



Human Identification and Forensics:

Advanced Workflow Solutions

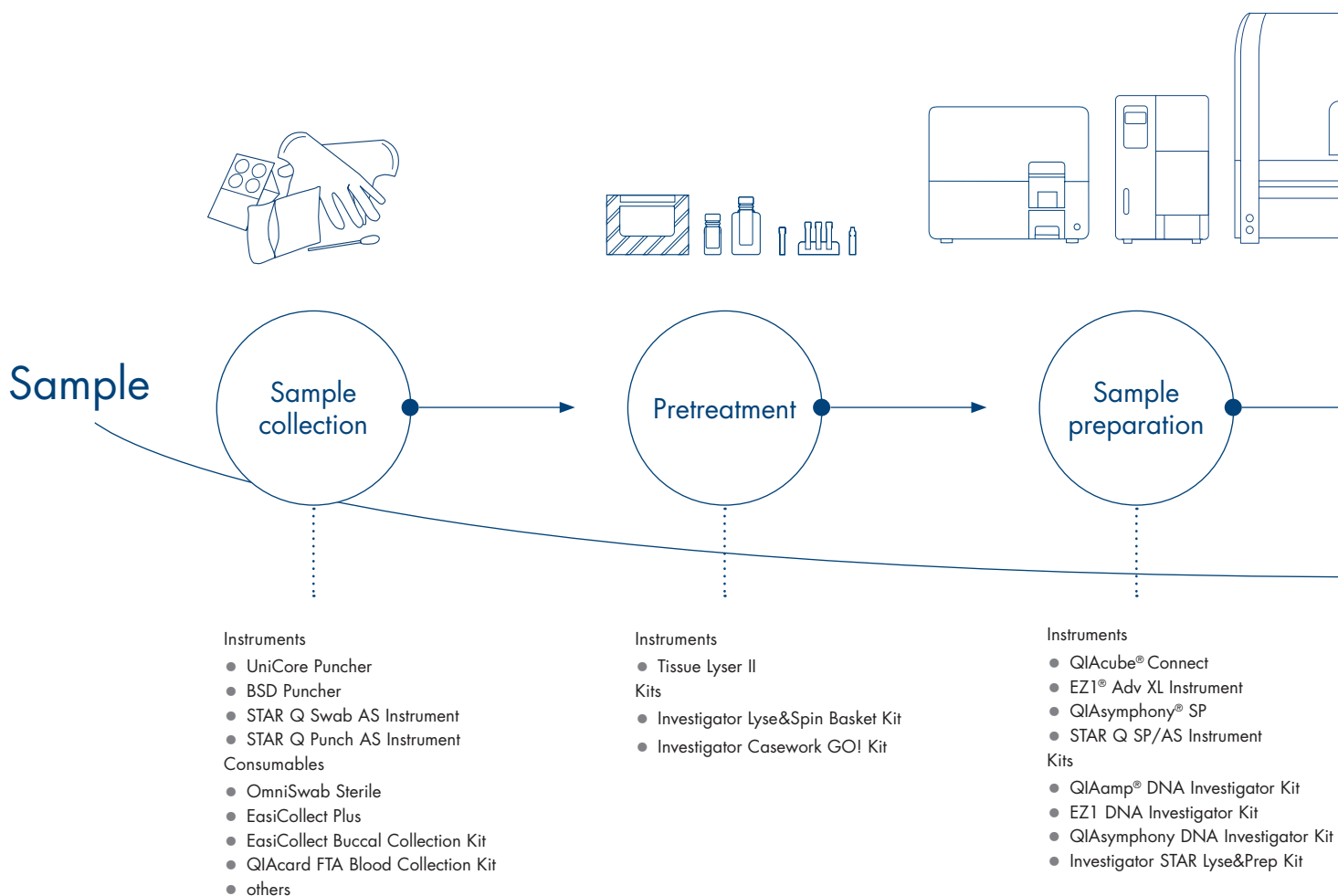
From crime scene to court



Sample to Insight

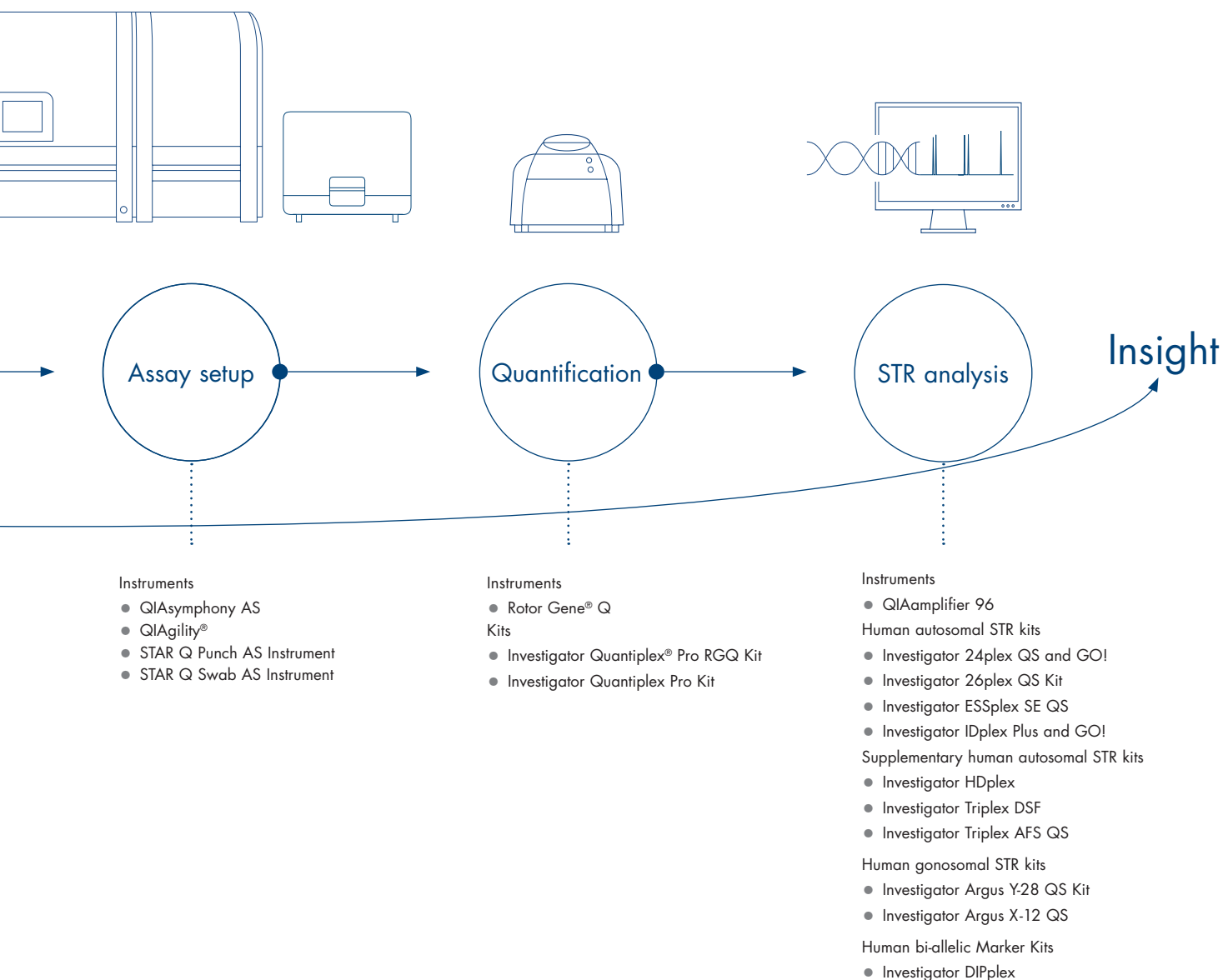
Streamline your workflow – get more information faster with QIAGEN

Nowadays, forensic and paternity laboratories are often faced with increasing workloads, due to growing demand for DNA testing. To reduce costs and increase efficiency, productivity and quality of laboratory operations, forensic facilities like yours are required to optimize their workflows. This is why QIAGEN has developed high-quality automation, sample collection and preparation consumables, as well as assay solutions designed to meet your needs, whether you belong to a smaller lab or a higher-throughput facility.



