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Forensic age prediction in bone samples

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Forensic age prediction provides key information to be used as a tool for DNA intelligence in order to guide police investigations (if absence of suspects or DNA databases entries occurs). Recent discoveries of age-correlated epigenetic signatures such as DNA methylation on CpG sites through the genome were used to design age prediction models to be applied to forensic biological stains. Recently, our research group developed a forensic age prediction system based on seven DNA methylation biomarkers (CpG sites) detected under EpiTYPER technology. The prediction model was constructed using 725 DNA blood samples from European population and was based on quantile regression analysis, providing a median absolute prediction error of ± 3.07 years. The prediction system was already implemented in Snipper Forensic Classifier with open access to customers. The simultaneous calculation of the corresponding age prediction intervals besides the estimated age becomes a great advantage, allowing more accurate predictions in certain sample groups as young subjects. In the present work, further assessment of our model was carried out in order to be reduced and adapted to be applied to data derived from the Illumina HumanMethylation450 Bead-Chip. Moreover, additional forensic tissues such as bone samples were subsequently evaluated. Prediction accuracies are outlined and discussed.

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Biometrics solves the crimes: Science fiction or science fact?

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Biometric is any measurable, robust, distinctive, physical or behavioral characteristic of an individual that can be used to identify or verify the identity. There are two types of biometrics which fall in category of science facts that have many applications in forensic practice, they are: Physiological biometrics which include: Fingerprint, facial recognition, hand geometry, iris pattern and retinal scan and behavioral biometrics include: Voice recognition, signature verification and keystroke dynamics. Another types of biometrics which fall in category of science fiction as brain finger printing which is a scientific technique to determine whether or not specific information is stored in an individual's brain so as to identify the perpetrator, brain fingerprinting is a computer-based test that is designed to discover, document and provide evidence of guilty knowledge regarding crimes. Electrical brain responses can be a reliable indicator of information-processing activities in the brain. Event-related potentials (ERPs) are specific, simple, positive and negative voltage changes that take place during the information processing of a particular stimulus. These changes occur only when a person is selectively attentive to a stimulus, and they are elicited only in circumstances in which he/she is required to distinguish one stimulus (the target) from a group of other stimuli (the non-targets). P300 is a specific ERP component that has the potential for detecting concealed information in the brain. This testing determines objectively whether or not certain information is stored in the brain, regardless of any false or truthful statements the subject may or may not make about it. Brain finger printing has many applications in National security (counter terrorism), criminal justice system, medical diagnosis and others.

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