

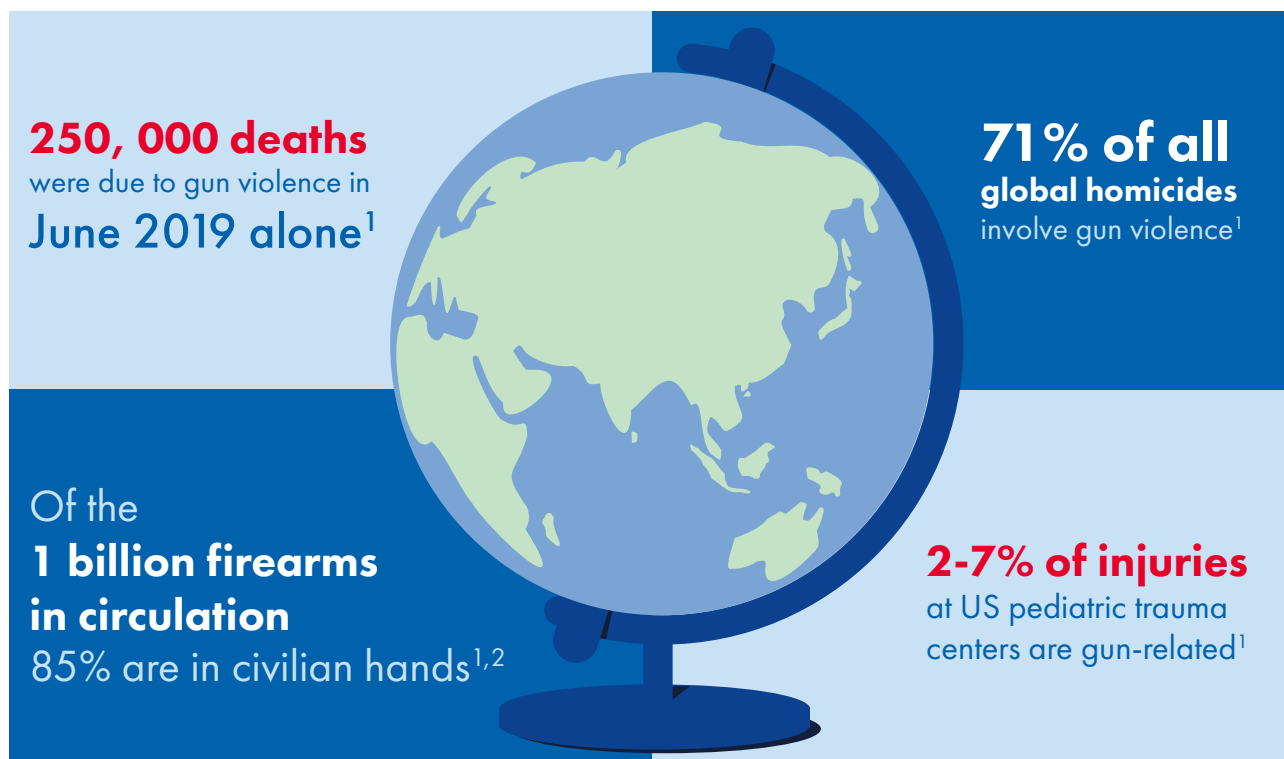
Maximizing DNA recovery for every case

EZ2® Connect Fx optimizes DNA yield from difficult firearm and cartridge casings.



EZ2 Connect Fx Firearm and Cartridge Casings Protocol

Fired cartridge casings (FCC) and firearms (FA) are some of the most challenging samples forensic laboratories receive. DNA analysis can be difficult due to the low levels of DNA typically left by those handling the firearm or the fired cartridge and extreme heat to which fired cartridges are exposed. For many labs, the high number of firearms-related submissions and the challenging nature of these samples leads to large backlogs and low success rates.



Do you want to maximize recovery of PCR-ready DNA from these samples while maintaining your lab throughput? Implement the EZ2 Connect Fx Firearm and Cartridge Casing Protocol to streamline your sample processing, ensuring optimal DNA analysis and successful identifications for more cases. The EZ2 Connect Fx is your new partner for firearms casework.

- Enable batch processing up to 24 samples in one run.
- Combine 2 mL lysate from two casings in a single sample to maximize DNA recovery.
- Use the same instrument for your regular casework samples. Simply use a different protocol for FCCs.