® solutions for human identity and forensic testing

All Investigator® products have been validated according to recommendations of the European Network of Forensic Science Institutes (ENFSI) and the Revised Validation Guidelines of the Scientific Working Group on DNA Analysis Methods (SWGDM). QIAGEN can help your forensic laboratory standardize sample processing, and enable you to achieve consistent high-quality results – from Sample to Insight!

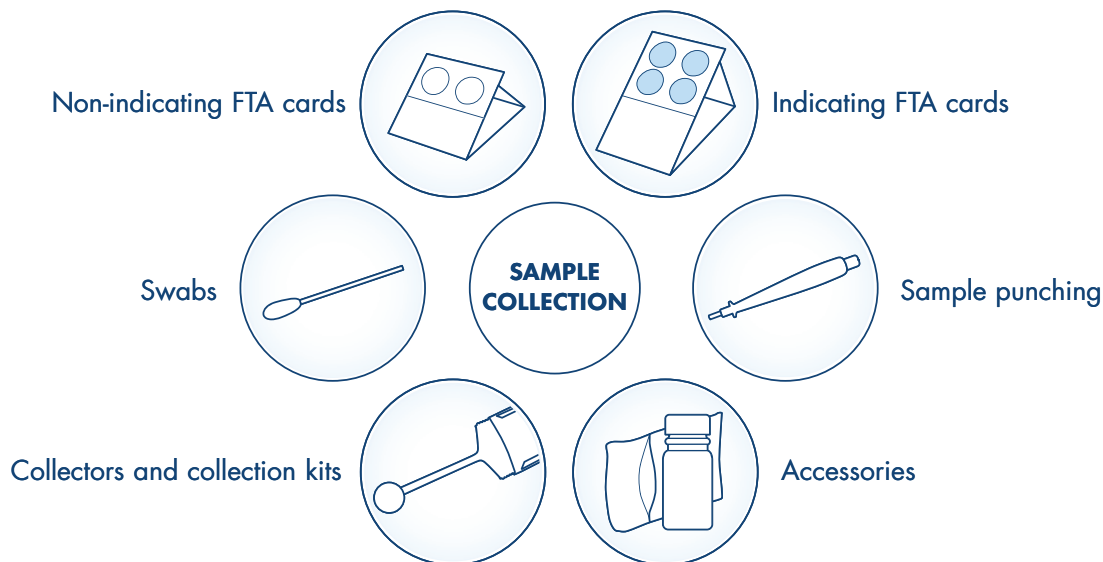


Responsibility from the start

Reliable QIAcard FTA technology and EasiCollect solutions for safe storage and high-quality DNA processing

Whether you're performing reference or casework sample collection, or looking to store and protect the integrity of your precious samples under all conditions, or even considering customized kits for your workflow, we have a solution for you!

- Collectors and collection kits – For simple, reliable and standardized sample collection
- Indicating FTA cards – For collection, stabilization, processing, transport and archiving of buccal and saliva samples
- Non-indicating FTA cards – For collection, stabilization, processing, transport and archiving of blood samples
- Sample punching – For precise sample disc removal from FTA cards
- Swabs – Foam swabs and OmniSwabs with ejectable head for buccal and saliva samples
- Accessories – For contamination-free collection, storage, transport and processing of DNA samples
- Custom solutions – For creating optimized solutions that fit into your workflow



If your needs fall outside of standard catalog kits, we can create a kit that enables you to handle sample collection with a single product that fits into your workflow. Your kit can include any of our Whatman FTA products or other sample collection products and accessories.

For more information and a full list of products, go to www.qiagen.com/forensic-sample-collection.

Sample pretreatment for best results

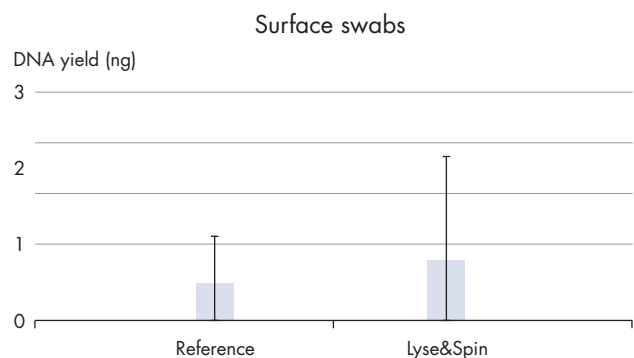
Investigator Lyse&Spin Basket Kit

Reduced sample handling and complete nucleic acid recovery

The Investigator Lyse&Spin Basket Kit is used for pretreatment of forensic samples, in combination with manual and automated extraction kits, such as the QIAamp DNA Investigator Kit, the EZ1 DNA Investigator Kit and the QIASymphony DNA Investigator Kit. This kit enables you to perform sample lysis and separation of solid sample substrates at the same time (for example, swabs, pieces of fabric or leather, paper, cigarette butts, chewing gum, small tapes or other sample types), in one simple procedure (Figure 1).

- A streamlined front-end solution for pretreatment of forensic samples
- Lysis at 56°C for up to 16 hours without leaking
- Filtration of lysates and retention of particles >10 µm
- EO-treated bulk or single blistered kit configurations

Figure 1. Higher DNA yield. Comparison data with standard lysis and filtration using the QIAshredder (Reference), and lysis and filtration using the Investigator Lyse&Spin Basket Kit (Lyse&Spin). The Casework 500 ADV protocol was used on the QIASymphony SP for DNA purification, and the Investigator Quantiplex Kit for human DNA quantification (n=12).



Tissuelyser II

Convenient sample disruption of bone or teeth samples

As a molecular forensic investigator or archaeologist, you know better than anyone else that DNA purification from bones or teeth can be a very challenging task. The Tissuelyser II (Figure 2) bead mill is capable of grinding a bone or tooth sample to a fine powder in just a few minutes, using liquid nitrogen for the grinding jar set of the instrument.

- Bead mill for grinding bones or teeth until pulverized
- Convenient and secure disruption process
- Reproducible results with difficult-to-lyse tissues
- Adapter sets optimized for high-throughput disruption
- Front-end solution for QIAGEN sample preparation



Figure 2. Tissuelyser II.

Automated solutions for rape samples

Differential wash on the QIAcube Connect

Standardization of critical steps in sexual assault analysis with automation

Sexual assault cases are a serious public safety concern, and samples recovered from victims and suspects pose particular challenges to forensic laboratories. While DNA evidence has the power to identify assailants, effective lysis and careful separation of the sperm and epithelial fractions are essential for you to achieve the best possible results in downstream STR analysis. Our specially designed differential wash protocols for the QIAcube Connect rise to meet this challenge, helping you to achieve success with even the most difficult samples. These protocols are directly compatible with all QIAGEN downstream DNA purification kit solutions (Figure 3).

- Automated wash steps and sperm pellet lysis for up to 6 samples in 60 minutes, or up to 12 samples in 90 minutes
- Standardized procedures reducing run-to-run variability
- Increased efficiency due to less hands-on time

Sexual Assault Evidence/Y-screening

Many sexual assault cases lie in storage for months or even years, simply because the effort and complexity of recovering PCR-ready DNA is too great. The use of a “Direct to DNA” approach maximizes the chances that only samples worth full processing are attempted. The Investigator Casework GO! – Quantiplex Pro-workflow determines the male/female DNA ratio and predicts PCR inhibition as well as degradation, and thus provides a rapid Y-screening and quality assessment for selection of evidential samples for further STR testing.

