

# Forensic Applications

**D N A**

E X T R A C T I O N &

**I D** E N T I F I C A T I O N



# BIOTYPE FORENSICS

20 YEARS OF  
EXPERIENCE

Over the past 20 years, Biotype has applied its experience and capabilities in the field of human identification. The company started its business by optimization of methods and reagents according to the needs of German State Offices of Criminal Investigations and The Federal Criminal Police Office.

Our forensic multiplex PCR kits played a crucial role in the establishment and the extension of the German DNA Analysis Database (DAD) including all important biomarkers that are necessary for human identification. Users appreciate the exceptional discrimination power, sensitivity and robustness of these kits for screening purposes and forensic stain analysis. Forensic material is often limited, and DNA extraction is very important. Therefore, Biotype offers products for DNA preparation to maximize analyte recovery from specimens.

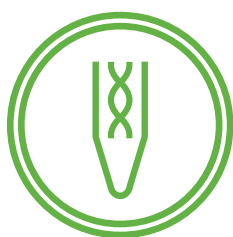
Biotype's quality management system fulfills all EU standards for the development and production of diagnostic tests (DIN EN ISO 9001:2015 and DIN EN ISO 13485:2016). We produce according to the forensic DNA grade guideline ISO 18385:2016.

Biotype provides straightforward customer services. We support our customers in selecting the best products for their needs and implementing these products into their daily routine.



## PROVEN SOLUTIONS TO OBTAIN RELIABLE RESULTS

Biotype offers validated solutions for medical and forensic labs to effectively process samples and obtain reliable results. Explore the possibilities to optimize your workflow for human identification testing. Our solutions can easily be integrated in your current workflow and improve the overall laboratory efficiency. Because of the fact, that forensic material is often limited, we put special focus on optimal sample preparation to get the most out of the sample material.



### DNA EXTRACTION

Samplettype i-sep<sup>®</sup> is a single tube sample preparation and DNA extraction system. It simplifies the workflow and reduces the cross-contamination risk. The system consists of two types of spin columns: SQ for single DNA separation and DL for differential lysis, which are perfectly combined with the proprietary lysis buffer Samplettype i-sep<sup>®</sup> MB.



### STR ASSAYS FOR HUMAN IDENTIFICATION

Biotype offers cost-efficient and robust STR assays for fast and reliable pre-qualification and classification of human profiles. The kits Mentype<sup>®</sup> Nonaplex I and Mentype<sup>®</sup> Nonaplex<sup>QS</sup> enable the analysis of eight STR markers (core markers for Germany and Interpol), and one sex-specific marker.



### DATA ANALYSIS

You can profit from the software solutions GenoProof and GenoProof Mixture provided by Biotype's partner qualitytype for the subsequent data analysis, especially for mixed samples.

# DNA EXTRACTION

## Sampletype i-sep<sup>®</sup> SQ-MB

### EFFICIENT DNA EXTRACTION TO INCREASE DNA YIELD

The quantity and quality of genomic DNA extracted from any sample can greatly impact the success of the downstream analysis and the overall quality of the result. Particularly for samples of low quantity which might contain degraded DNA or PCR inhibitors. Sampletype i-sep<sup>®</sup> SQ-MB was optimized to provide DNA lysates of highest quality. The proprietary filter material (SQ) enables cell disruption and separation of the cell lysate containing the DNA in the same device without extra pipetting steps. The column system is suitable for DNA extraction procedures involving a diversity of clinical and forensic specimens, even FFPE sample material. The proprietary lysis buffer, Sampletype i-sep<sup>®</sup> MB, is highly effective for DNA extraction. For the subsequent DNA purification manual or automated methods can be used.

### FEATURES

- Improved yield, reproducibility, and overall purity of isolated DNA even from low sample inputs
- Fast and easy to perform DNA preparation in the same device without extra pipetting steps
- Minimized risk of cross-contaminations and mix-ups (no manual substrate transfer)
- Ethylene oxide sterilized to guarantee a RNA, DNA, RNase and DNase free product
- Increased effectiveness of the DNA extraction due to the lysis buffer Sampletype i-sep<sup>®</sup> MB

### REFERENCES

1 G. Schwerdtner et al., „The separation of male and female: A comparison of seven protocols [P]“, Forensic Science International: Genetics Supplement Series, vol. 6, p. e9-e11, 2017.