1. Amnesty International. (n.d.). Gun violence. Retrieved from <https://www.amnesty.org/en/what-we-do/arms-control/gun-violence/#:~:text=Up%20to%2071%25%20of%20all,also%20be%20perpetrated%20at%20gunpoint>

2. Small Arms Survey. (n.d.). Global firearms holdings. Retrieved from <https://www.smallarmssurvey.org/database/global-firearms-holdings>

Maximize recovery, maintain efficiency

The results of traditional FCC protocols tend to be highly variable in terms of DNA yield. The EZ2 Connect Fx FCC Protocol increases the amount of extracted DNA with lower concentration of PCR inhibitors by processing lysates from two FCCs instead of one in currently established methods. The method also significantly streamlines the processing of fired cartridge casings and firearms, enabling a higher throughput workflow and resolution of more cases.

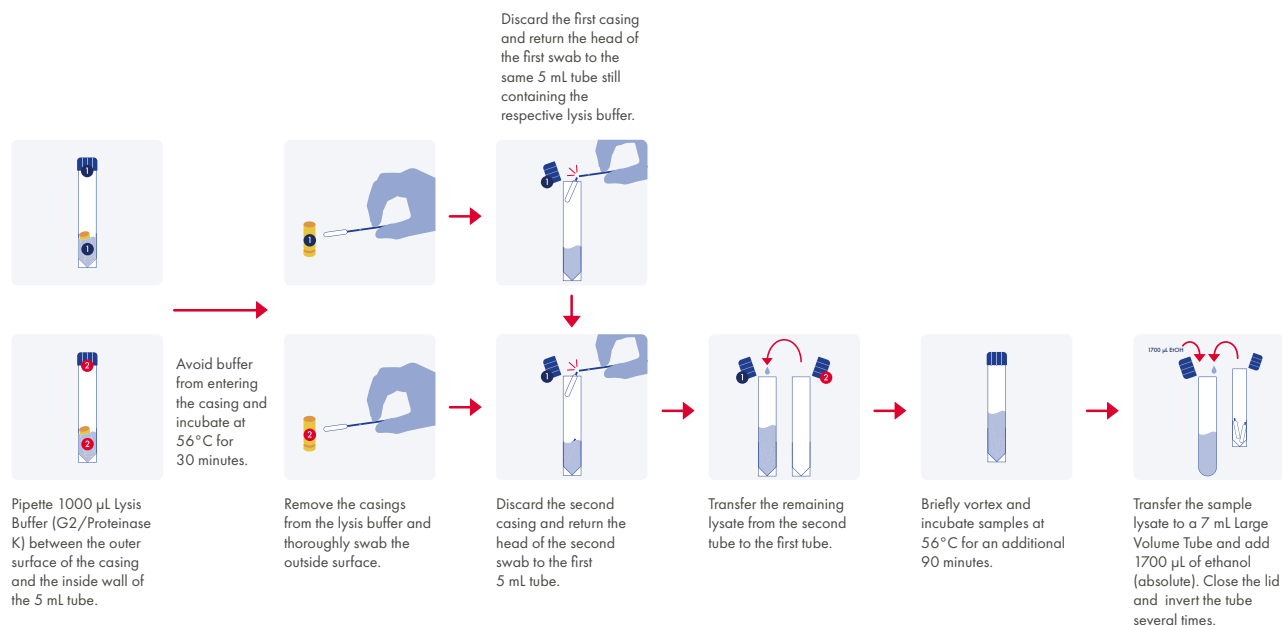


Figure 1
Complete workflow for processing Fired Cartridge Casings (FCCs).

