units). In extreme circumstances, this may be lowered to [fifty] RFUs with approval of the technical leader or the laboratory director."

d. Postconviction proceedings. In December 2014, the defendant filed a motion pursuant to G. L. c. 278A for postconviction access to evidence and forensic testing. He requested that the court authorize "PCR-based Y-STR type DNA analysis, using Quantifiler Duo or Quantifiler Trio during the quantitation stage of the STR process," of the following evidence: (1) swabs from the right side of the victim's neck; (2) vaginal swabs; (3) external genital swabs; (4) anorectal swabs; (5) oral swabs; (6) the victim's known blood standard; (7) swabs from latent print paper from the victim's neck; (8) the drinking glass found near the victim's head; and (9) the cellular telephone found near the victim's head. The defendant also requested mtDNA testing of the "questioned hair sample" recovered from the victim's body, and mtDNA testing of the victim's known blood standard. In support of his motion, the defendant submitted an affidavit from a DNA expert, Dr. Carll Ladd, a senior supervisor and analyst at the Connecticut State forensic laboratory and a forensic DNA consultant. The Commonwealth opposed the motion.

In January 2015, a Superior Court judge, who had not been the trial judge, found that the defendant had made the minimal preliminary showing necessary under G. L. c. 278A, § 3, in order to proceed to an evidentiary hearing. She then referred all further proceedings to the trial judge.

In May 2015, the defendant filed a supplemental affidavit from Ladd, which focused on advances at later stages of analysis after the quantification stage. Ladd opined that the samples should be analyzed with two newly available Y-STR testing kits, either the "PowerPlex Y23" or the "Yfiler Plus," that had become available in 2014 but that, under national accreditation standards, required a process of internal validation by a given laboratory before it could adopt the test for its own use. He explained, "In the time since my 2014 affidavit, some laboratories, including Cellmark . . . , have finished validating and began using a new test kit for [Y-STR] DNA analysis . . . called PowerPlex Y23." Other laboratories were at that point validating the Yfiler Plus test, and Ladd "expect[ed] many [would] begin using it for forensic casework in the coming months or as late as early 2016." Ladd asserted that both PowerPlex Y23 and Yfiler Plus were more discriminating than the Yfiler test kit, because they analyze, respectively, six and ten additional markers on the Y-chromosome. He opined that these tests could offer other improvements as well over the Y-STR testing that previously had been performed on the samples the defendant sought to test.

The trial judge conducted an evidentiary hearing over three days from November 2015 through March 2016. Ladd and Sharon Convery Walsh, the technical lead at the crime lab's DNA and

Combined DNA Index System (CODIS) units, testified, and the parties stipulated to the introduction of forty-five exhibits. The judge then issued a written decision denying the defendant's motion.

2. Discussion. a. Statutory framework. Upon a finding that a moving party's motion for forensic testing has satisfied the preliminary requirements of G. L. c. 278A, § 3, a judge "shall order a hearing on the motion." G. L. c. 278A, § 6 (a). At that hearing, the moving party is required to establish by a preponderance of the evidence each of the six factors set forth in G. L. c. 278A, § 7 (b) (1)-(6). Commonwealth v. Wade, 475 Mass. 54, 56 (2016) (Wade III). "If the moving party has done so, then the judge shall allow the requested forensic or scientific analysis" (quotation and citation omitted). Commonwealth v. Clark, 472 Mass. 120, 125 (2015). The judge must "state findings of fact and conclusions of law on the record," or issue written findings and conclusions, "that support the decision to allow or deny [the] motion." See G. L. c. 278A, § 7 (a).

The judge is required to consider the following criteria under G. L. c. 278A, § 7 (a):

- "(1) that the evidence or biological material exists;
- "(2) that the evidence or biological material has been subject to a chain of custody that is sufficient to establish that it has not deteriorated, been substituted,

tampered with, replaced, handled or altered such that the results of the requested analysis would lack any probative value;

"(3) that the evidence or biological material has not been subjected to the requested analysis for any of the reasons in clauses (i) to (v), inclusive, of paragraph (5) of subsection (b) of [§] 3;

"(4) that the requested analysis has the potential to result in evidence that is material to the moving party's identification as the perpetrator of the crime in the underlying case;

"(5) that the purpose of the motion is not the obstruction of justice or delay; and

"(6) that the results of the particular type of analysis being requested have been found to be admissible in courts of the commonwealth."