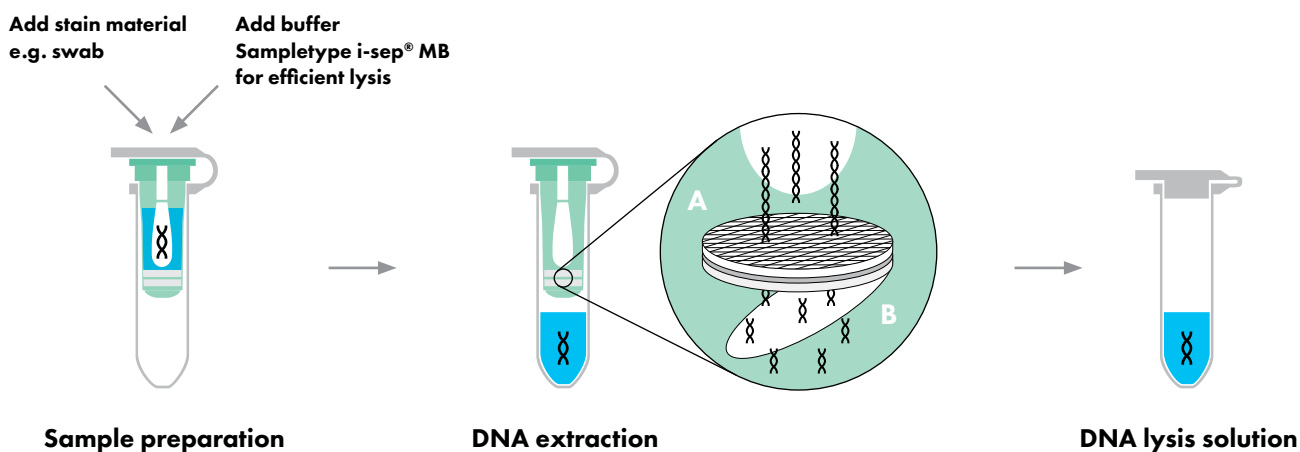
### SPECIFICATIONS

- Maximum filling volume: 200 - 500  $\mu$ l
- Maximum centrifugation force: 19,390 g / r = 95 mm (13,500 rpm)
- Temperature stability:  $\leq 95^{\circ}$  C
- Stain material: e.g. swabs, cloth, cigarette butts, chewing gum, paper, tissue, card punches



## SPECIAL TUBE DESIGN TO ENHANCE PCR EFFECTIVENESS

Sampletype i-sep® SQ is based on a mini spin-column format containing a special filter which prevents flow-through of the solution before the sample lysis is completed. By carrying out the lysis directly in the column with the proprietary lysis buffer Sampletype i-sep® MB, both the overall efficiency is improved, and the DNA extraction process optimized. During centrifugation, the lysis solution passes through the filter (see part B, illustration below) into the collection tube. The advantage of the SQ filter column is that the DNA is sheared mechanically (see part A, illustration below) to a smaller fragment size (approx. 20,000 bp), which increases the effectiveness of the PCR.



### ORDER INFORMATION

Product	Size	Cat. no.
Sampletype i-sep® SQ-MB	250	70-13702-0250

sales@biotype.de

# DNA EXTRACTION

## Sampletype i-sep<sup>®</sup> DL-MB

### HIGHLY EFFICIENT AND POWERFUL DIFFERENTIAL LYSIS

The success of an optimal separation of DNA derived from victim and offender hinges on an efficient differential lysis. Vaginal smears derived from sexual offences are particularly challenging due to the large number of female epithelial cells compared to the small number of sperm cells. The method relies on the differential lysis of epithelial cells and sperm cells by an optimized proprietary buffer. The combination of the buffer Sampletype i-sep<sup>®</sup> MB with the i-sep<sup>®</sup> DL Spin Column provides the perfect solution to this problem. The proprietary filter material allows the lysis and separation to be carried out in the same device and without extra pipetting steps. For a subsequent DNA purification, manual or automated methods can be used.

### FEATURES

- Efficient and reproducible separation of DNA fractions during differential lysis
- Fast and easy to perform DNA preparation in the same device without extra pipetting steps
- Minimized risk of cross-contaminations and mix-ups (no manual substrate transfer)
- Ethylene oxide sterilized to guarantee a RNA, DNA, RNase and DNase free product
- Increased effectiveness of the DNA extraction due to the lysis buffer Sampletype i-sep<sup>®</sup> MB

### REFERENCES

1. G. Schwerdtner et al., „The separation of male and female: A comparison of seven protocols [P]“, Forensic Science International: Genetics Supplement Series, vol. 6, p. e9-e11, 2017.
2. V. Bogas et al., „Validation of sampletype i-sep DL for differential extraction and purification with prepfler express in the automate express DNA extraction system“. Forensic Science International: Genetics Supplement Series, vol. 6, p. e353-e354, 2017.