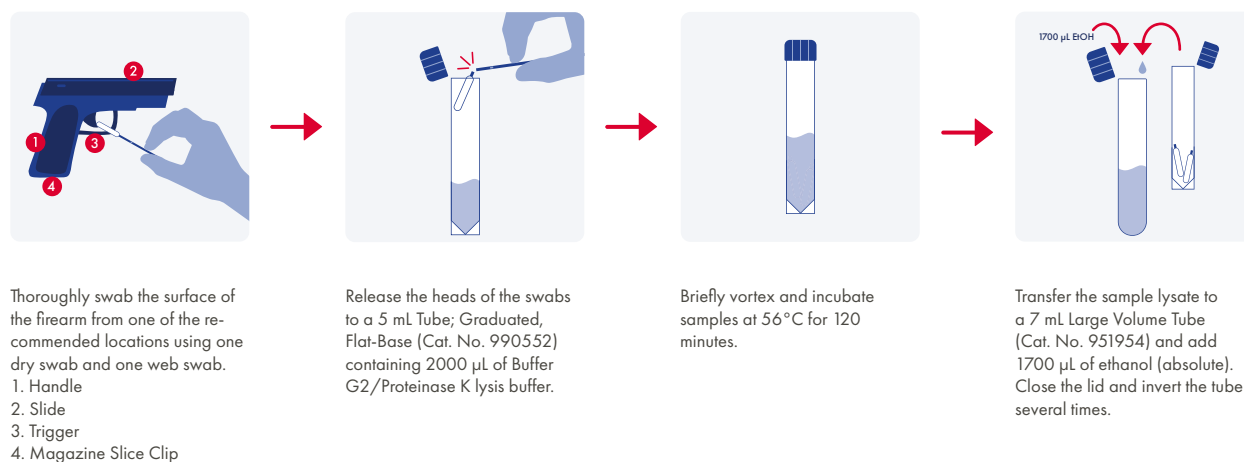


Figure 2
Complete workflow for processing firearms.

Obtain more amplifiable DNA

The EZ2 Connect Fx FCC protocol is able to recover more low molecular weight DNA than the standard method (see Figure 3) in samples with degraded DNA, improving the chance of generating a full profile.

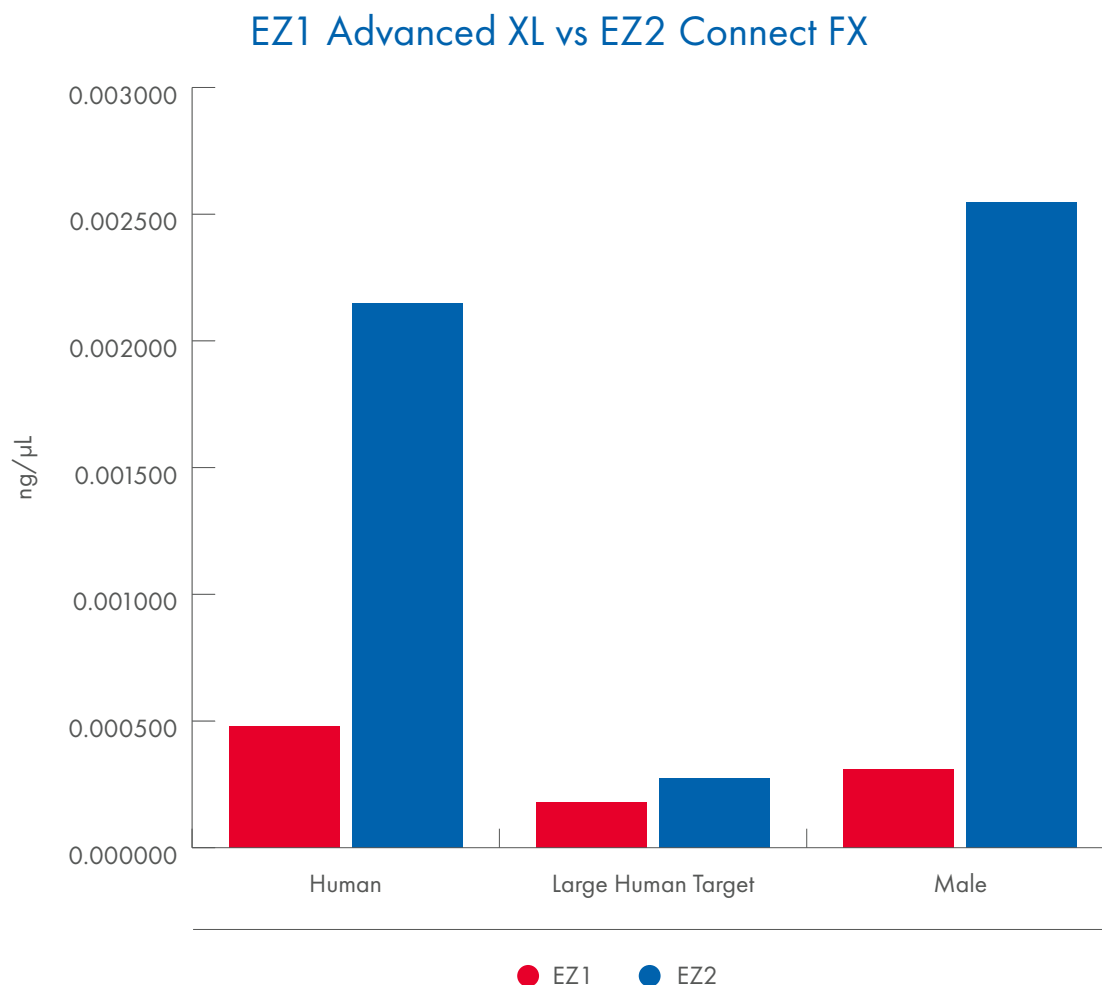


Figure 3
DNA yield obtained from EZ1 and modified EZ2 methods.