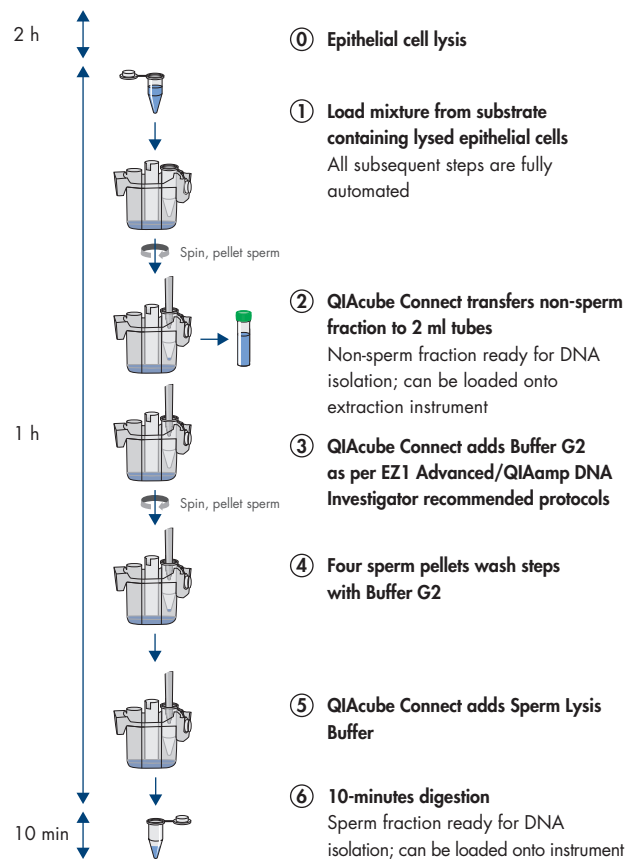


Figure 3. Differential wash and lysis protocol for the QIAcube Connect.

Start to standardize sexual assault analysis. Watch the webinar *Validation of the QIAcube for Differential Separation* at www.qiagen.com/forensics-webinar or go to www.qiagen.com/cmp/lis/sexual-assault-analysis.

Proven silica membrane technology for DNA purification

QIAamp DNA Investigator Kit and QIAcube Connect Instrument

Manual or automated DNA purification from forensic samples

The QIAamp DNA Investigator Kit is designed for manual or automated purification of total DNA. Proven silica membrane technology provides you with high-quality DNA, which is suitable for direct use in downstream analysis or storage for later use. Pretreatment protocols are available for various typical casework or reference sample types.

- Proven silica membrane technology
- Rapid purification of high-quality, ready-to-use DNA
- Consistently high yields with elution in as little as 20 μ l
- Manual or automated on the QIAcube Connect

The QIAcube Connect uses advanced technology to process QIAGEN spin columns, enabling you to seamlessly integrate automated, low-throughput sample prep into your laboratory workflow (Figure 4). No change of purification chemistry is required, assuring fast startup and immediate results. All steps in the purification procedure are fully automated — up to 12 samples can be processed per run.

- Automation of trusted QIAGEN spin-column kits
- Elimination of manual processing steps
- More free time with affordable automated processing
- Standardized results and increased productivity

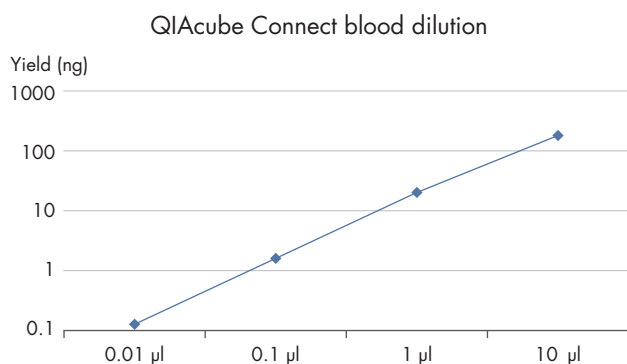


Figure 4. Linear correlation of input sample amount and purified DNA (left), performed on a QIAcube Connect instrument (right).

Fast, efficient and reliable – purification with magnetic beads

EZ1 Advanced XL Instrument and EZ1 DNA Investigator Kit

Standardized automated purification for up to 14 samples

The EZ1 Advanced XL Instrument enables you to achieve fast, efficient and standardized DNA purification in just ~20 minutes. Manual sample handling is minimized, ensuring safety and reliable processing of any sample from your forensic routine work. The EZ1 DNA Investigator Kit includes all reagents and accessories required to process your samples, providing prefilled, foil-sealed reagent cartridges that remain sealed until the instrument door is closed and the protocol run started, reducing the risk of contamination during setup (Figure 5).

- Efficient yield and reproducible high performance from casework samples
- Prefilled, foil-sealed reagent cartridges
- Optimized, easy-to-run protocols
- Bar code reading for tracking of samples and reagents
- UV lamp to prevent cross-contamination

Pretreatment protocols for typical casework or reference samples are available in the EZ1 DNA Investigator Handbook. DNA purification protocols provided on EZ1 DNA Investigator Cards:

- Trace protocol
- Tip Dance protocol
- Large Volume protocol
- Large Scale Bone protocol

In the Tip Dance protocol, the filter-tip moves back-and-forth relative to the worktable platform while pipetting, without the need for prior centrifugation to remove solid materials that could clog the tip. This allows you to process solid materials, such as swabs or blood discs, directly in the sample tube.

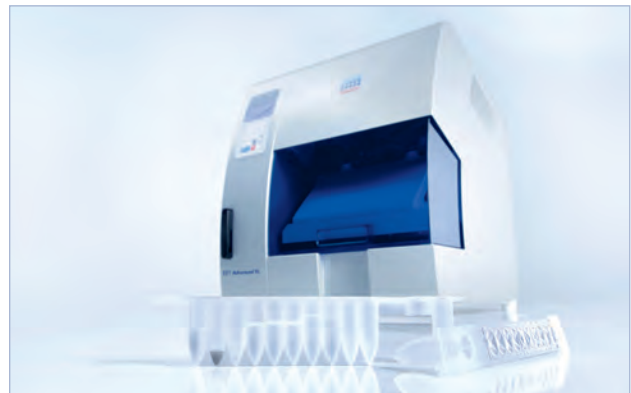


Figure 5. EZ1 Advanced XL with prefilled reagent cartridges.

To find out more about standardizing automated purification, watch the webinar *Improving DNA Analysis Efficiency with the EZ1* at www.qiagen.com/forensics-webinar.

QIAsymphony – in tune with your DNA evidence

Automate crime solving with QIAsymphony SP/AS

Sample purification and assay set up with one versatile instrument

The QIAsymphony SP/AS offers you unequalled quality in medium- to high-throughput DNA sample purification (SP) and assay setup (AS) for human identity and forensic analyses (Figure 6). Latest software and protocol developments have improved handling of difficult sample and subsequent STR assay setup options. This innovative, easy-to-use modular system with built-in touchscreen offers you excellent performance, traceability and LIMS compatibility.

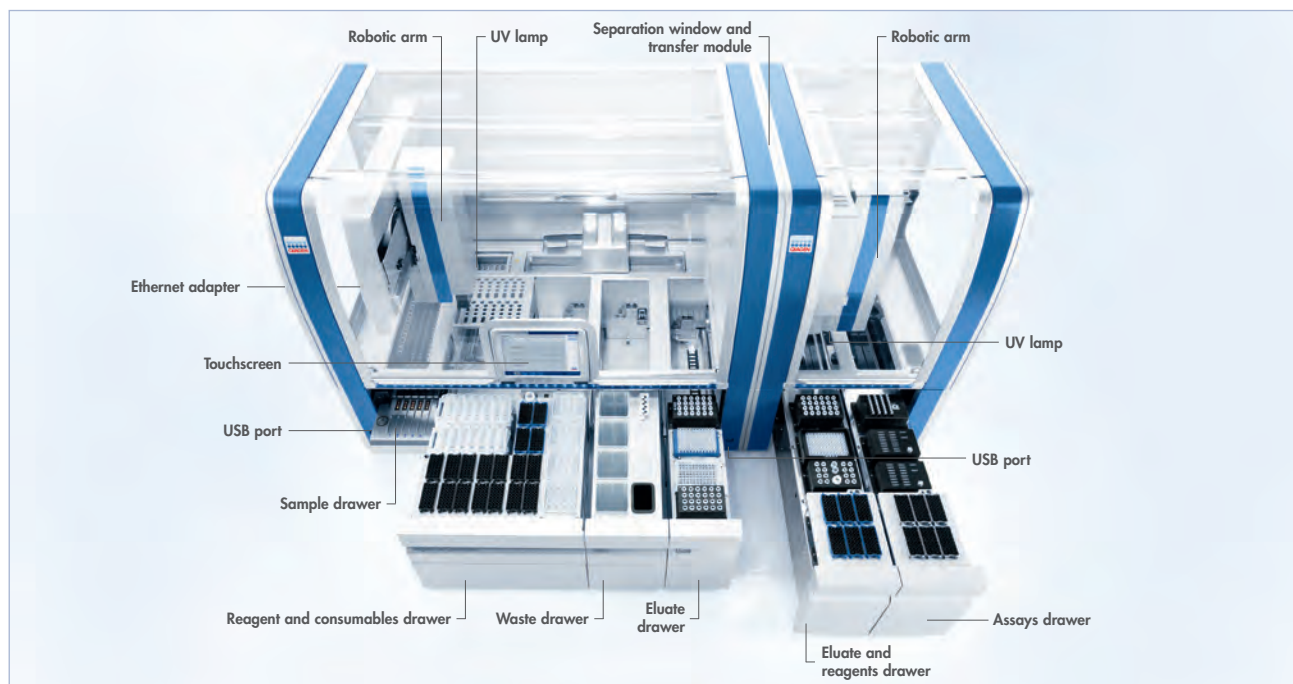


Figure 6. The QIAsymphony instrument with the SP and AS module.