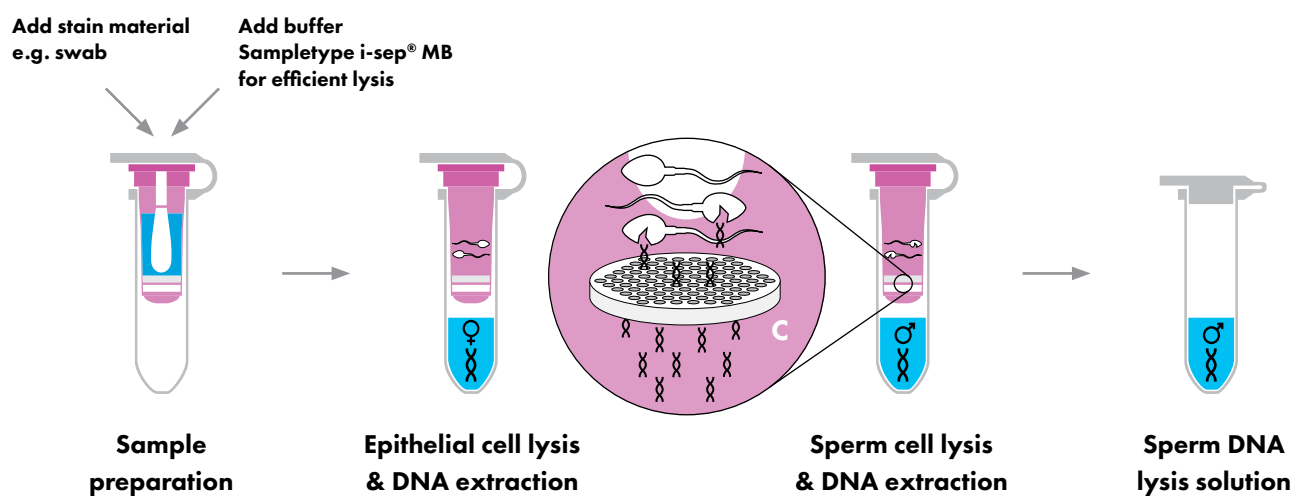
### SPECIFICATIONS

- Maximum filling volume: 200 - 500 µl
- Maximum centrifugation force: 5214 g / r = 95 mm (7000 rpm)
- Temperature stability: ≤ 60 °C
- Stain material: e.g. swabs, cloth, tissue, FFPE embedded material



## MULTI-STEP LYSIS IN ONE DEVICE

Sampletype i-sep<sup>®</sup> DL was developed for differential DNA extraction to provide DNA lysates of the highest quality. The proprietary self-sealing filter material (see part C, illustration below) allows a stepwise release and separation of DNA. First, the epithelial cells are efficiently lysed, while leaving the sperm cells intact. Subsequent addition of dithiothreitol (DTT) to the lysis buffer Sampletype i-sep<sup>®</sup> MB induces efficient lysis of sperm cells. The resulting sperm cell lysates and epithelial cell lysates are compatible with any commercially available DNA purification kit. Sampletype i-sep<sup>®</sup> DL-MB can be easily integrated into existing automatized DNA purification workflows.



### ORDER INFORMATION

Product	Size	Cat. no.
Sampletype <b>i-sep<sup>®</sup></b> DL-MB	100	70-13701-0100
Sampletype <b>i-sep<sup>®</sup></b> DL-MB	250	70-13701-0250

sales@biotype.de

# DNA EXTRACTION BUFFER

## Samplettype i-sep<sup>®</sup> MB

MAXIMUM DNA YIELD  
FROM LOW SAMPLE MATERIAL

Samplettype i-sep<sup>®</sup> MB is a highly effective and universal lysis buffer for different applications. This buffer can easily be integrated into the existing lab routine. In contrast to other commercial lysis buffers, the Samplettype i-sep<sup>®</sup> MB is suited for the differential lysis because it selectively prevents an early lysis of sperm cells. With the buffer Samplettype i-sep<sup>®</sup> MB, even difficult samples like gynaecological swabs can easily be processed in combination with the Samplettype i-sep<sup>®</sup> DL spin columns. For the purification of the lysate, magnetic beads as well as filter columns can be used.