With respect to the third factor, as relevant here, the reasons enumerated in G. L. c. 278A, § 3 (b) (5), that the evidence or biological material has not been subjected to the requested analysis, include

"(i) the requested analysis had not yet been developed at the time of the conviction; [and]

". . .

"(iv) the moving party's attorney in the underlying case was aware at the time of the conviction of the existence of the evidence or biological material, the results of the requested analysis were admissible as evidence in courts of the commonwealth, a reasonably effective attorney would have sought the analysis and either the moving party's attorney failed to seek the analysis or the judge denied the request."

With this framework in mind, we turn to the issues raised by the denial of the defendant's motion for forensic testing.

b. Standard of review. In Commonwealth v. Moffat, 478 Mass. 292, 298 (2017), we discussed "the appropriate standard of review when considering the denial of a motion pursuant to G. L. c. 278A, § 7." Where the motion judge was not the trial judge, and the record before the court is purely documentary, we review claims of error under a de novo standard. Id. In such circumstances, the motion judge is "not required 'to make credibility determinations, or to consider the relative weight of the evidence or the strength of the case presented against the moving party." Id., quoting Clark, 472 Mass. at 130. See Commonwealth v. Wade, 467 Mass. 496, 505-506 (2014) (Wade II). Therefore, we are in the same position as the motion judge, and in as good a position to assess the record. See Commonwealth v. Tremblay, 480 Mass. 645, 654-655 (2018).

Where, instead, the trial judge presides over the hearing, "we review the trial judge's findings under an abuse of discretion standard." Moffat, 478 Mass. at 299. See Wade III, 475 Mass. at 55-56. "This deference is warranted because a motion judge who was the trial judge conducts a fact-specific analysis [predicated on] a thorough knowledge of trial proceedings" (quotation and citation omitted). Moffat, supra. The language of G. L. c. 278A, § 6 (b), expresses the Legislature's preference ("if possible") that the trial judge be the one to conduct an evidentiary hearing to determine whether

the moving party has met the enumerated requirements of G. L. c. 278A, § 7 (b) (1)-(6).

In reviewing the denial of a motion for forensic testing, we are mindful that the Legislature enacted G. L. c. 278A as a means to permit prompt access to scientific and forensic testing in order to remedy wrongful convictions. See Commonwealth v. Donald, 468 Mass. 37, 46 (2014) (purpose of G. L. c. 278A "is to remedy the injustice of wrongful convictions of factually innocent persons by allowing access to analyses of biological material with newer forensic and scientific techniques"); Wade II, 467 Mass. at 511 (G. L. c. 278A was enacted to provide greater access to forensic testing than had been allowed following motions for new trials pursuant to Mass. R. Crim. P. 30, as appearing in 435 Mass. 1501 [2001]). The remedial purpose of the statute makes it "entirely appropriate that we construe the language of G. L. c. 278A, § 7 (b), in a manner that is generous to the moving party." Clark, 472 Mass. at 136.

The defendant contends that the judge abused his discretion in finding that the defendant did not meet his burden to establish, by a preponderance of the evidence, that his request for testing met the criteria set forth in G. L. c. 278A, § 7 (b) (1)-(6). There was no dispute, as the judge found, that the defendant had met his burden with respect to factors (5) and (6). Accordingly, we consider only the first four factors

mandated by G. L. c. 278A, § 7 (b) (1)-(6). We discuss, in turn, the issues raised by each of the items for which the defendant sought testing.

c. Cellular telephone, drinking glass, and fingerprint lift paper. The defendant sought testing of the glass and cellular telephone that had been found on the floor near the victim's head, as well as the lift paper that the defendant argued might have contained skin fragments from the victim that had been picked up along with the fingerprint powder that was applied to her neck. The judge denied the motion for testing of these items because he determined that the chain of custody with respect to these items had not been shown to be "sufficient to establish that [the biological material] has not deteriorated, been substituted, tampered with, replaced, handled or altered such that the results of the requested analysis would lack any probative value." G. L. c. 278A, § 7 (b) (2).