Whether you operate the instrument in an integrated mode or as two separate modules, the QIAsymphony architecture prevents cross- and operator-contamination, ensuring complete sample integrity. To reduce manual handling steps and minimize the risk of sample contamination, your samples processed on the QIAsymphony SP are transferred automatically to the QIAsymphony AS (integrated operation). The QIAsymphony system also provides additional safety features, including optimized design and protocols, moving UV light and drop catchers, a hooded system with magnetic lockers and separate and safe waste disposal.

For further information on sample preparation with the QIAsymphony DNA Investigator Kit on QIAsymphony SP, watch our webinar *Successfully overcoming challenges in forensic sample preparation* at www.qiagen.com/forensics-webinar.

Fast and efficient automated sample DNA purification

QIAAsymphony SP and QIAAsymphony DNA Investigator Kit

Automated purification of DNA from 1–96 samples

To meet the specific challenges of your forensic samples, we have developed sample preparation protocols, ensuring the highest possible first-pass success rates. Advanced protocols (ADV) use a heated binding step and increased binding time to maximize yields of pure DNA from the most difficult samples (Figure 7). High-Efficiency (HE) protocols address the challenge of recovering sufficient DNA from touch samples and other low-template samples. TopElute Fluid maximizes sensitivity for these difficult samples (data not shown). The full range of high-efficiency forensic protocols available for different reference and casework samples are described in Table 1.

- Maximum process safety with prefilled, sealed reagent cartridges of the QIAAsymphony DNA Investigator Kit
- Continuous loading in batches of up to 24 samples including internal controls with bar code reading
- Option to assign different protocols to each batch
- Different protocol options to ensure maximum DNA recovery, yield and quality, free from inhibitors

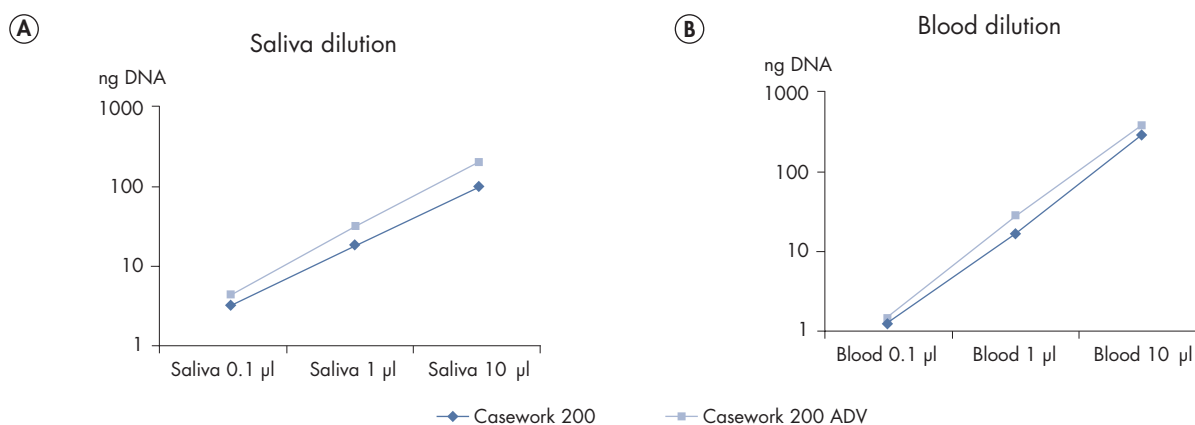


Figure 7. Improved DNA yields using the Casework Advanced protocol. A: Series of saliva or B: blood dilutions (4 replicates each) were purified using the Advanced protocol (Casework 200 ADV), which includes a heated and prolonged binding step, or the standard protocol (Casework 200). The Investigator Quantiplex Kit was used for DNA quantification.

Table 1. High-efficiency forensic protocols for the QIAAsymphony

Protocol	Lysis volume options	Enhanced binding	Eluate volume	TopElute Fluid
Reference	200, 500 µl	No	100–400 µl	No
Casework	200, 500, 1000 µl	No	100–200 µl	No
Casework ADV	200, 500, 1000 µl	Yes	100–200 µl	No
Casework HE	200, 500, 1000 µl	No	30–80 µl	Yes
Casework HE ADV	200, 500, 1000 µl	Yes	30–80 µl	Yes

Reproducible results with automated PCR assay setup

QIAsymphony AS module

Forensic workflow integration and user-friendly assay setup

The QIAsymphony AS extends the capabilities of the QIAsymphony SP by integrating automated PCR assay setup, for both real-time quantification and traditional STR assays (Figure 8). If your laboratory is already operating a QIAsymphony SP, you can easily upgrade your system onsite with a QIAsymphony AS module, and use the module as an independent or integrated liquid handler.

- Automated transfer of eluates from the SP to the AS module for assay setup
- Automated serial dilution of quantification standards
- Import of concentration data from various frequently used real-time cyclers
- Normalization of samples for subsequent STR assay setup
- User-defined target amount, minimum and maximum

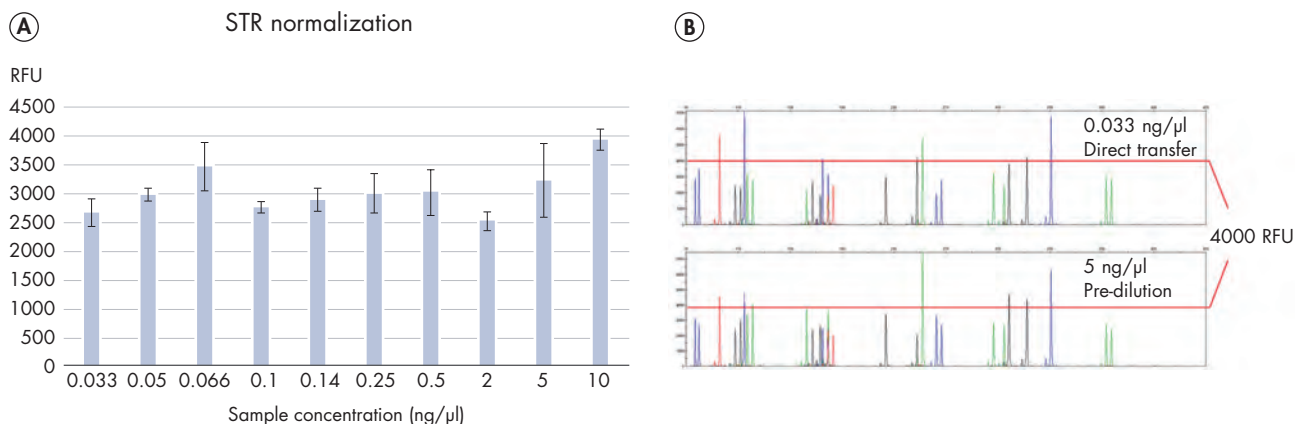


Figure 8. Normalized STR results. A dilution series of DNA from 33 pg/μl to 10 ng/μl was prepared. Samples were loaded on the QIAsymphony AS module (4 replicates each) and an Investigator ESSplex Plus reaction with a target input of 500 pg/reaction was set up. DNA was amplified by PCR and analyzed by capillary electrophoresis. **A:** Comparison of average peak heights across all 16 ESSplex markers. **B:** Profile examples.