In a study by The Center for Forensic Science Research & Education, PA, USA, in partnership with Abington Township Police Department, 24 firearm samples and 60 bullets were handled and fired. FCC samples had an average total DNA of 92.84 pg, and an average DNA range between 33.17–217.7 pg. The firearm swabs had an average total DNA of 752.7 pg and an average range of 178.1–1,908 pg. Each FA swab location (one wet and one dry) was processed separately: trigger, handle, slide and magazine clip. DNA degradation was observed, as expected, in both FCC and FA samples, but sufficient amounts of DNA were recovered for DNA results and downstream analysis (Figures 4 and 5). Quantification was done using Investigator Quantiplex Pro RGQ Kit.

Quantiplex Pro RGQ Results - FCCs (Human Target)

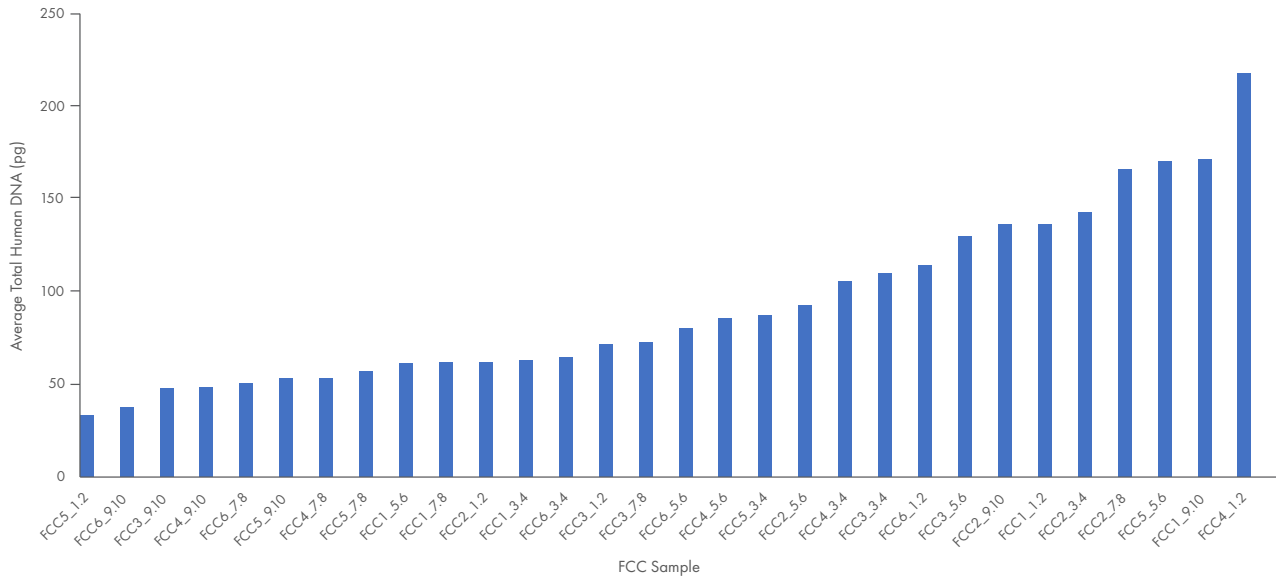


Figure 4

Average total DNA yield in FCC samples quantified using Investigator Quantiplex Pro RGQ Kit.

Quantiplex Pro RGQ Results - Firearm Swabs (Human Target)

