Faculty of Forensic & Legal Medicine

Recommendations for the collection of forensic specimens from complainants and suspects – the evidence

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Toxicology samples
(blood, urine and hair)

General advice

Some drugs can adhere or 'stick' to plastic and therefore glass tubes are recommended for toxicological samples.

Drug-facilitated crime

UNODC. (2011)
Guidelines for the forensic analysis of drug facilitating sexual assault and other criminal acts
Accessed 24/06/2025

Detection times for drugs

Moffat AC., Osselton MD., Widdop B. & Watts J. Eds.
Clarke's Analysis of Drugs and Poisons. 4th ed
London, Pharmaceutical Press, 2011.

Baselt RC.
Disposition of Toxic Drugs and Chemicals in Man, 11th ed
Biomedical Publications, Seal Beach, CA, 2017

Urine collection up to 14 days in DFSA cases

Negrusz A., Moore C., Stockham TL., & Levy NA.
Elimination of 7-Aminoflunitrazepam and Flunitrazepam in urine after a Single Dose of Rohypnol®
Journal of Forensic Sciences 2000: 45(5): 1031-40

Biological Samples

Double gloving with changing of gloves with different body areas

Margiotta, G., Tasselli, G., Tommolini, F., Lancia, M., Massetti S., Carnevali, E.
Risk of DNA transfer by gloves in forensic case work.
Forensic Science International: Genetics Supplement Series 2015: 5; e527-e529
(It is imperative to change gloves every time after touching items or surfaces, prior to touching the exhibit. It is desirable to wear multiple layers of gloves to avoid skin exposure during the changing of gloves.)

Double swabbing

Sweet, D., Lorente, M., Valenzuela, A., Vilanueva, E.
An improved method to recover saliva for human skin: the double swab technique
J Forensc Sci. 1997: 42(2): 230-2
(Use of the double swab technique increased the recovery of saliva from human skin and therefore DNA evidence.)

Pang, BCM., & Cheung, BKK.
Double swab technique for collecting touched evidence
Legal Medicine 2007: 9; 181-184
(The double swab technique improves the quality of the resulting DNA profiles.)

Oral samples

Allard, J. E.
The collection of data from findings in cases of sexual assault and the significance of spermatozoa on vaginal, anal and oral swabs
Sci. Justice 1997: 37; 99– 108 (maximum persistence of sperm in the oral cavity recorded as 28-31 hours)

Nittis M., Franco M., Cochrane C.
New oral cut-off time limits in NSW
Journal of Forensic and Legal Medicine 2016: 44; 92-97 (oral rinse and perioral (lip) swab recommended in cases of oral assault)

Saliva on skin

Kenna J., Smyth M., McKenna L., Dockery C. & McDermott SD.
The recovery and persistence of salivary DNA on Human Skin
J Forensic Sci. 2011: 56; 1; 170-175
(showed persistence of salivary DNA up to 96 hours when not washed in 3 volunteers with saliva on their legs)

Hair

Salter, M.T., Cook, R.
Transfer of fibres to head hair, their persistence and retrieval
Forensic Science International 1996: 81; 2; 211–221
(hair style and activity are major factors in affecting persistence; taping is more efficient than combing)

Exline, D.L., Smith, F.P., Drexler, S.G.
Frequency of pubic hair transfer during sexual intercourse
J Forensic Sci. 1998; 43; 505-508
(important to collect pubic hair combings from the male suspects as well as from female victims, provided the time interval is not extreme)

Fingernail swabbing

Dowlman EA., Martin NC., Foy MJ., Lochner T. & Neocleous T.
The prevalence of mixed DNA profiles on fingernails swabs
Sci. Justice 2010: 50; 64-71
(looking at the persistence of DNA profiles after intimate contact)

Flanagan N. & McAlister C.
The transfer and persistence of DNA under the fingernails following digital penetration of the vagina
For Sci International: Genetics 2011: 5; 479-483
(DNA profiles maybe obtained up to 18 hours post digital penetration)

Oz C. & Zamir A.
An Evaluation of the Relevance of Routine DNA Typing of Fingernail Clippings for Forensic Casework
Journal of Forensic Science 2000: 45(1):158-160
(clippings from 6 volunteers did not reveal donor profile – hence swabbing might be more effective)

Lederer, T., Betz P. & Seidl S.
DNA analysis of fingernail debris using different multiplex systems: a case report
Int J Legal Med 2001: 114(4-5): 263-6
(showed that a victim's DNA might be accessed from fingernail scrapings from an assailant (using a small plastic spatula) two days after an assault and after the assailant had admitted to washing his hands several times)

Foran D., Hebda L., Doran A.
Trace DNA from Fingernails: Increasing the Success Rate of Widely Collected Forensic Evidence December 2015
Accessed 05/01/2016
(double swabbing of nails best in the living)

