

E52 Can Body Cooling Animal Models Help Solve the Jeju Island Cold Case?

*Dae-Kyoon Park, MD, PhD**, Soonchunhyang University, Cheonan-si, Seoul 31151, SOUTH KOREA; *Duk-Soo Kim, PhD*, Soonchunhyang University, Cheonan-si, YT Seoul 331946 Korea, SOUTH KOREA; *Cheolho Hyun*, Jeonju, Jeonbuk, SOUTH KOREA; *Taehwa Song*, Korean Police Investigation Academy, Asan, SOUTH KOREA; *Kyeongyang Sim, Suweon*, Gyeonggido, SOUTH KOREA; *Na Jin Kim*, Busan, SOUTH KOREA

Learning Overview: After attending this presentation, attendees will understand the application of body cooling animal models to solving cold cases in that the rectal temperature could be influenced by the ambient temperature and the surface temperature where the body was laid.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating more reliable time-since-death estimation in the early stages of decomposition by employing animal models.

When a body is found at the early stages of decomposition, crime scene investigators estimate time since death using the Henssge nomogram that requires rectal and ambient temperature. However, the application of the Henssge nomogram is problematic in Korea because there may be interferences with body heat radiation during algor mortis. A previous study suggested that the temperature of the substrate has a greater effect on the postmortem cooling of the body than the ambient temperature.¹ For this experiment, key words in cold case files such as “rectal temperature” or “time since death” were reviewed. The Jeju Island homicide case involves a body that was found in a drainage area at 1:30 p.m., on February 8, 2009, seven days after the victim was reported missing. Six hours later, the body was moved to the road beside the scene, and the rectal and ambient temperatures were 13°C, and 9.2°C, respectively. According to the autopsy report, internal organs were fresh, and stomach contents were present. Based on these observations, the postmortem interval was estimated as within 24 hours from the time the body was found. The prime suspect was released from the police investigation as the man had an alibi during that postmortem interval. The purpose of this study is to reconstruct the Jeju Island crime scene and to reevaluate the postmortem interval by employing animal models.

The study was approved by the Korean Police Investigation Academy Institutional Animal Care and Use Committee (KPIA-18—01). Four pig (*Sus scrofa* L.) and three beagle (*Canis familiaris* L.) carcasses were placed at the scene where the body was found and monitored for eight days by Closed-Circuit Television (CCTV), from January 29 to March 2. Six temperature probes were placed: inside the rectum; on the body surface (skin); inside the clothing; on the surface of the clothing; in between the body surface and the surface of the drainage; and inside the drainage. Temperatures were recorded every ten minutes with a data logger system, and the WatchDog® 2000 mini station was placed next to the carcasses to record ambient temperature.

The mean temperature inside the drainage area was higher (0.93°C to 3.13°C) than the mean ambient temperature during the daytime. Because the drainage was exposed to sunlight from 9:00 a.m. to 4:00 p.m., the temperature inside the drainage might be affected by solar radiation. The rectal temperature reached that of the ambient temperature in at least 50 hours in pigs and 28 hours in beagles. The rectal temperature fluctuated thereafter; as the temperature inside the drainage rose, the rectal temperature rose four to six hours after, and when the temperature inside the drainage fell, the rectal temperature fell six to eight hours after. Therefore, the Henssge nomogram may have been an unreliable method for estimating postmortem interval in the Jeju Island homicide case.

The present study demonstrates that the postmortem interval in the Jeju Island case is greater than 24 hours because the victim’s rectal temperature was possibly affected by the temperature inside the drainage. Furthermore, the victim was found seven days after being reported missing. After reviewing the original autopsy report and applying the results of this study, it was estimated that the postmortem interval is 28 to 50 hours from the day the victim was reported missing and not from time when the body was found. It could also be suggested that the Jeju Island case needs to be reinvestigated. The results of this study on postmortem cooling of animal models has a potential application in unsolved cold cases in Korea.

Reference(s):

1. Park D.K. et. al. Estimation of Time Since Death Using Body Cooling Models of Pigs: A Pilot Study. *Proceedings of the American Academy of Forensic Sciences*, 69th Annual Scientific Meeting, New Orleans, LA. 2017. E41.

Postmortem Interval, Henssge Nomogram, Rectal Temperature