The cellular telephone had been introduced in evidence at the defendant's trial and possibly handled by jurors, counsel, or court staff; it also had been sent to this court in conjunction with the defendant's direct appeal. More recently, it had been stored, not packaged, in an open box with other trial exhibits. The liquid in the glass had been tested, but the glass itself had a label attached directly to it, was at that point stored in a plastic bag rather than the more

desirable paper bag, and could have been handled by an unknown number of people. The lift paper had been kept in an envelope with the case file and not with the stored exhibits; the envelope had not been properly sealed with evidence tape; and the evidence could have been contaminated during the fingerprinting process.

At the hearing on the defendant's motion for forensic testing, the experts offered somewhat differing opinions regarding whether the cellular telephone, drinking glass, and latent lift paper had been subject to a chain of custody or stored in a manner sufficient to produce probative DNA results. Ladd testified that the evidence storage had not been "ideal" or "optimal," but that there was no impediment to testing the items and possibly obtaining scientifically valid DNA results. The judge asked Ladd whether the possibility that the cellular telephone might have been touched by an unknown number of male jurors and court or prosecution staff gave Ladd any concerns regarding DNA testing. Ladd responded that the profiles might be mixed, but the later handling would not wipe out any earlier placed DNA. He opined that it would be possible to obtain DNA standards from any male who had handled the telephone, for elimination purposes.

Walsh testified that, under those circumstances, she would begin extracting DNA from the object, but that, if her testing

produced any suggestion that at least three different people had handled the object, the crime lab's policy would deem the sample not suitable and would preclude further examination or providing a result on any profile. While Walsh agreed that it might be possible to obtain a very mixed sample of "handler" DNA if multiple people had touched an object, that would not produce a viable result because of the virtual impossibility of determining when any handler DNA had been placed on the object or by whom.

The judge determined that "the cellphone . . . , the blue drinking glass . . . , and the swabs of the latent print paper from the victim's neck . . . have not been subject to a chain of custody or securely stored in a manner likely to yield usable and material DNA results." He concluded that "[t]he chain of custody of these items is not sufficient to prevent evidence degradation or to avoid the presence of 'handler' DNA. They are not suitable for DNA testing, and any analysis or results would lack any probative value."

The judge did not, as the defendant maintains, turn the requirement of G. L. c. 278A, § 7 (b) (2), "on its head" by requiring the defendant to establish the absence of degradation or contamination. Rather, the judge weighed the testimony and made findings adverse to the defendant. See generally

Commonwealth v. Gentile, 437 Mass. 569, 573 (2002) (judge's obligation to assess weight and credibility of witnesses).

We conclude that the judge's findings were supported by the evidence, and see no reason to disturb them.

d. "Questioned hair." The defendant challenges the denial of his motion for postconviction testing of the "questioned" hair possibly found on the victim's body or clothing, which was not introduced at trial and was never tested for DNA.

Neither party disputes that mtDNA analysis was admissible at the time of the defendant's trial, and that trial counsel was aware that the police had recovered a hair when the victim's body was first examined. See Commonwealth v. Carnes, 457 Mass. 812, 841 & n.17 (2010); Commonwealth v. Baker, 440 Mass. 519, 528-529 (2003). Accordingly, pursuant to G. L. c. 278A, §§ 3 (b) (5) (iv) and 7 (b) (3), to obtain postconviction testing of the hair, the defendant was required to establish that "a reasonably effective attorney would have sought the analysis." Wade III, 475 Mass. at 57, quoting G. L. c. 278A, §§ 3 (b) (5) (iv). We conclude that, on this record, he has not done so.