For further information on the QIAsymphony SP/AS, watch our webinar *Optimizing DNA Purification from Forensic Samples for Higher Yield and Quality* at www.qiagen.com/forensics-webinar.

High-precision, reproducible reaction and plate setup

QIAgility

The flexible benchtop liquid handler for automated assay and capillary electrophoresis (CE) plate setup

The QIAgility is a compact benchtop instrument that helps you save time by enabling rapid, high-precision PCR and CE setup, and providing standardization, traceability and highly accurate pipetting (Figure 9). The unmatched versatility of the QIAgility means that almost all tube and plate formats are supported, as well as Rotor-Discs® for the Rotor-Gene Q.

For PCR success at the first attempt, you can use verified prewritten and ready-to-run Q Protocols for PCR setup in combination with QIAGEN PCR kits for end-point and real-time PCR.

- Assay setup for quantitative real-time PCR and STR analysis
- Normalize up to 64 DNA samples in a single run
- Import sample IDs and concentration data directly from the normalization protocol
- Automatic addition of DNA extract at the recommended template input

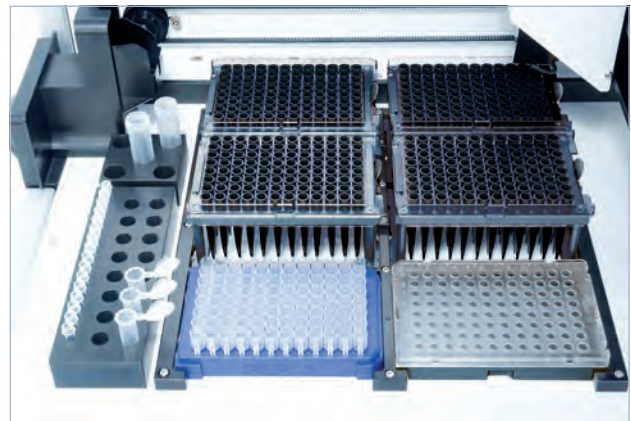


Figure 9. QIAgility instrument and deck layout.

Manually setting up 96-well plates for CE to obtain STR profiling results is time-consuming and prone to error. The QIAgility can set up a 96-well plate for CE in just 34 minutes, including dispensation of Hi-Di™ Formamide/size standard mix, samples and allelic ladders.

- Prewritten protocols for CE plate setup with fixed or user-defined ladder positions
- High accuracy by sensing the meniscus during pipetting and retracting the tip while dispensing to prevent bubbles in the Hi-Di Formamide/PCR product mixture that could result in failed injections

Trusted DNA quantification results, even from difficult samples

Investigator Quantiplex Pro and Investigator Quantiplex Pro RGQ Kits

Quantification prior to downstream STR analysis confirms that sufficient DNA is present in your sample and indicates if it contains inhibitors, which may interfere with your STR analysis.

We have two new easy-to-use human DNA quantification kits based on quantitative real-time PCR:

- **Investigator Quantiplex Pro Kit** – for quantification of total human and human male DNA with integrated human DNA degradation assessment
- **Investigator Quantiplex Pro RGQ Kit** – for quantification of total human and human male DNA with integrated male and human DNA degradation assessment

Both kits offer the following features:

- Unique and precise DNA degradation assessment
- Highly accurate and sensitive results for male DNA in a high female background
- High dynamic range from 0.5 pg/μl to 200 ng/μl for both human and male DNA
- Reliable information about inhibitors with high correlation to STR results
- Fast-cycling PCR in about one hour

Both kits work with any human ID workflow and are designed to complement the Quality Sensor included in several of our Investigator STR PCR assays (see page 14), enabling an unparalleled level of workflow optimization. The Investigator Quantiplex Pro Kit includes small and large human DNA targets to provide an accurate assessment of DNA degradation. The Investigator Quantiplex Pro RGQ Kit contains in addition small and large human male targets, which is particularly beneficial when analyzing sexual assault samples where low levels of the male perpetrator's DNA could be highly degraded in a background of non-degraded female DNA (Figure 10).

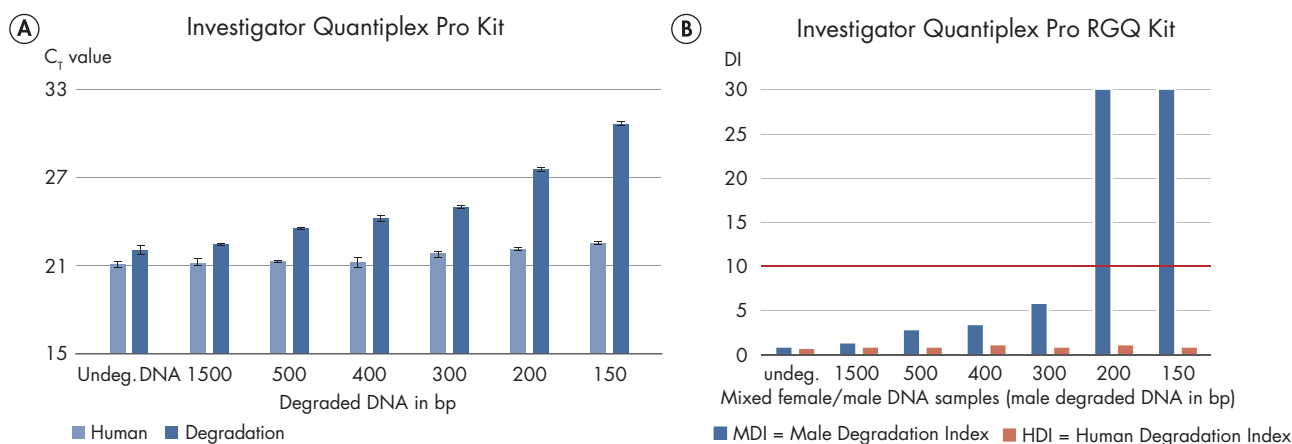


Figure 10. Accurate detection of DNA degradation. **A:** Male genomic DNA was sheared with a Covaris® S220 Focused-ultrasonicator™ to average fragment sizes of 150–1500 bp. Each fragment size (4.6 ng) was tested with the newly developed Quantiplex Pro degradation detection system. **B:** Male genomic DNA was sheared as described above. Each set contains 0.1 ng/μl of degraded male DNA mixed with 100 ng/μl of non-degraded female DNA and were tested using the Investigator Quantiplex Pro RGQ Kit.

Watch our webinars *A comparison of protocols for human DNA quantification in forensic casework* or *Assessment of Y chromosome degradation level using the Investigator Quantiplex Pro RGQ Kit* at www.qiagen.com/forensics-webinar.

STR analysis – have confidence in your evidence

Investigator Human Identification PCR Kits

Accelerated DNA profiling with unique features

When preparing to give evidence in court, you need to have an STR profile you can trust. QIAGEN offers a broad portfolio of multiplex PCR kits for human identification and paternity testing that allow you to do just that – trust in your evidence. Our kits offer the most comprehensive and versatile coverage of current international STR standards: the Combined DNA Index (CODIS), European Standard Set (ESS) or Chinese marker set of loci. Dedicated assays are available for casework analysis that requires DNA purification as well as for direct amplification of reference samples.

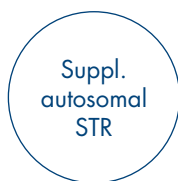
Sometimes, standard autosomal kits are not sufficient to resolve a case and further genetic markers are needed. Conversely, there are situations where you need only a few, highly discriminating markers. Therefore, we offer a broad range of unique solutions for complex deficiency cases, ChrX or ChrY analysis, prescreening solutions with triplex subsets, as well as deletion/insertion polymorphisms.

Furthermore, PCR for all of QIAGEN's DNA profiling assays, as well as any other of your laboratory's end-point PCR needs, can be achieved using the QIAamplifier 96 high performance thermocycler.