### FEATURES

- Highly effective and universal lysis buffer (90% lysis efficiency)
- Easy to integrate into the existing workflow
- Improved overall efficiency of DNA extraction and resulting DNA yield
- Lysate can easily be processed further with the magnetic beads or with filter columns

### REFERENCES

- 1 V. Bogas et al., „Validation of samplettype i-sep DL for differential extraction and purification with prepfler express in the automate express DNA extraction system“. Forensic Science International: Genetics Supplement Series, vol. 6, p. e353-e354, 2017.

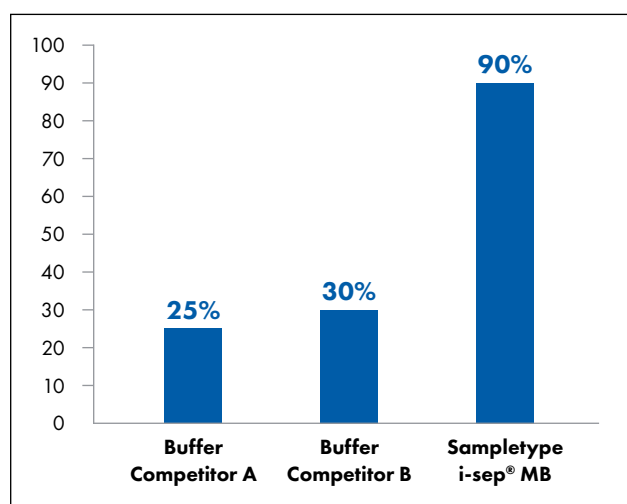
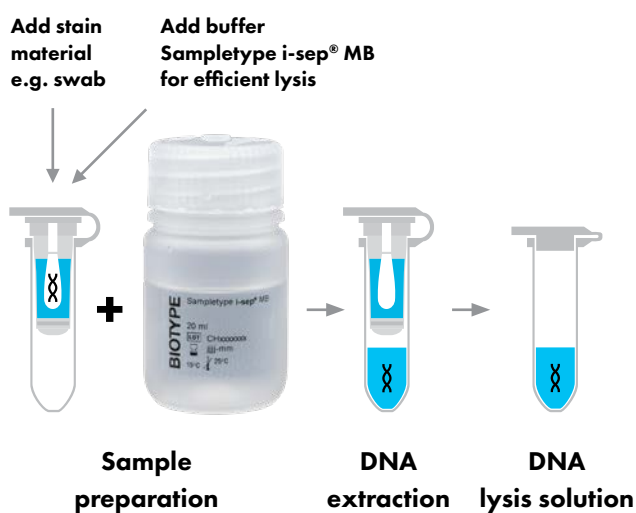






## IMPROVE YOUR CURRENT DNA EXTRACTION PROCESS

Samletype i-sep<sup>®</sup> MB is a unique designed lysis buffer that enables efficient sample lysis and DNA extraction. It perfectly matches Biotype's Samletype i-sep<sup>®</sup> SQ and DL spin columns. Due to its high efficiency, the application of the buffer Samletype i-sep<sup>®</sup> MB is not restricted to the differential lysis. It can be used for all other DNA preparations, for which a higher yield of the analyte is desired than is currently possible with other commercially available lysis buffers.



Comparison of lysis buffer efficacy for DNA extraction with magnetic beads from swabs containing saliva smear

### SPECIFICATIONS

- Efficient lysis at 56°C
- Temperature stability: ≤ 95°C
- Almost complete lysis of epithelial cells within 30 min at 56°C
- Addition of DTT enables the efficient lysis of sperm cells

# STR LOCI AMPLIFICATION

## Mentype® Nonaplex I

### COST-EFFICIENT APPROACH FOR DNA GENOTYPING

Mentype® Nonaplex I was developed for the multiplex amplification of the eight core STR-markers of the German DNA database plus Amelogenin. The primer mix is optimized batchwise to provide a well-balanced intensity of all signals. The Mentype® Nonaplex I enables a fast and well defined interpretation of STR profiles from blood samples, swabs, and forensic stains. The following markers are amplified simultaneously:

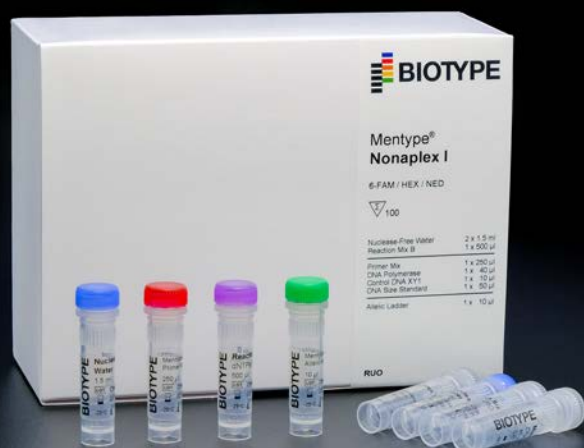
<b>6-FAM:</b>	Amelogenin	D3S1358	TH01 (TC11)	SE33 (ACTBP2)
<b>HEX:</b>	vWA	FGA (FIBRA)	D18S51	
<b>NED:</b>	D8S1179	D21S11		

### FEATURES

- Fast, robust and cost-efficient DNA genotyping
- Simultaneous amplification of 8 polymorphic and 1 sex-specific STR loci
- Core STR-markers of German Forensic DNA Database, Interpol, and EDNAP
- Precise and reliable discrimination of alleles of low and mixed DNA material

### REFERENCES

- 1 Bär W, Brinkmann B, Budowle B, Carracedo A, Gill P, Lincoln P, Mayr W, Olaisen B (1997) DNA recommendations. Further report of the DNA Commission of the ISFG regarding the use of short tandem repeat systems. Int. J. Legal Med. 110: 175-176.
- 2 Szibor R, Edelmann J, Hering S, Plate I, Wittig H, Roewer L, Wiegand P, Cali F, Romano V, Michael M (2003) Cell line DNA typing in forensic genetics – the necessity of reliable standards. Forensic Sci. Int. 138 37-43.