Unlike in a motion for a new trial under Mass. R. Crim. P. 30, the reasonably effective attorney prong of G. L. c. 278A, §§ 3 (b) (5) (iv) and 7 (b) (3), does not require a defendant to establish that trial counsel's strategic decision to forgo

forensic testing was manifestly unreasonable. In Wade II, 467 Mass. at 511, this court concluded that an interpretation of the phrase "reasonably effective" that imported the Saferian standard of ineffective assistance "does not accord with the Legislature's intent of promoting access to DNA testing regardless of the presence of overwhelming evidence of guilt in the underlying trial." See Commonwealth v. Saferian, 366 Mass. 89, 96-97 (1974). Rather, the statute requires that a moving party must establish, by a preponderance of the evidence, that "a reasonably effective attorney would have sought the requested analysis, not that every reasonably effective attorney would have done so." Wade II, supra.

The judge found that the defendant failed to demonstrate that a reasonably effective attorney would have sought DNA testing of any of the items of evidence. We agree.³

³ Our agreement with this outcome, however, does not indicate that we agree with all of the judge's reasons for denying the motion to test the hair. The judge concluded that the hair had not been tested at the time of trial "presumably because it did not include hair roots." No evidence, however, was produced to show whether the hair in fact retained its roots, as the defendant's expert had not examined the hair itself. In any event, both experts agreed that, if it had no roots, the hair could have been tested using mtDNA. The judge also stated that mtDNA testing only allows comparisons of DNA from one hair to DNA from another hair. As both experts explained, however, mtDNA testing can be used to compare any two biological samples from any source. See Commonwealth v. Carnes, 457 Mass. 812, 841-842 (2010) (mtDNA from hair and from saliva were compared).

The precise source of the hair, and whether it came from the victim's body, from her clothing, or possibly from an extraneous source, is unknown. On the evidence submission form to the crime lab, the hair was listed with items of clothing removed from the victim, and not as having been found on her body. The submission form described it as "brown paper with possible hairs." At the crime lab, the item was numbered "8-10" and labeled "questioned hair sample."

Neither the Commonwealth nor the defendant's trial counsel appears to have treated the "questioned" hair as relevant evidence, and neither party sought to have it tested before trial. Based on its choice to forgo any type of forensic testing of the hair, the Commonwealth clearly viewed it as of no evidentiary value.

The record is entirely devoid of even basic evidence concerning the appearance of the hair, its length and color, or whether it was in any way similar to the victim's hair. Yet, the defendant apparently did not seek to have his expert examine it or to make any visual comparisons.⁴ In essence, the defendant's motion for testing does not provide any further information about the hair than that which was included on the

⁴ The expert had examined the materials he had been given with respect to the hair, e.g., photographs of the envelope containing the hair, in which the hair itself is not visible.

evidence submission form. See Wade II, 467 Mass. at 510 (defendant's request for postconviction testing included information that pretrial serological tests "revealed the presence of a third party's seminal fluid").

At trial, the defendant made effective use of the absence of information concerning the hair in support of his Bowden defense. In his closing, trial counsel relied on the uncertainties concerning the hair to argue that police were deliberately not testing evidence in an effort to locate other suspects because they had focused improperly upon the defendant as the only suspect. Pointing to the lack of testing, trial counsel argued, based on the Y-STR DNA results from the other testing of areas of the victim's body (which, except for the fingernails of one hand, returned results of "no [male] data"), that "the most . . . important [DNA] evidence," "where the person's hands actually strangled her," did not "com[e] back" to the defendant as a possible contributor. We cannot say that a reasonable attorney would have chosen to undertake testing in these circumstances.

As the judge noted, given that the defendant and the victim were married, the result showing that the defendant was a possible contributor to the DNA found under the victim's fingernails on one hand was of little importance. Nonetheless, as a result of that finding, a reasonable attorney well might

have chosen to forgo testing of an item of questionable exculpatory value that possibly could have yielded inculpatory results.