Female genitalia

Davies A. & Wilson E.
The Persistence of Seminal Constituents in the Human Vagina
Forensic Science 1974:3: 45-55
(spermatozoa found up to 3 days post intercourse and occasionally up to 6 days)

Graves H. C. B., Sensabaugh G. F. & Blake E. T.
Postcoital detection of a male-specific semen protein: application to the investigation of rape
N. Engl. J. Med. 1985: 312; 338–340
(spermatozoa isolated from endocervix 17 days after intercourse)

Astrup B.S., Thomsen J.L., Lauritsen J., Ravn P.
Detection of spermatozoa following consensual sexual intercourse
Forensic Science International 2012: 221; 137-141
(spermatozoa best recovered from the posterior fornix)

Wilson, E. M.
A comparison of the persistence of seminal constituents in the human vagina and cervix
Police Surg. 1982: 22; 44–45
(more chance of finding spermatozoa on cervical rather than vaginal swabs)

Owers R., McDonald A., Montgomerie H., & Morse C.
A casework study comparing success rates and expectations of detecting male DNA using two different Y-STR multiplexes on vaginal swabs in sexual assault investigations where no semen has been detected
Forensic Science International: Genetics 2018: 37: 1–5
(demonstrates the value of using more recently developed Y-STR multiplexes to detect male DNA on vaginal swabs in sexual assault investigations where no semen has been detected)

Hanson EK. & Ballantyne J.
A Y-short tandem repeat specific DNA enhancement strategy to aid the analysis of late reported (≥6 days) sexual assault cases
Med Sci Law 2014; 54: 4: 209-218
(semen donor Y-STR profiles found in post-coital samples collected 6-9 days after intercourse)

Sween, Kayla R., Quarino, Lawrence A., Kishbaugh, Janine M.
Detection of Male DNA in the Vaginal Cavity After Digital Penetration Using Y-Chromosome Short Tandem Repeats
Journal of Forensic Nursing 2015; 11: 1: 33–40
(viable possibility exists that probative Y-STR profiles can be obtained from vaginal swabs taken from subjects exposed to digital penetration at time intervals up to 72 hours post penetration)

Speck P. & Ballanytne J.
Post-coital DNA Recovery Study
NIJ, Washington, DC, March 2015
Accessed 23/07/2025
(provides strong pilot data to collect samples in females from the cervix and posterior fornix through their first menses for forensic laboratory analysis)

Ballantyne J.
DNA Profiling of the Semen Donor in Extended Interval Post-Coital Samples
NIJ, Washington DC, June 2012
Accessed 23/07/2025
(using a combination of novel methods to selectively enhance male DNA fractions the ability to obtain male donor profiles in extended interval post-coital samples collected 6 to 9 days after intercourse was demonstrated)

Paediatrics

Christian C., Lavelle J., DeJong A., Loiselle J., Brenner L. & Joffe M.
Forensic Evidence Findings in Prepubertal Victims of Sexual Assault
Pediatrics 2000: 106(1): 100-104
(medical records of 273 children under the age of 10 were reviewed. All children had forensic evidence collected within 44 hours of an alleged sexual assault. No swabs taken from the child's body were positive for blood after 13 hours or sperm/semen after 9 hours)

Giardet R., Bolton K., Lahoti S., Mowbray H., Giardino A., Isaac R., Arnold W., Mead B & Paes N.
Collection of Forensic Evidence from Paediatric victims of sexual assault 2011
Paediatrics 2011: 128; 2
(body samples should be considered for children beyond 24 hours although the yield is limited)

Penile

Please note that collective experience from forensic scientists in the UK has shown that positive results of female DNA on penile swabs can be obtained after 48 hours.

Cina S.J., Collins K. A., Pettenati M. J. & Fitts M.
Isolation and identification of female DNA on post-coital penile swabs
Am. J. Forensic Med. Pathol. 2000: 21; 97–100
(female DNA profiles obtained on penile swabs up to 24 hours post coitus)

Farmen RKB., Haukeli I., Ruoff P., Froyland E.
Assessing the presence of female DNA on post-coital penile swabs: Relevance to the investigation of sexual assault
Journal of Forensic and Legal Medicine 2012: 19; 386-389
(female DNA was recovered on all post-coital penile swabs taken at 5-24 hours; volunteer study)

Anal

Enos WF., Beyer JC.
Spermatozoa in the Anal Canal and Rectum and in the Oral Cavity of Female Rape Victims
Journal of Forensic Sci. 1978: Jan; 23(1) ;231-3
Davies A.
Discussion of Spermatozoa in the Anal Canal and Rectum and in the Oral Cavity of Female Rape Victims
Journal of Forensic Sci. 1979 Jul; 24(3); 541-2

(Finding of a few spermatozoa usually without tails in the smears taken from the anal canal and rectum in the living or murder/rape victim does not necessarily indicate anal intercourse has occurred. In most rape cases in which rectal intercourse has not been performed there is some contamination of the anal canal and rectum by vaginal contents.)