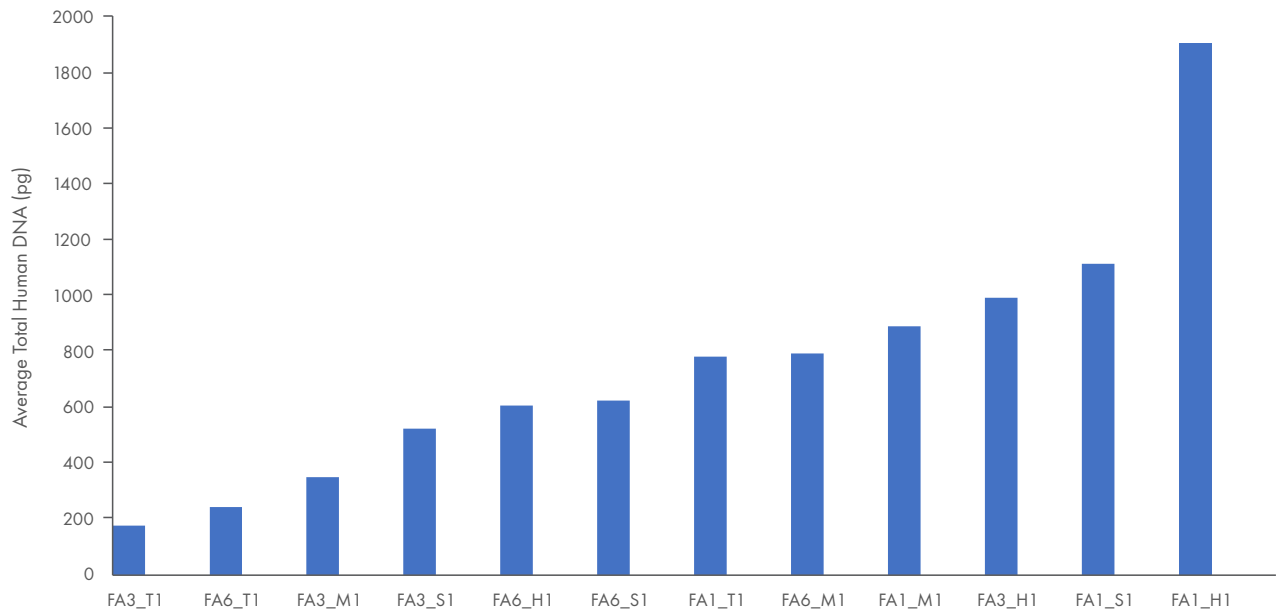


Figure 5

Average total DNA yield in FA quantified using Investigator Quantiplex Pro RGQ Kit.

STR analysis using Investigator 24plex QS demonstrated strong DNA profiles (many of which were mixed, which is not unusual for firearms and fired cartridges) for all samples (example DNA profile shown), indicating that the total DNA obtained was adequate for further downstream analysis, despite the DNA degradation commonly observed in FCC samples (Figure 6).