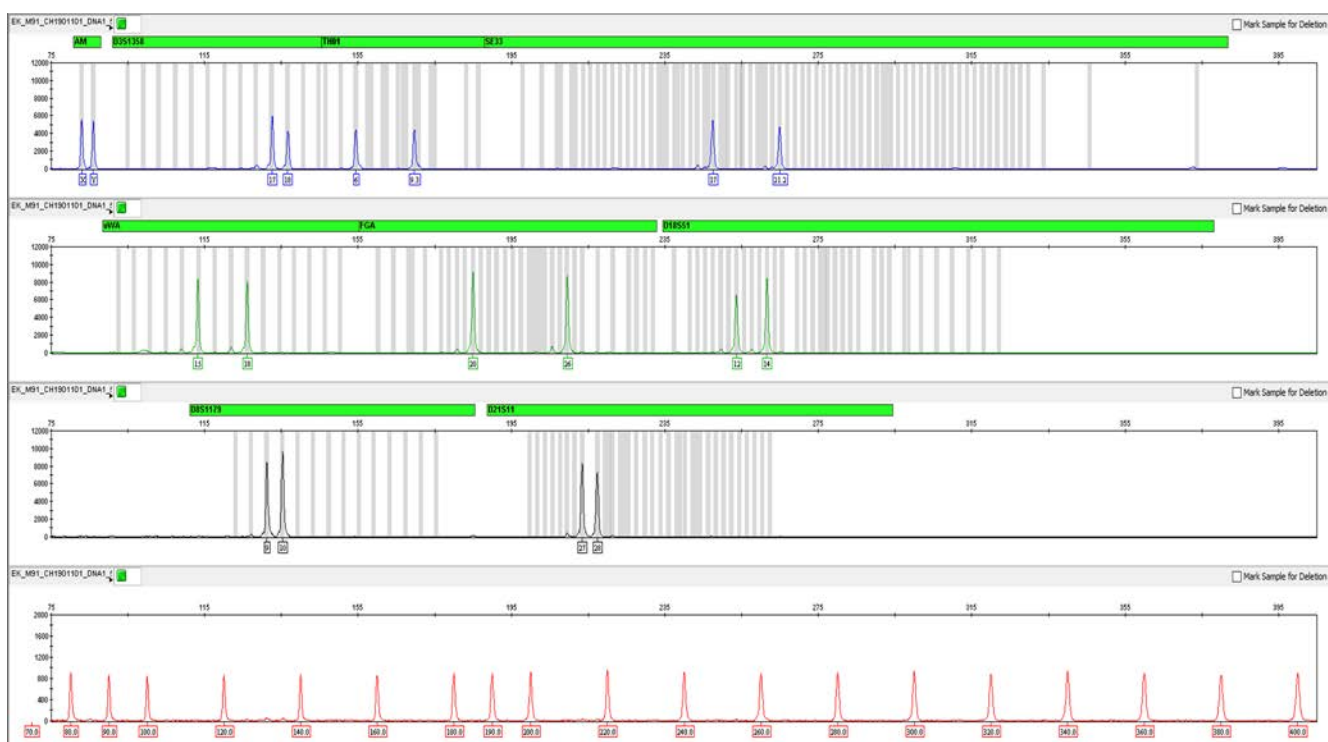


### TECHNICAL SPECIFICATIONS

- Detection limit: 200 pg genomic DNA
- Optimal amount of template DNA per reaction: 0.5-1.0 ng
- Fluorescence labels: 6-FAM, HEX, NED, ROX
- Use with: ABI PRISM® 3000-series Genetic Analyzer



## ROBUST PROFILING OF EIGHT CORE MARKERS



Electropherogram of PCR products using the Mentype® Nonplex I analyzed on an ABI PRISM® 3500 Genetic Analyzer with GeneMapper® Software. Use of 500 pg control DNA XY1.

### ORDER INFORMATION

Product	Size	Cat. no.
Mentype® Nonplex I	100	41-09113-0100
Mentype® Nonplex I	400	41-09113-0400

sales@biotype.de

# STR LOCI AMPLIFICATION

## Mentype® Nonaplex<sup>QS</sup>

### FAST AND SENSITIVE SCREENING OF HUMAN DNA PROFILES

Mentype® Nonaplex<sup>QS</sup> is a comprehensive multiplex approach for a fast screening of eight core STR markers of the German DNA database plus Amelogenin from blood samples, swabs and forensic stains. An optimized primer set for SE33 allows the accurate amplification of alleles in samples containing mutations which may interfere with PCR. The multiplex primer-mix offers well-balanced intensities of all signals. The kit contains the internal PCR control Mentype® Quality Sensor (QS), which provides information about the efficiency of the PCR reaction and the presence of PCR inhibitors. The following markers are amplified simultaneously:

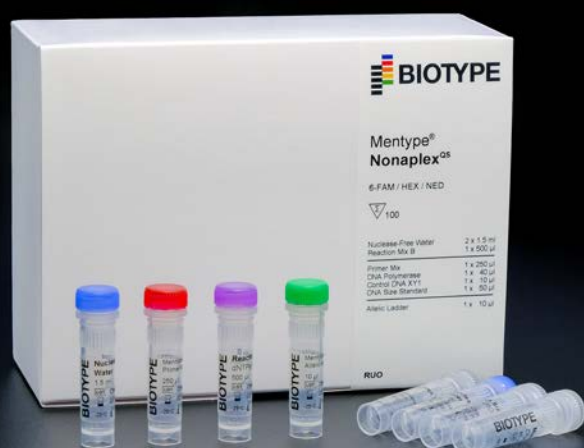
<b>6-FAM:</b>	Quality Sensor	Amelogenin	D8S1179	D21S11	D18S51
<b>HEX:</b>	TH01 (TC11)	D3S1358	SE33 (ACTBP2)		
<b>NED:</b>	vWA	FGA (FIBRA)			

### FEATURES

- Fast, robust and cost-efficient DNA genotyping
- Simultaneous amplification of 8 polymorphic STR and one sex-specific loci
- Covers all core STR-markers of German Forensic DNA Database, Interpol, and EDNAP
- Highly sensitive analysis and discrimination of alleles in samples with low-copy-number and mixed DNA
- Includes Mentype® QS indicating the presence of PCR inhibitors and the efficiency of the PCR reaction

### REFERENCES

- 1 Bär W, Brinkmann B, Budowle B, Carracedo A, Gill P, Lincoln P, Mayr W, Olaisen B (1997) DNA recommendations. Further report of the DNA Commission of the ISFG regarding the use of short tandem repeat systems. Int. J. Legal Med. 110: 175-176.
- 2 Szibor R, Edelmann J, Hering S, Plate I, Wittig H, Roewer L, Wiegand P, Cali F, Romano V, Michael M (2003) Cell line DNA typing in forensic genetics – the necessity of reliable standards. Forensic Sci. Int. 138 37-43.