Accordingly, the defendant has not met his burden to show that a reasonable attorney would have sought the testing at the time of his trial.

e. Swabs collected from the victim's body. The judge concluded that the defendant did not meet his burden to establish that testing of the vaginal swabs, external genital swabs, and oral swabs, using newer versions of Y-STR tests than had been available at the time of his trial, "has the potential to result in evidence that is material to the moving party's identification as the perpetrator of the crime."⁵ See G. L. c. 278A, § 7 (b) (4).

The judge made this finding after hearing conflicting expert testimony concerning the likelihood of obtaining material DNA results from the untested portions of the swabs. Ladd

⁵ We agree with the defendant that the judge at one point misstated the law by requiring the defendant to show that the information sought would "identify or exclude [the defendant] as the murderer." A defendant is not required to demonstrate that the requested forensic testing would identify the real perpetrator. It is the defendant's burden to prove, by a preponderance of the evidence, that testing may result in evidence that, on its own, or with other evidence, might be material to the identity of the perpetrator. See G. L. c. 278A, § 7 (b) (4); Moffat, 478 Mass. at 301. As noted, however, in other parts of his decision, the judge properly stated the materiality standard.

testified that there was a possibility that DNA remained on the untested portions of the swabs that had not been present on the tested portions. He did not believe that it was appropriate to assume there had been a roughly "homogeneous distribution" of the cellular material on the swabs. He opined that it is "fairly standard" laboratory procedure to continue testing swabs that yield negative results until the entire swab is consumed.

Walsh testified that the general policy of the crime lab was to test a portion of a swab (described as a "cutting" or "snippet"), and to retain an equal amount for independent testing by defense experts, as well as possible future analysis if new forms of forensic testing were developed. If an analyst obtains negative DNA results, the crime lab does not test the retained portion of a swab because the swabs are "required to be collected homogeneously" and the analysts assume that that protocol has been followed.

With respect to Ladd's testimony concerning the untested portions of the swabs, the judge found that "there is no scientific support for the proposition that DNA not found on one portion of a homogeneous swab will produce enough evidence on another portion of the swab sufficient enough for DNA testing." The judge determined further that, "[u]pon consideration of the credible testimony presented at the hearing, it is not evident that the swabs from the victim items would, if tested using the

newer version of Y-STR DNA analysis, have the potential to produce any new, different or material DNA-based evidence."

It was for the judge to weigh and resolve the conflicting expert testimony. We discern no abuse of discretion in his decision to deny the defendant's request for testing of the remaining swabs.

f. DNA extract from neck swab. The defendant sought permission to test, among other evidence, "Swabs from the right side of the victim's neck (MSP lab item 3-2)." The judge found that the defendant did not establish that the neck swabs existed, see G. L. c. 278A, § 7 (b) (1); testing of the neck swab did not have the potential to result in evidence that is material to the defendant's identification as the perpetrator, see G. L. c. 278A, § 7 (b) (4); and the requested PowerPlex Y23 or Yfiler Plus testing was not a material improvement over previous Y-STR testing, see G. L. c. 278A, §§ 3 (b) (5) (i), 7 (b) (1).

i. Whether the neck swabs still exist. The judge concluded that the defendant had not established that "the evidence or biological material exists," G. L. c. 278A, § 7 (b) (1), because he determined that the swabs had been consumed during "court-approved" exhaustive testing. This finding is contrary to the undisputed evidence at the hearing

that a DNA extract from the neck swabs does still exist and is capable of being tested.

The defendant's written motion for postconviction testing, filed before the hearing, indeed did request testing of the biological material contained in the two swabs from the right side of the victim's neck. Postconviction counsel's affidavit, however, filed in support of the motion, asserted that "whatever is left of item 3-2, the swabs of the victim's neck" is available for testing.

At the hearing, both experts explained clearly that the swabs themselves had been consumed, but that the untested portion of pure DNA extract, which had been derived from the swabs, was still extant and contained in a test tube. The extract likely had evaporated due to the passage of time. The experts agreed, however, that evaporation is not an impediment to testing; the extract could be reconstituted with liquid and then analyzed.