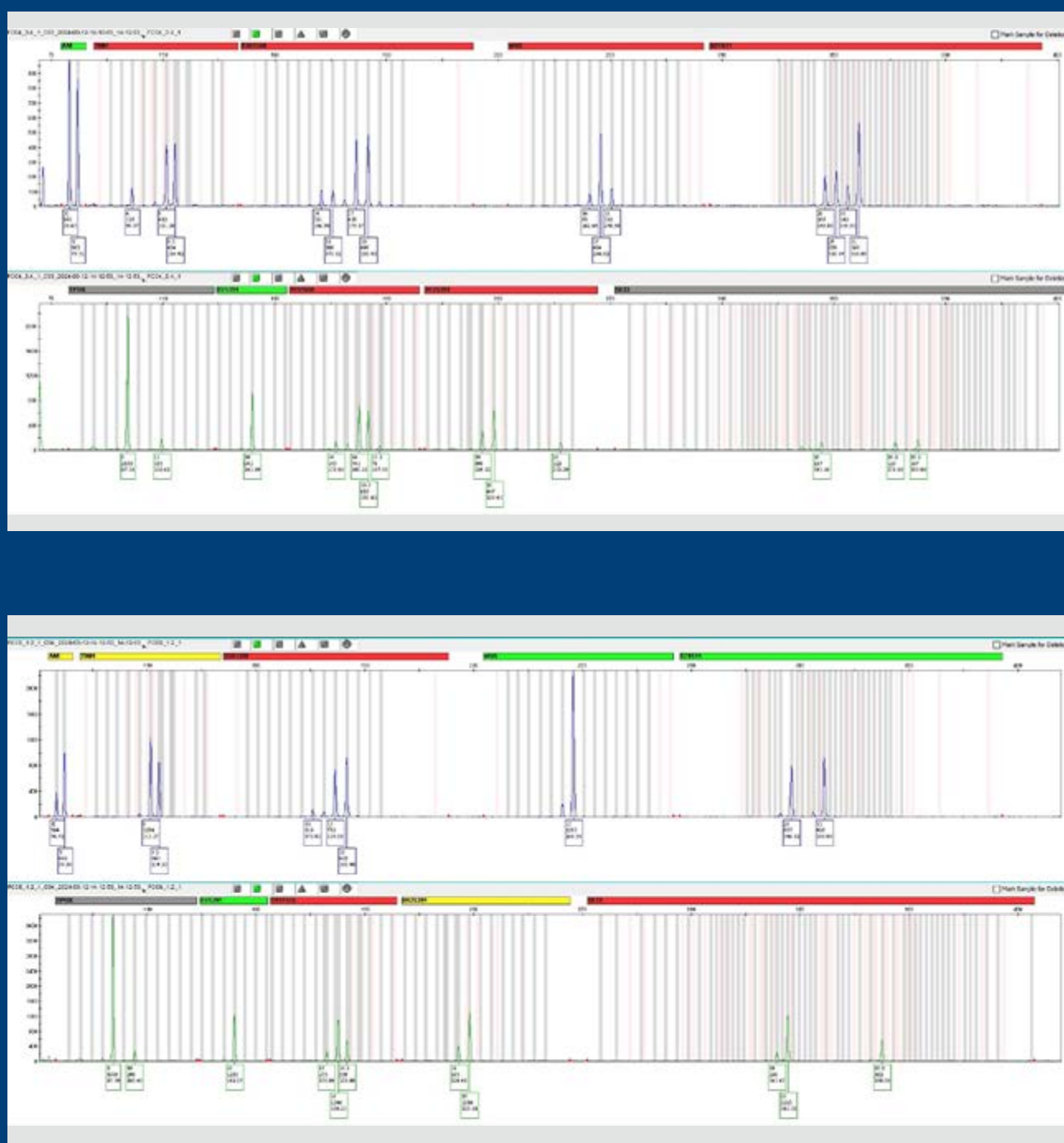


Figure 6

Electropherograms of 69 pg Sample FCC4_3.4_1 and 74 pg Sample FCC6_1.2_1 analyzed with the Investigator 24plex QS Kit. Full profiles were obtained from these challenging samples. Blue and Green dye channels were shown only for illustrative purpose.

EZ2 Connect Fx: A single platform for all casework

Handle any regular casework or FCC samples with a simple modification in the protocol. The EZ2 Connect Fx allows for the processing of 24 samples per batch using pre-filled cartridges and combining two samples for the same case for higher throughput and DNA recovery. The large lysate volume also enables more effective DNA purification with lower concentration of PCR inhibitors. With ISO 18385 standard consumables and validated protocols, you can expect higher quality and accuracy in your data.

Dedicated protocols ensure

- More samples processed in one go and limited backlogs
- Higher success rates in DNA profiling and human identification
- More accurate quantification
- Increased confidence in your case samples

Ordering Information

Product	Contents	Cat. no.
EZ1&2 DNA Investigator Kit	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
EZ2 Connect Fx	Benchtop instrument for automated isolation of nucleic acids from up to 24 samples in parallel, using sealed prefilled cartridges; includes 2x EZ2 Connect racks (EZ2 Connect Fx Tip Rack and the EZ2 Connect Fx Tip Rack – Flip Cap Tubes), EZ2 Connect Fx Cartridge Rack and 1-year warranty on parts and labor.	9003220
4N6FLOQSwabs	For 100 samples	WB100101
5 mL Tube; Graduated, Flat-base	Bag of 50; suitable for holding diluent and master mix on the instrument worktable; graduated, flat-base design with a tapered internal profile for minimum dead volume; screw cap included	990552
7 mL Large Volume Tube	Two bags of 24 large-volume tubes (7 mL)	951956
EZ2 Connect Tip Rack, Large Volume	Rack for use with EZ2 Connect; for Large-Volume Tubes	9027011
Investigator Quantiplex Pro RGQ Kit (200)	For use on QIAGEN RotorGene Q Real-Time Systems: Quantiplex Pro RGQ Reaction Mix, Quantiplex Pro RGQ Primer Mix, Male Control DNA M1, QuantiTect Nucleic Acid Dilution Buffer	387316
Investigator 24plex QS Kit (100)	Primer Mix, Fast Reaction Mix including Taq DNA Polymerase, Control DNA, allelic ladder 24plex, DNA size standard 24plex (BTO) and nuclease-free water	382415

The Fire Cartridge Protocol is part of the latest EZ2 Connect FX Software release. Contact us for more information about this update. You can also access the protocol, together with the EZ2 Connect FX Software 1.2 update at www.qiagen.com/EZ2ConnectFxSoftware and www.qiagen.com/FCCProtocol.

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