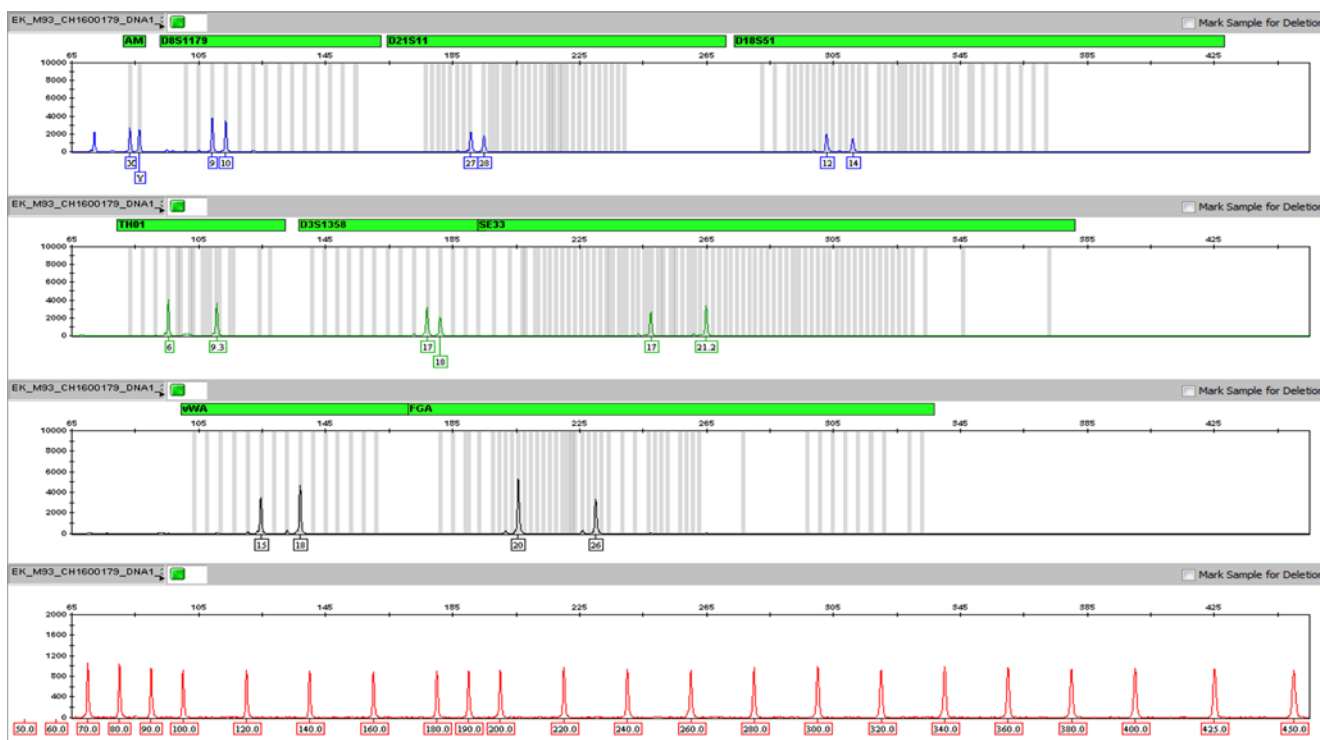


### TECHNICAL SPECIFICATIONS

- Detection limit: 100 pg genomic DNA
- Optimal amount of template DNA per reaction: 0.2-1.0 ng
- Fluorescence labels: 6-FAM, HEX, NED, ROX
- Use with: ABI PRISM® 3000-series Genetic Analyzer



# RELIABLE DISCRIMINATION OF ALLELES OF LOW AND MIXED DNA MATERIAL



Electropherogram of PCR products using the Mentype® Nonaplex<sup>QS</sup> analyzed on an ABI PRISM® 3500 Genetic Analyzer with GeneMapper® Software. Use of 350 pg control DNA XY1. The Mentype® Quality Sensor fragment signal is shown at 72 bp.

