THE APPLICATION STUDY OF DNA FACIAL PREDICATION IN FORENSIC SCIENCE

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There will always be criminal cases, where the evidence DNA sample will not match either a suspect's DNA file, or any in a criminal DNA database. In the absence of mass DNA screening and family searching, there is an option to avoid or solve the "cold cases": predict human externally visible characters (EVCs) of an unknown person, and publish police investigations with DNA-based mugshots. In recent years, the potential of constructing useful DNA-based facial composites is of great interests in forensic studies. Facial morphology is a combination of many complex traits and highly heritable, much of the total variation in facial features is genetically mediated. At the early-stage of researches in this area, knowledge of genetic variation on facial morphology has mainly arisen from studies of genetic abnormality, such as non-syndromic cleft lip with or without cleft palate (NSCL/P), recent advances have produced novel methods for fully automatic 3D facial image mapping and crude models of facial structure constructed by SNPs variants analysis. In our previously studies, we selected 350 facial morphology related SNPs via genome-wide association studies (GWAS) in 700 Uygur and established a face prediction model (FPM) of East Asian population. Using whole-genome sequencing and FPM, we took the following steps to model 3D facial morphology of 18 Uygur and 6 Chinese Han in this paper: (1) extracted the phenotypes of 350 SNPs from whole genome sequencing data; (2) modeled and analyzed the 3D predict faces of those 24 individuals; (3) evaluated the similarity between genetic predict facial morphology and real faces; (4) evaluated the accuracy of this method; (5) summarized problems of current FPM and planned to improve it in future works; (6) examined the correct recognition rate of 3D predict faces in participants. The FPM will expectedly to descript an unknown person's appearances from DNA and is likely to improve forensic case work/ police investigations in future.