Department of Forensic Medicine

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General Summary

Our main research projects in 2016 have mainly focused on forensic pathology, DNA analysis, and forensic toxicology as has happened in the past. Much of the research was based on forensic practice. The details of our research are described below.

Research Activities

Forensic Pathology

1. Values of Acrolein and several markers, of which patients died in the bath tabs

In Japan, many people die in the bath tabs, and it is said that transient ischemic attack (TIA) is contributory to death there. We determined the values of Protein conjugated acrolein (PC-Acro), polyamine oxidase (SMO, AcPAO etc.) and several markers, of 10 cases died in the bath tabs and 10 control cases, in our forensic autopsy. In the results of analysis, we are not able to get significantly different between groups. It might be because TIA doesn't play a part in death in the bath tabs, number of cases are too low, and the value fluctuate due to postmortem change. Therefore we need to increase number of cases and study the intergradation of each value due to the time since death.

DNA analysis

1. Identification of war-dead remains with DNA analysis

We performed identification of war-dead remains that recovered and repatriated from the former Soviet Union and southern area by means of DNA analysis as part of the war-dead remains return project of the Ministry of Health, Labor and Welfare. For genetic markers we used single nucleotide polymorphisms of hypervariable region of mitochondrial DNA and short tandem repeats of nuclear DNA.

2. The detection and analysis of X chromosome Short tandem repeats (X-STR) locus

The analysis of STRs located on the X chromosome is known to be useful in kinship testing.

We performed detection and population genetic study of a novel tetranucleotide X-STR locus in the present study. We analyzed sequence structure of novel X-STR, appearance frequency of Alleles and forensic statistics data. And we registered these data with the International Nucleotide Sequence Databases (ISDN). We are going to investigate relevance with other X-STR by linkage analysis.

Forensic toxicology

1. Medicines and poisonous substances (abuse drugs, alcohol, carbon monoxide, cyanide, and agricultural chemicals) suspected to have caused deaths were quantitatively analyzed

with gas chromatography, gas chromatography/mass spectrometry, liquid chromatography-tandem mass spectrometry, and spectrum photometry in tissue specimens obtained at autopsy.
In addition, for the purpose of quality control of drug analysis, we conducted a blind test twice a year in collaboration with other universities.
2. For 158 autopsy cases, drug screening analysis was performed. As a result, there were three cases in which caffeine corresponding to a lethal area was detected. In addition, there were 14 cases where caffeine above the poisoning region was detected. Though one of them was drug addiction due to multiple drug administration, evidence of ingestion of drugs, caffeine tablets and a large amount of energy drinks was not observed in the other 13 cases. From the situation and the environment of the deceased, it is presumed that it is due to intake of luxury goods on a daily basis, and none caffeine directly linked to the cause of death.
3. Trace analysis of the odor in the dissected room was performed using Two-Dimensional Gas Chromatography with Time-of-Flight Mass Spectrometer.

Radiocarbon analysis
1. Establishment of date of birth
We studied the estimation of date of birth from carbon-14 isolated from a tooth. To apply this method to the forensic practice, we have examined the amount of minimum enamel and dentin required for the analysis.

Publications

Nishi T, Nakamura T, Honda K. Detection of a novel X-chromosomal short tandem repeat marker in Xq28 in four ethnic groups. *Leg Med (Tokyo).* 2016; **19:** 43-6.
Irii T, Maebashi K, Fukui K, Sohma R, Matsumoto S, Takasu S, Iwadate K. Development of a dual test procedure for DNA typing and methamphetamine detection using a trace amount of stimulant-containing blood. *Leg Med (Tokyo).* 2016; **20:** 53-60.