Because DNA extract remains notwithstanding the exhaustive testing, the defendant established that biological material from the victim's neck exists within the meaning of G. L. c. 278A, § 7 (b) (1), and the judge's conclusion to the contrary was error.

ii. Evidence material to the defendant's identification as the perpetrator. The defendant's motion for forensic testing

relied in large part on findings by his expert, using newer computer software, that, if the threshold for analysis of DNA "peaks" were lowered, and the samples were examined using newer, more precise tools, three "peaks" that had not been identified in the Yfiler kit used in 2006 could be identified in the DNA taken from the victim's neck.

A brief explanation of certain aspects of DNA testing is necessary to understand the significance of this evidence of "peaks" and "thresholds." Y-STR testing focuses on different markers on the male Y-chromosome where known sequences of DNA base pairs repeat themselves. During Y-STR testing, analysts run DNA samples through an instrument that produces a graphical representation of the results in an electropherogram. The electropherogram displays peaks corresponding to specific loci, measured in RFUs. The higher the peak, the more amplified DNA is present at the location. Peaks that are at or above a minimum threshold RFU are "called" or "reported" as DNA results. In 2006, Cellmark employed a threshold calling level of one hundred RFUs. Pursuant to a 2015 Y-STR guideline, the crime lab set its calling threshold at 165 RFUs. In 2015, the calling threshold at the Connecticut State forensics laboratory was seventy-five RFUs.

A lower threshold, the "analytical" threshold, set at a point above background machine noise but below the calling

level, "may be used for interpretational purposes along with other data when examining an individual's DNA profile." Commonwealth v. DiCicco, 470 Mass. 720, 731 (2015). Ladd testified that it is common practice in forensic DNA analysis to interpret peaks at or above fifty RFUs for exclusionary purposes. Cellmark allows the use of a threshold at or above fifty RFUs in "extreme" circumstances. The crime lab also allows an analyst to assess "below threshold" level peaks "to support the inclusion and/or exclusion of an individual(s)." The 2002 short tandem repeat analysis protocols of the Federal Bureau of Investigation require all "labeled peaks of [fifty] RFU and greater" to be interpreted.

In this case, Ladd examined the data derived from the samples that had been taken from the victim's neck, using a newer computer testing program, and a threshold setting of fifty RFUs. He found peaks at levels exceeding fifty RFUs at three loci: DYS390, DYS391, and DYS393. At DYS390, he observed a potential allele of 21 at fifty RFUs, and, at DYS393, he observed a potential allele of 13 at eighty-three RFUs. These two potential alleles matched the defendant's DNA profile. At DYS391, however, he observed a potential allele of 11, measured at sixty-four RFUs. The defendant has an allele of 10 at locus DYS391.

The judge weighed this evidence and determined that Ladd's detection of a potential exculpatory DNA result at a single locus was insufficient to support a determination of materiality under G. L. c. 278A, § 7 (b) (4). The judge commented that "it far from clear" that a lower threshold would "yield any analytical or reportable DNA results."

Reviewing the defendant's proffer under the preponderance of the evidence standard, and with due regard for the purpose of the statute, we conclude that the defendant has established that testing of the DNA from the right side of the victim's neck has the potential to result in material evidence within the meaning of G. L. c. 278A, § 7 (b) (4).

The Commonwealth argues, pointing to DiCicco, 470 Mass. at 731, that a single below-threshold peak is not indicative of a potentially exculpatory DNA result. In DiCicco, supra, we held that a judge did not abuse her discretion in determining that a DNA expert's opinion concerning a single below-calling threshold peak was not sufficiently reliable to be put before a jury. See, e.g., Commonwealth v. Lanigan, 419 Mass. 15, 25-26 (1994). The defendant in that case proffered no evidence to establish that the expert's opinion "was generally accepted by the relevant scientific community or otherwise sufficiently reliable." DiCicco, supra.