- International compatibility with CODIS core, ESS or Chinese loci
- Compatibility for direct amplification and challenging casework samples after DNA purification
- Combinatorial kits with non-standard markers or triplex applications
- Very high sensitivity and inhibitor resistance
- Accelerated PCR speed for fast results
- Smart primer design for minimal allelic overlap, reducing the risk of misinterpretation



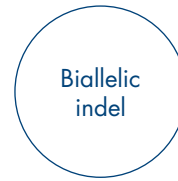
- Investigator 24plex QS and GO! Kits
- Investigator 26plex QS Kit
- Investigator ESSplex SE QS Kit
- Investigator IDplex Plus and GO! Kits



- Investigator HDplex Kit
- Investigator Triplex DSF Kit
- Investigator Triplex AFS QS Kit



- Investigator Argus Y-28 QS Kit
- Investigator Argus X-12 QS Kit



- Investigator DIPplex Kit

Investigator 24plex QS and Investigator 24plex GO! Kits are approved for use in laboratories that generate DNA profiles for submission to the National DNA Index System (NDIS). See www.fbi.org.



Better quality control checks for your STR analyses

Investigator Quality Sensor

Advanced STR analysis with an innovative and unique internal performance control

One cost- and labor-intensive part of forensic workflows is the process of repeating STR analyses on DNA samples that showed poor results or failed quality criteria, due to degradation, inhibition or absence of DNA. As part of our dedication to improving forensic workflows, we have developed a new feature to give you more information about your sample quality. The innovative Quality Sensor (QS) allows you to generate additional, valuable information for your quality control and performance checks (Figure 11). The QS is amplified simultaneously with the DNA, therefore no extra steps are needed and time is saved. Suboptimal profiles can now be interpreted for the correct action to minimize unnecessary PCR reruns. Let the QS redefine the way you think about casework analysis.



For better quality control in your STR analysis, see www.qiagen.com/qualitysensor.

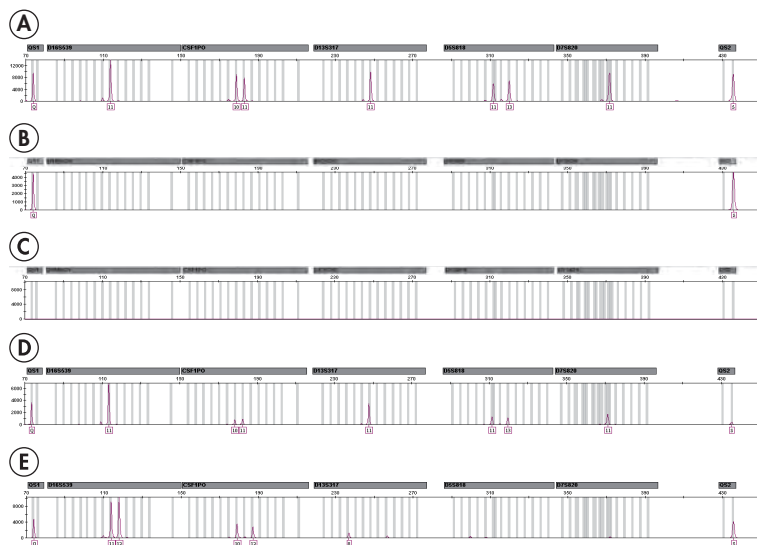


Figure 11. Quality Sensor explained. **A:** Successful run. Small amplicon Quality Sensor peak (QS1) and large amplicon Quality Sensor peak (QS2) appear at similar heights. Sample allele peaks have balanced height across the profile. **B:** Confirmed successful PCR amplification but with absence of DNA. QS1 and QS2 appear at similar heights. No sample allele peaks appear. **C:** Failed PCR amplification. Lack of QS1 and QS2. No sample allele peaks appear. **D:** Inhibited DNA. QS1 with normal peak height and QS2 with decreased peak height can be seen if inhibitors are affecting PCR. Sample allele peaks for the markers show decreasing height towards the larger markers. **E:** Degraded DNA. QS1 and QS2 appear at similar heights. Sample shows allele peaks for the STR loci with decreasing height towards the larger STR loci. The analysis was performed on a GeneAmp® PCR System 9700 Thermal Cycler and Applied Biosystems 3500 Genetic Analyzer using the Investigator 24plex QS Kit.

The right STR kit for the right sample

Investigator STR QS Kits – For casework sample analysis

You know better than anyone else that small traces of DNA, which are often present as a DNA mixture, may be challenging for casework sample analysis. In such situations, a clean baseline and high sensitivity of the STR assays is crucial for a successful STR profile. The QIAGEN Investigator STR products offer the sensitivity and robustness you need, as well as the Quality Sensor, which shows you the quality of your sample and how best to proceed (Figure 12). This allows you to reduce costs and increase process efficiency. The following kit options are available:

- **Investigator 24plex QS Kit** – for analysis of the CODIS expansion marker set, with Quality Sensor
- **Investigator 26plex QS Kit** – for analysis of all Chinese, CODIS and ESS markers, with Quality Sensor
- **Investigator ESSplex SE QS Kit** – for analysis of the ESS standard set including SE33, with Quality Sensor
- **Investigator IDplex Plus Kit** – for analysis of the CODIS marker set

These kits offer the following features:

- Fast results with a PCR speed of around 60 minutes
- Highest pass rate for the most challenging samples due to high sensitivity and inhibitor resistance
- Added information and better decision, when the Quality Sensor is present
- Compatible with Investigator Casework GO! to maximize recovery of DNA from trace or touch samples

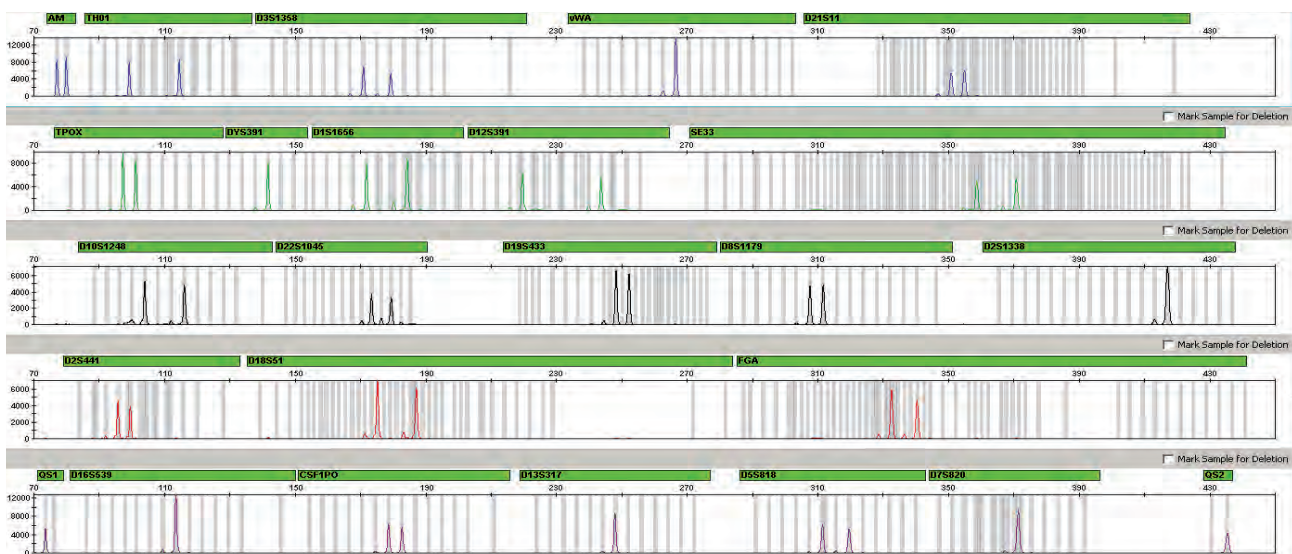


Figure 12. Electropherogram of control DNA 9948 analyzed with the Investigator 24plex QS Kit. The sample was amplified in the presence of 500 μ M hematin, which did not interfere with amplification, meaning that a high-quality profile was obtained. This can be seen as the Quality Sensor fragments QS1 (lowest panel on the left) and QS2 (lowest panel on the right) were not adversely affected, indicating a successful run.

Investigator Argus QS Kits – For X- and Y-chromosomal analysis

Argus X-12 QS Kit

ChrX genotyping can complement the analysis of autosomal and ChrY markers very efficiently, especially in complex cases of kinship testing or in paternity cases involving close blood-relatives as putative fathers. Here, the exclusion power of STRs is considerably reduced and ChrX STRs may be superior to autosomal markers. For example, if two alleged fathers are father and son, they would not share any X-chromosomal alleles identical by descent, and hence ChrX markers would be more efficient than AS markers. Besides kinship and paternity testing, the kit is also highly suitable for forensic stain analysis, such as female traces on a male background. The 12 X-chromosomal STR markers are clustered into four linkage groups (Table 2), and thus, each set of three markers is handled as a haplotype for genotyping.

