

Development of basic tools to predict appearance, ancestry and age using massively parallel sequencing (VISAGE)

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Unknown perpetrators of crime cannot be identified with the current forensic use of DNA. The European Horizon 2020 Project VISAGE (Visual Attributes Through Genomics) aims to overcome this limitation by developing, validating, and implementing a set of molecular genetic tools for predicting appearance, age, and ancestry from unknown trace donors directly from their traces left at crime scenes. The tools are based on massively parallel sequencing (MPS) for analyzing a large number of DNA predictors established within the project, as well as an integrated statistical framework with prototype software for translating the generated genotype data into statistical probabilities on appearance, age and ancestry. Ethical, societal, and legal dimensions of Forensic DNA Phenotyping as identified within the project are considered by applying a privacy-by-design strategy. The interdisciplinary VISAGE Consortium includes European (and global) scientific leaders in Forensic DNA Phenotyping (FDP) as well as in forensic MPS, leading European forensic DNA service providers, and one of the leading social scientists in the field of forensic DNA analysis.

The molecular genetic tools are being developed in a stepwise fashion. In a first set of collaborative experiments so-called basic tools have been tested within the VISAGE partner laboratories. These basic tools included published DNA predictors for appearance, ancestry and age that were assembled in MPS multiplex-PCR format and optimized having the forensic genetic workflow in mind. The basic tools were devised to allow all 13 VISAGE partner laboratories gain experience with predictive DNA analysis in MPS format. In 2019 advanced tools will be developed including additional and novel DNA predictors that build on experience gained with the basic tool. With the enhanced tool VISAGE aims at improving skill and knowledge in practical and academic European forensic laboratories and drive the development of suitable assays for Forensic DNA Phenotyping.

The presentation leads through the developmental stages of the basic tools and provides preliminary experimental results.