Here, by contrast, the defendant introduced sufficient evidence to demonstrate that analytical level peaks provide relevant data, and can be used to support an exclusion. Significantly, as well, the procedural posture of this case is quite different. We are not deciding whether the evidence of a single potential allele supports the allowance of a motion for a new trial. The requirements of G. L. c. 278A are, by design, less stringent than a motion for a new trial pursuant to Mass. R. Crim. P. 30. "In enacting G. L. c. 278A, the Legislature separated the procedure for seeking forensic testing from the procedure for seeking scientific testing in conjunction with a motion for a new trial pursuant to Mass. R. Crim. P. 30 (b), and intended that G. L. c. 278A provide increased and expeditious access to scientific or forensic testing." Wade II, 467 Mass. at 509.

Under the preponderance of the evidence standard set forth in G. L. c. 278A, § 7 (b) (4), we conclude that the defendant has demonstrated that additional Y-STR testing of the DNA extract from the victim's neck has the potential to result in evidence material to the identity of the perpetrator. The Commonwealth's theory at trial was that the defendant strangled his wife and grabbed her throat so forcefully that he left fingernail marks on the right side of her neck. Crime scene investigators swabbed the victim's neck at the location of those

marks in an effort to obtain the killer's DNA. See Moffat, 478 Mass. at 301; Commonwealth v. Coutu, 88 Mass. App. Ct. 686, 702 (2015).

Based on the importance of this evidence at trial, and the identification of potentially exculpatory male DNA at locus DYS391, the defendant has satisfied the materiality requirement of G. L. c. 278A, § 7 (b) (4). Thus, the judge erred in denying the defendant's motion for postconviction forensic testing on this basis.

iii. Whether the requested analysis had not yet been developed at the time of trial. The defendant also was required to establish, by a preponderance of the evidence, that his motion for postconviction testing with the PowerPlex Y23 or Yfiler Plus Y-STR test was a request for analysis that had not been developed at the time of his conviction. See G. L. c. 278A, §§ 3 (b) (5) (i), 7 (b).

As stated, in 2006, Cellmark employed the Yfiler Y-STR test kit, which had been released in 2004. Its manufacturer, Applied Biosystems, Inc., released an upgraded version, Yfiler Plus, in 2014. In 2012, a different manufacturer, Promega Corporation, also released an enhanced DNA test kit, PowerPlex Y23. At the time of the hearing on the defendant's motion for postconviction forensic testing, at least one private laboratory, Bode Cellmark, had finished validation studies and was using the

PowerPlex Y23 test kit. At the same time, Bode Cellmark and other laboratories were in the (up-to-one-year-long) process of validating the Yfiler Plus test kit.

These newer tests are capable of analyzing additional loci on the Y-chromosome beyond the seventeen loci examined by the Yfiler test. As its name implies, PowerPlex Y23 examines twenty-three locations on the Y-chromosome, and Yfiler Plus examines twenty-seven. Ladd testified that the forensic community considered the newer test kits to be substantial improvements over the older Yfiler. He explained, "It's not, strictly speaking the number of tests [(i.e., loci)], although that's part of it, but collectively the product is much more discriminating, which means that it's more accurate in that it is better suited to distinguish people and minimize the chance of a coincidental match or a false inclusion. And the methodologies are more sensitive as well. . . . They require less starting material, less DNA, in order to get a result." He also testified that the newer tests are better suited to examining degraded samples because they examine more stable loci with smaller base pairs and can detect DNA in a smaller number of cells, approximately one-half the minimum number needed by Yfiler. Ladd opined that "[b]oth [PowerPlex 23 and Yfiler Plus] are more discriminating, significantly more discriminating, and significantly more sensitive" than Yfiler, which might in some

circumstances (on a "case-by-case basis") be able to produce a positive result from a small sample where an earlier test had shown no DNA was present. He did not opine whether this was such a case.

Walsh agreed that an advantage of new tests such as PowerPlex Y23 and Yfiler Plus was the ability to test smaller areas on the Y-chromosome. She had searched the scientific literature, however, and had been unable to find any studies comparing the results of Y-STR testing using Yfiler and the newer tests. Although Ladd discussed the existence of validation studies, he did not offer any specific studies or provide statistical data involving the PowerPlex Y23 and Yfiler Plus test kits.