Please note that these two papers rely exclusively on casework data from a time when anal intercourse was more unmentionable than currently and hence some or all the patients examined may not have wanted to admit that it happened. However, until research using consenting donors has been done, this is the only direct data about the frequency of anal contamination that is available.

Wilson GM. & Allard JE.
Spermatozoa – their persistence after sexual intercourse
For Sci Int 1982: 19; 135-154
(maximum recorded interval between the act of anal intercourse and the identification on a rectal swab is 96 hours)

Janisch S., Meyer H., Germerott T., Albrecht U., Schultz Y. & Debertin A.
Analysis of clinical forensic examination reports on sexual assault
Int J Legal Med 2010: 124(3); 227-35
(found that only 7 anal swabs out of 37 (18.9%) were positive for sperm, when taken within 24 hours of assault)

Tucker S., Ledray LE., & Werner JS.
Sexual Assault Evidence Collection
Wisconsin Medical Journal 1990: 89(7); 407-411
(1007 sexual assault examination laboratory results were reviewed in 1990. Of the 210 cases with anal involvement, sperm was only found in 4 cases (2%). These exams were completed within 4 hours of rape)

Time since intercourse

Dziak R., Parker L., Collins V. & Johnston S.
Providing Evidence Based Opinions on Time Since Intercourse (TSI) Based on Body Fluid Testing Results of Internal Samples
Canadian Society of Forensic Science Journal 2011:
44; 2; 59 to 69
Accessed 24/06/2025

Casey DG., Domijan K., MacNeill S., Rizet D., O'Connell D., Ryan J.
The Persistence of Sperm and the Development of Time Since Intercourse (TSI) Guidelines in Sexual Assault Cases at Forensic Science Ireland, Dublin, Ireland.
J Forensic Sci 2017; 62(3):585-592.
(TSI not AP informs precase assessment and the evaluative approach for sexual assault cases)s

Owers R., Davidson G., McDonald A., Morgan R., O'Rourke P.
Time since intercourse (TSI) data from a large-scale casework study of penile–vaginal penetration allegations using Sperm Elution.™
Forensic Science International 2018; 288:10-13
(TSI data is significantly affected by the sperm recovery method used. Using Sperm Elution improves the amount of spermatozoa recovered from vaginal swabs and the length of time to detect spermatozoa on swabs)

Urine for DNA (in exceptional circumstances)

Smith D.A., Webb L.G., Fennell A.I., Nathan E.A., Bassindale C.A., Phillips M.A.
Early evidence kits in sexual assault: an observational study of spermatozoa detection in urine and other forensic specimens
Forensic Science, Medicine, and Pathology 2014; 10: 3:336–343
(the first void urine from an early evidence kit can be analysed for spermatozoa (within 20 hours) prior to testing for toxicology)

Joki-ErkkilaM., TuomistoS., Seppala M., HuhtalaH., Ahola A., Karhunen PJ.
Urine specimen collection following consensual intercourse – A forensic evidence collection method for Y-DNA and spermatozoa
Journal of Forensic and Legal Medicine 2016;37:50-54
(urine specimen may be useful (up to 24 hours) for detection of Y-DNA and spermatozoa following penile-vaginal penetration)

Intimate and non-intimate sampling

Gaskell M., Guiness J., Hamm A., Hanford GO., Marshall, A., Sullivan, K.
Verification of intimate and non-intimate recovery of DNA within Sexual Assault Referral Centres (SARCs)
Forensic Science International: Synergy 2025: 11; 100620
(description of the verification of DNA recovery processes undertaken in forensic medical examination facilities within SARCs across England and Wales in the investigation of rape and sexual assault)

Consumables

Gaskell M., Guiness J., Sullivan K.
Validation of consumables used in the recovery of DNA evidence within Sexual Assault Referral Centres (SARCs)
Forensic Science International: Synergy 2024: 9; 100559
(assessment of the fitness for purpose of consumables used for the recovery of body-fluids and biological material for subsequent DNA analysis in forensic medical examinations, specifically within SARCs)

DNA Environmental Monitoring

Gaskell M., Guiness J., Sullivan K.
Understanding and mitigating the risks that environmental DNA contamination poses to the recovery of forensic evidence from victims and suspects of rape and sexual assault
Journal of Forensic and Legal Medicine 2025: 114; 102911
(assessment of the real-life risk of DNA in the forensic medical room environment to the evidential samples recovered from suspects and complainants of rape and sexual assault)

DNA – Transfer, Prevalence. Persistence and Recovery (TPPR)

Woollacott C., Goray M., van Oorschot RAH., Taylor D.
The Transfer, Prevalence, Persistence, and Recovery of DNA from Body Areas in Forensic Science: A Review
Forensic Sci. 2025: 5(1); 9
(a review that aims to summarise research on DNA-TPPR concerning various human body surfaces following different types of activities)

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Send any feedback and comments to forensic.medicine@fflm.ac.uk