## ORDER INFORMATION

Product	Size	Cat. no.	Comment
Mentype® Nonaplex <sup>QS</sup>	100	41-09330-0100	On demand
Mentype® Nonaplex <sup>QS</sup>	400	41-09330-0400	On demand

sales@biotype.de

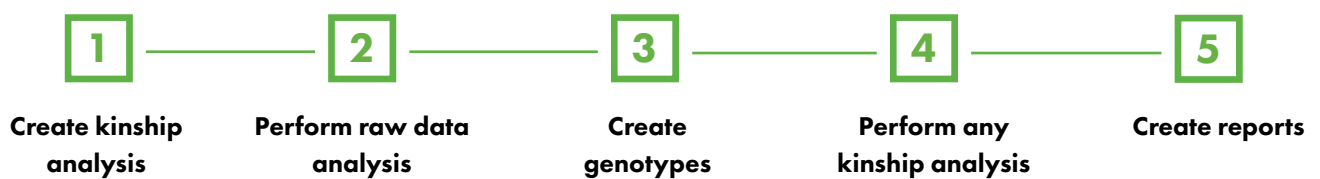
# DATA ANALYSIS GENOPROOF

## YOUR ALL-IN-ONE SOLUTION FOR PATERNITY TESTING

Labs analyzing parentage relationships demand process reliability and high quality results. On that account, GenoProof comprises the entire process from raw data analysis (supporting 6-dye-kits), biostatistic calculations for basic and complex cases to reporting.

### FEATURES

- Easy to learn and user-friendly operation
- Easy data exchange with other software such as GeneScan®, Genotyper®, GeneMapper® ID or other qualitytype products
- Data management for storing and filtering all information
- Expandable reference data including continuously updated markers, test kits and a population database with more than 1000 allele frequency tables
- Flexible licence model enables to use GenoProof exactly according to you requirements – in small and large labs – GenoProof grows with your success
- Extensive services such as support, training, customized configurations as well as consulting



qualitytype

GenoProof

# DATA ANALYSIS GENOPROOF MIXTURE 3

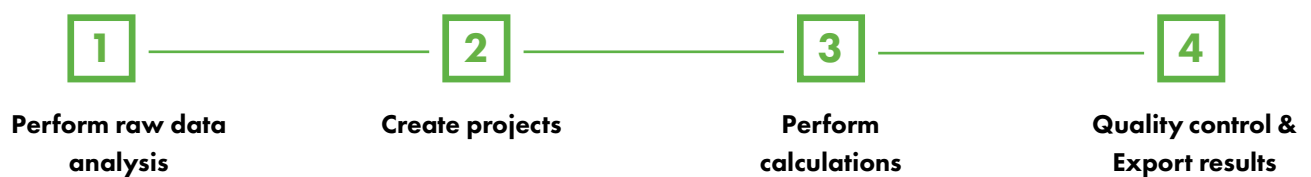


## YOUR EXPERT SYSTEM FOR COMPLEX FORENSIC DNA MIXTURES

GenoProof Mixture 3 is a complete solution for analysis of forensic DNA mixtures in high throughput. It covers the whole analytic workflow from DNA profile analysis, the statistical evaluation of mixtures with exclusionary and common probabilistic approaches to genotype deconvolution. It analyses several hundreds of thousands forensic DNA traces, reference samples and DNA mixtures per year worldwide.

### FEATURES

- Experienced: developed with forensic scientists and proved itself in more than 1 million real crime cases within the last years
- State-of-the-art: Use of fully continuous approach for likelihood ratio (LR) calculation
- Use all information from the DNA profile with the fully continuous model
- Deconvolution of the genotypes of all mixture components
- Direct comparison of results of LR calculation via binary, semi-continuous and fully continuous approach and comprehensive quality control
- User-friendly operation and project management including report functionality
- Faster than other: optimized algorithms for faster calculations



qualitytype



## ORDER INFORMATION

Product	Size	Cat. no.
Sampletype <b>i-sep</b> <sup>®</sup> DL-MB	100	70-13701-0100
Sampletype <b>i-sep</b> <sup>®</sup> DL-MB	250	70-13701-0250
Sampletype <b>i-sep</b> <sup>®</sup> SQ-MB	250	70-13702-0250
Mentype <sup>®</sup> <b>Nonaplex I</b>	100	41-09113-0100
Mentype <sup>®</sup> <b>Nonaplex I</b>	400	41-09113-0400
Mentype <sup>®</sup> <b>Nonaplex</b> <sup>Q5</sup>	100	41-09330-0100*
Mentype <sup>®</sup> <b>Nonaplex</b> <sup>Q5</sup>	400	41-09330-0400*

\* On Demand

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