

SHORT TANDEM REPEAT TYPING FOR THE IDENTIFICATION OF SKELETAL REMAINS FROM KOREAN WAR VICTIMS

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Objective: To offer a unique perspective on the design, logistics, and operation of a new forensic DNA casework laboratory. The intricate process flow of conception to realization will be shared with attendees along with unforeseen struggles. The information presented will help DNA analysts, supervisors, and management understand each other's roles in the larger picture and provide helpful suggestions to laboratories seeking to improve efficiency and quality.

In order to identify the remains of service members missing in the Korean War (1950-1953), a population-based, DNA-led identification has been performed since 2000 on the initiative of Korean Ministry of National Defense (MND) Agency for Killed in Action Recovery and Identification (MAKRI). Based on circumstantial evidences and/or mitochondrial DNA sequencing results which were matched with results from DNA analysis of reference samples collected from the biological relatives of victims, 21 skeletal remains were selected for further analysis to confirm the alleged relationship using short tandem repeat (STR) typing. DNA was extracted using a large-scale silica-based extraction method combined with complete demineralization in order to maximize the DNA recovery from old skeletal remains. Three commercial STR systems (AmpFISTR® Identifiler®, AmpFISTR® MiniFiler™ and AmpFISTR® Yfiler™) and two in-house STR systems (miniplex NC01 plus and Y-miniplex plus, detailed protocols are available at <http://forensic.yonsei.ac.kr>) were used for DNA amplification. By using reduced-size amplicons of AmpFISTR® MiniFiler™ and in-house miniplex NC01 plus as a complement to the AmpFISTR® Identifiler®, all 21 skeletal remain samples produced successful STR typing results with the mean success rate of 95.8% (17.2 from 18 loci). Likelihood ratios for the alleged relationship were also obtained to be over 100 in almost all cases except for 3. In case of having paternal male relatives, Y-STR typing was carried out, and the results confirmed the alleged relationship by increasing the likelihood ratio. Our analyses emphasize the value of mini- and Y-STR systems as well as efficient DNA extraction method in the success and efficiency of forensic DNA testing for the identification of old skeletal remains.