The most useful applications for the Investigator Argus X-12 QS Kit include:

- Paternity with related putative fathers (superiority of ChrX-markers if father/son)
- Paternity testing for daughters (only ChrX of males is transmitted to all females)
- Motherhood (Verification of mother/son)
- Sisterhood (identical paternal ChrX-haplotype)
- Deficiency cases with missing putative father (reconstruction of family trees)

Table 2. Linkage groups of Investigator Argus X-12 QS Kit

Linkage group	
1 (Xp22)	DXS8378 – DXS10135 – DXS10148
2 (Xp11)	DXS7132 – DXS10074 – DXS10079
3 (Xp26)	HPRTB – DXS10101 – DXS10103
4 (Xp28)	DXS7423 – DXS10134 – DXS10146

Argus Y-28 QS Kit

The Investigator Argus Y-28 QS Kit is designed to process highly challenging Y-STR casework and database samples. It is optimized to help improve resolution of trace evidence and sexual assault mixtures that contain small quantities of male DNA in a large background of female DNA and offers laboratories both the power of discrimination and the performance to enable accurate results in less time from challenging samples – For sure it contains the Quality Sensor and it is compatible with Investigator Casework GO!

The features of the Investigator Argus Y-28 QS Kit include:

- Co-amplification of 27 Y-chromosomal loci incl. 17 commonly used Yfiler markers
- An integrated Quality Sensor for better decision making and data interpretation
- Best in class performance with degraded samples and PCR inhibitors
- Dedicated for casework samples with high female input

Whatever your throughput of reference samples is – we have the right as

Investigator STR GO! Kits – For direct amplification from reference samples

Direct amplification can dramatically increase your lab's throughput and simultaneously decrease the complexity of your STR analysis processes. This reduces costs and minimizes the potential for errors. The Investigator STR GO! Kits offer specific optimized direct protocols without the need for sample purification, for blood or saliva on FTA® papers or buccal swabs. If integrated, the Quality Sensor lets you see whether there is a lack of DNA or an unsuccessful PCR. This streamlines your decision-making process and lets you focus your resources optimally. The following kit options are available:

- **Investigator 24plex GO! Kit** – for analysis of the CODIS expansion marker set, with Quality Sensor
- **Investigator IDplex GO! Kit** – for analysis of the CODIS marker set

These kits offer the following features:

- Ideal for reference samples from buccal cells or blood on FTA paper or buccal swabs
- Swab lysis in just 5 minutes (see Figure 13)
- Validated protocols for automated sample punching and reaction setup

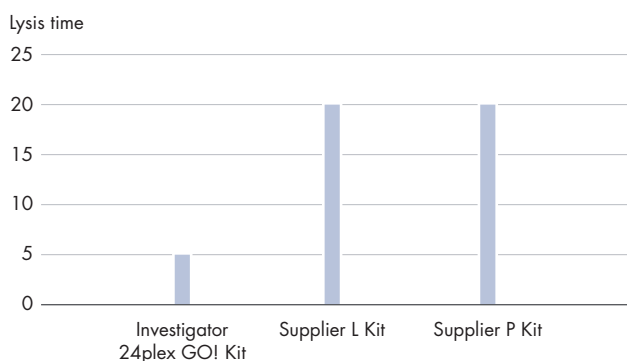


Figure 13. Quicker swab lysis for direct amplification. The effective swab lysis time of the Investigator STR GO! Lysis Buffer for the Investigator 24plex GO! Kit protocol, and swab lysis times for other suppliers, are shown.

Direct amplification protocols are also available for other Investigator STR Assays, e.g., Investigator ESSplex SE QS or 26plex QS kit. Please check the corresponding product catalogue pages at www.qiagen.com.

To see what our Investigator STR kits can do for you, watch our webinar *The New Approach to Global STR Analysis: Avoid False Negatives with Quality Sensor or Direct Amplification of Reference Samples Using Investigator STR GO! Kits* at www.qiagen.com/forensics-webinar.

Assays and tools to support you

From low- to high-throughput sample processing and assay setup for reference samples
Whatever your throughput of reference samples is – we have the right tools to support you!

Low throughput/manual sample handling: **The UniCore Punch system with Cutting Mat**

An easy, cost-effective manual punch system for precise sample disc removal from FTA cards. The cutting mat ensures clean sample cuts from FTA/FTA Elute Cards and extends the life of the cutting tip of punch.

Medium throughput/Semi-automated sample handling: **The BSD Puncher**

The BSD600 Plus is the third generation of BSD punchers and suitable for medium to higher punching throughput and more complicated test sequences. Multiple punching is assisted by the light targeting and pattern punching feature in the software. The instrument provides a two-plate-capacity with dual punch sizes and is compatible with 96 standard and deep-well plates or PCR tube racks.

High throughput/fully-automated sample handling: **STAR Q AS Instruments**

The STAR Q AS Instruments automate sample pre-treatment and STR assay setup from reference samples on swabs (STAR Q Swab AS) or collection cards (STAR Q Punch AS) such as database or paternity samples. The STAR Q Swab AS is designed to work with all commonly used swab types. The STAR Q Punch AS is designed for use with QIAcard FTA and EasiCollect Cards and Copan NUCLEIcard system collection cards. Both have pre-validated protocols for Investigator 24plex GO! Kit, and Investigator IDplex GO! Kit, and combines QIAGEN's expertise in performance and process safety with high-throughput liquid handling to enable processing more than 360 samples per day with no compromise in quality.

- Efficient and safe processing of epithelial and blood samples from swabs or cards for high-throughput database and reference sample laboratories
- Easy-to-use software for minimal training requirements
- Fast setup and implementation with pre-validated protocols for assay setup
- First-pass success with QIAGEN's Investigator STR GO! Kits



Figure 14. Reference sample processing. A. Unicore Punch system, B. BSD Puncher, C. The STAR Q Punch instrument.

QIAGEN Forensic DNA Grade quality

High-quality Investigator solutions

Trust in your results with QIAGEN Forensic Grade products

In criminal investigation, the introduction of foreign DNA to a crime scene sample, either at the scene itself or during laboratory analysis, can be devastating for the examination. As a manufacturer of consumables used to collect and analyze samples from crime scene or reference materials, QIAGEN has a broad range of quality measures in place to guarantee highest product quality and safety. Our Investigator branding and Forensic Grade labels (Figure 15) demonstrate compliance with industry-leading quality control systems, and exacting manufacturing standards which includes:

- ISO 9001:2008
- Production in clean-room compliant to ISO 14644 standard and EU guidelines on GMP for Medicinal Products for Human and Veterinary Applications
- Risk analysis of manufacturing processes for potential exogenous human DNA
- Cleaning and environmental monitoring procedures
- Automated manufacturing and EO treatment whenever feasible
- Testing for absence of human DNA post-production before batch release
- Contamination Exclusion Database service

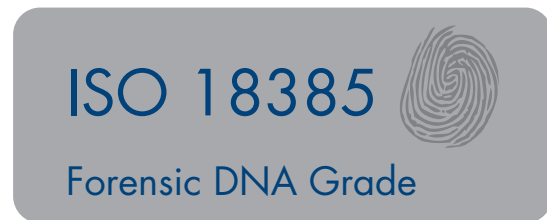


Figure 15. ISO 18385 Forensic DNA Grade. Investigator products that undergo an EO treatment are labeled accordingly.

As part of the stringent and process oriented quality management system, all Investigator kits are manufactured in ISO-certified facilities. This ensures that they comply with the applicable regulatory requirements. To further ensure consistent high quality, each kit lot is tested against pre-determined specifications and for absence of human DNA post production.

With these measures, QIAGEN's entire Investigator product portfolio and corresponding manufacturing sites are ISO18385 certified by external authorities and compliant with the ISO18385 forensic manufacturing standard to minimize the risk of human DNA contamination in products used to collect, store and analyze biological material for forensic purposes.