Neither of the experts had any experience using the new Y-STR test kits in their own laboratories. Indeed, in 2015, the Connecticut State forensics laboratory and the crime lab continued to use the Yfiler test kit. The Connecticut State forensics laboratory intended to undertake the validation process to move to one of the enhanced tests during the following year (2016), and the crime lab was expected to move to the newer tests at some point.

The judge recognized that the new tests increased the ability to find identifiable DNA in degraded samples. Notwithstanding this improvement, however, the judge concluded

that the defendant had "failed to show that this new DNA technology is a marked improvement over the old testing procedure. . . . While [the tests] appear to work with smaller, older, and/or somewhat degraded test samples, they do not represent a 'material' or 'marked['] advancement in DNA technology or analysis, such that they would identify or exclude [the defendant] as the murderer." The judge noted, but did not discuss, the differences in the numbers of alleles tested; this is consistent with the testimony, as neither expert had explained the extent to which these additional alleles would produce meaningfully different results.

In Donald, 468 Mass. at 38-39, we also confronted the issue whether the degree of improvement in DNA testing at issue met the criteria of being a new analysis that had not been developed at the time of the convictions. In that case, a cutting from a rape victim's underwear had been submitted to a crime laboratory for polymerase chain reaction (PCR) DNA testing. Id. at 39. Before the defendant's trial in 1999, a DNA expert examined six loci from the sample and determined that the defendant in that case was "among 1 in 7,800 African Americans whose DNA profile would match that of sperm obtained from the underwear." Id. at 46. The defendant was convicted. Beginning in 2012, he sought postconviction testing in the Superior Court. Id. at 38-40. His renewed motion requested DNA analysis using "Profiler Plus

and Cofiler" test kits. Id. at 41. The motion was supported by a letter from a DNA expert stating that testing using Profiler Plus and Cofiler was "more powerful statistically than [the PCR testing] used previously in [the defendant's] case." Id. at 45. The defendant also presented evidence that the newer testing methods combined PCR and STR analysis to "generate information for all [thirteen] core [short tandem repeat] loci required by the [CODIS] database" (footnote and citation omitted). Id.

General Laws c. 278A is designed to "allow access to more sophisticated forensic and scientific tests than were available at the time of a moving party's trial." Donald, 468 Mass. at 46. "[A] § 3 motion should not be denied on the ground that the evidence sought to be tested has been subjected previously to a method of testing, if the accuracy of that testing has materially improved the test's ability to identify the perpetrator of a crime." Id. at 47. Such a determination necessarily is a case-specific inquiry. Id. at 44-45. Factors to consider in pursuing the inquiry include whether the requested analysis "uses a different technology that is designed to reduce error, or applies a more comprehensive technique, or offers a significant increase in statistical accuracy." Id. at 45.

Here, the motion judge applied the Donald factors and concluded, on the basis of the evidence then before him, that

the newer Y-STR tests were a modest advancement over the Yfiler testing that had been conducted in 2006. Given the evidence presented at the hearing in 2015, we are unable to say that the judge abused his discretion. That is not to say that enhanced Y-STR testing might not, given what we know today, or hereafter, represent a material difference that could be described, demonstrated, or quantified. The circumstances of each case differ, and a determination whether the new testing sought meets the requirements of G. L. c. 278A, § 7 (b), is a fact-specific inquiry at a given point in time.⁶ See Donald, 468 Mass. at 44-45.

We are required, however, to consider the evidence that was before the judge at the hearing in 2015, and at the level of specificity that was presented to him. In that light, we cannot say that the judge abused his discretion in denying the defendant's motion.

Order denying motion
for postconviction
testing affirmed.

⁶ The defendant is not precluded from refiling his motion with appropriate evidence of improvements in the DNA testing sought from the test used before trial. See G. L. c. 278A, § 7 (b) (4).