For more Forensic Grade quality, see www.qiagen.com/forensicgrade.

Ordering Information

Product	Contents	Cat. no.
Sample collection		
OmniSwab Sterile (100)	100 sterile collection swabs with ejectable brush-like head used for buccal and saliva samples	WB100035
EasiCollect Plus (50)	50 buccal sample collection devices: Includes a foam applicator for direct sample transfer to an integral QIAcard FTA Indicating.	WB120472
EasiCollect Buccal Collection Kit (50)	50 buccal sample collection kits: Includes EasiCollect (incl. barcode), return mailing envelop, multi-barrier pouch, nitrile gloves, tamper evident tape and desiccant	WB120237
QIAcard FTA Blood Collection Kit (50)	50 blood sample collection kits: Includes Indicating QIAcard FTA Micro (incl. barcode), disposable lancet, alcohol wipe, band aid, return mailing envelop, multi-barrier pouch, nitrile gloves, tamper evident tape and desiccant	WB120238
Uni-Core Punch 1.2 mm	Manual punch for precise sample disc removal from FTA cards	WB100028
BSD600 Ascent A2 (1.2mm + 3.0mm)	Semi-automated punch instrument, automatic punching of multiple disks from each sample collection card	WB120036
STAR Q Swab AS Instrument	Instrument with 1-year warranty on parts. For use with all commonly used swab types for human identity reference samples	9002652
STAR Q Punch AS Instrument	Instrument with 1-year warranty on parts. For use with QIAGEN EasiCollect cards, Bode Buccal Collectors and Copan NUCLEocard system collection cards	9002651
Pretreatment		
Investigator Lyse&Spin Basket Kit (50)*	50 pouches with 50 baskets and 100 collection tubes	19597
TissueLyser II	Bead mill, 100–120/220–240 V, 50/60 Hz; requires the TissueLyser Adapter Set 2 x 24 or TissueLyser Adapter Set 2 x 96 (available separately)	85300
Investigator Casework GO! Kit	Casework GO! Lysis Buffer, Proteinase K Solution and nuclease-free water	386546
DNA purification and assay setup		
QIAcube Connect	Instrument, connectivity package, 1-year warranty on parts and labor	Inquire
Starter Pack, QIAcube	Reagent bottle racks (3); 200 µl filter-tips (1024); 1000 µl filter-tips (1024); 30 ml reagent bottles (12); rotor adapters (240); rotor adapter holder	990395

* Larger kit sizes available; please inquire.

† Not available in all countries; please inquire.

Ordering Information

Product	Contents	Cat. no.
DNA purification and assay setup (cont)		
EZ1 Advanced XL	Robotic workstation for automated purification of nucleic acids from up to 14 samples using EZ1 Kits, 1-year warranty	9001492
EZ1 DNA Investigator Kit (48)	For 48 preps: Reagent Cartridges (DNA Investigator), Disposable Filter-Tips, Disposable Tip-Holders, Sample Tubes (2 ml), Elution Tubes (1.5 ml), Buffer G2, Proteinase K, Carrier RNA	952034
QIASymphony SP	QIASymphony sample prep module, 1-year warranty on parts and labor	9001297
QIASymphony AS	QIASymphony assay setup module, 1-year warranty on parts and labor	9001301
QIASymphony DNA Investigator Kit (192)	For 192 preps of 200 µl each from case-work and reference samples: Includes 2 re-agent cartridges and enzyme racks and accessories	931436
STAR Q SP/AS Instrument	Includes installation and training, 1-year warranty on parts and labor and 1-year maintenance	9002650
Investigator STAR Lyse&Prep Kit (400)	For 400 preps of 300 µl each from casework and reference samples: Buffer ATL, Buffer QSL3, Buffer QSW1, Buffer QSW2, Bead Suspension G, Buffer ATE, Proteinase K, Carrier RNA, Q-Card, Hand-book	931447
QIAgility System HEPA/UV (incl. PC)	Robotic workstation for automated PCR set-up (with UV light and HEPA filter); including notebook computer, QIAgility Software, installation and training, 1-year warranty on parts and labor	931436
Quantification		
Rotor-Gene Q 5plex HRM Platform	Real-time PCR cyclers and High Resolution Melt analyzer with 5 channels (green, yellow, orange, red, crimson) plus HRM channel, laptop computer, software, accessories, 1-year warranty on parts and labor, installation and training not included	9001532
Investigator Quantiplex Pro Kit (200)	For use on Applied Biosystems 7500 Real-Time Systems: Reaction Mix, Primer Mix, Control DNA M1, QuantiTect Nucleic Acid	387216
Investigator Quantiplex Pro RGQ Kit (200)	For use on QIAGEN RotorGene Q Real-Time Systems: Reaction Mix, Primer Mix, Control DNA M1, QuantiTect Nucleic Acid	387316

* Larger kit sizes available; please inquire.

† Not available in all countries; please inquire.

Ordering Information

Product	Contents	Cat. no.
Quantification (cont)		
Investigator Quantiplex Pro Calibration Kit	For use on Applied Biosystems 7500 Real-Time Systems: Calibration Standard FAM (60 µl), Calibration Standard JOE (60 µl), Calibration Standard ATTO 550 (60 µl), Calibration Standard ROX (60 µl), Calibration Standard ATTO 647N (60 µl), Quanti-plex Pro Calibration Buffer (30 ml)	387416
Investigator Human Identification PCR Instruments and Kits		
QIAmplifier 96 (230 V)	Fast cycling, high performance thermocycler with a 96-well block and a color touchscreen interface for end-point PCR requirements	9002991
Investigator 24plex QS Kit (100)*	Primer Mix, Fast Reaction Mix 2.0, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	382415
Investigator 24plex GO! Kit (200)*	Primer Mix, Fast Reaction Mix 2.0, Control DNA, Allelic Ladder, DNA Size Standard	382426
Investigator 26plex QS Kit (100)*	Primer Mix, Fast Reaction Mix 3.0, Control DNA, Allelic Ladder, Nuclease-Free Water	382615
Investigator ESSplex SE QS Kit (100)*	Primer Mix, Fast Reaction Mix 2.0, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	381575
Investigator IDplex Plus (100)*	Primer Mix, Fast Reaction Mix, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	381625
Investigator IDplex GO! (200)*	Primer Mix, Fast Reaction Mix, Control DNA, Allelic Ladder, DNA Size Standard	381636
Investigator Triplex DSF Kit (400)†	Primer Mix, Reaction Mix, DNA Polymerase, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	380327
Investigator Triplex AFS QS Kit (400)†	Primer Mix, Reaction Mix, DNA Polymerase, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	380317
Investigator HDplex Kit (100)	Primer Mix, Reaction Mix, DNA Polymerase, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	381215
Investigator Argus X-12 QS Kit (25)*	Primer Mix, Fast Reaction Mix 2.0, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	383223
Investigator Argus Y-28 QS Kit (100)*	Primer Mix, Fast Reaction Mix 3.0, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-free Water	383625
Investigator DIPplex Kit (100)	Primer Mix, Reaction Mix, DNA Polymerase, Control DNA, Allelic Ladder, DNA Size Standard, Nuclease-Free Water	384015

* Larger kit sizes available; please inquire.

† Not available in all countries; please inquire.

For up-to-date licensing information and product-specific disclaimers, see the respective QIAGEN kit handbook or user manual. QIAGEN kit handbooks and user manuals are available at www.qiagen.com or can be requested from QIAGEN Technical Services or your local distributor.

Investigator Kits meet ISO18385 requirements.

Learn more about our human identity and forensic testing solutions for confidence in your evidence at www.qiagen.com/human-id-solutions

Trademarks: QIAGEN®, Sample to Insight®, QIAamp®, QIAcube®, QIAgility®, QIASymphony®, EZ1®, Investigator®, QuantiPlex®, RotorDisc®, Rotor-Gene® (QIAGEN Group); Applied Biosystems®, FTA® (Whatman Group); GeneAmp® (Life Technologies Corporation); Hi-Di™ (Applera Corporation and subsidiaries). Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are not to be considered unprotected by law.

1122077 07/20 PROM-4628-004 © 2018–2020 QIAGEN, all rights reserved.

Ordering www.qiagen.com/shop | Technical Support support.qiagen.com | Website www.qiagen.com