A50 The Effects of Chemotherapy and/or Radiotherapy Treatment on Decomposition

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Learning Overview: After attending this presentation, attendees will better understand how chemotherapy and/or radiotherapy affect the rate of decomposition in human remains in an outdoor setting.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by adding to the ongoing research being conducted involving variables that can affect human decomposition.

Understanding how chemotherapy and/or radiotherapy affects the rate of decay is important in a forensic setting. Individuals who died while undergoing chemotherapy or radiotherapy have the potential to decompose at a slower rate, complicating the estimation of the postmortem interval in criminal and civil cases. There are also instances in which taphonomic research facilities receive donated individuals that either died while undergoing chemotherapy or had previously stopped chemotherapy treatment.

Chemotherapy and radiotherapy are both common practices used to fight cancer in individuals. While chemotherapy uses chemical substances to treat the disease, radiotherapy is a more localized attempt to fight the disease with forms of radiation. While the chemicals used during chemotherapy have the potential to slow the rate of decay, the half-life of the drugs used in chemotherapy can be as little as six hours.[1] The purpose of this study is to examine the difference in decomposition between individuals who had undergone chemotherapy or radiation at or near the time of death and individuals who had never undergone chemotherapy or radiation. Currently, there have been no studies that have used whole body donations in an outdoor setting to examine differences in decomposition between individuals who had undergone chemotherapy or radiation at or near the time of death and individuals who had never undergone chemotherapy or radiation.

For this study, a total of ten human remains that had been left to decompose in an outdoor setting at the Forensic Anthropology Center at Texas State were used. Five of the donations had undergone chemotherapy or radiation at or near the time of death and were pair matched to remains that had never had chemotherapy treatment using body size and season of placement. All remains were placed unclothed and on the ground surface under a wire cage to prevent scavenging. A Total Body Score (TBS) was calculated for each subject at approximately 100, 300, and 500 Accumulated Degree Days (ADD).[2]

An F-Test was conducted to explore the homogeneity of variance between groups. Results for 100, 300, and 500 ADD indicated there was a statistical difference in variance of TBS between groups ($F(1, 18)=0.314$, $p=0.144$; $F(1, 18)=0.358$, $p=0.172$; $F(1, 18)=0.685$, $p=0.362$). A two-tailed *t*-test assuming unequal variance was run to test for significance in 100, 300, and 500 ADD. The P value states that there is no significant difference between groups at 100, 300, and 500 ADD ($p=0.596$; $p=0.285$; $p=0.346$).

This research fails to reject the null hypothesis, showing there is no significant difference in rate of decomposition between individuals that had undergone chemotherapy or radiation at or near the time of death and individuals that had never undergone chemotherapy or radiation.

Reference(s):

1. Wasil T., Lichtman S.M. Clinical Pharmacology Issues Relevant to the Dosing and Toxicity of Chemotherapy Drugs in the Elderly. *The Oncologist*. 2005; 10:602-12.
2. Megyesi M.S., Nawrocki S.P., Haskell N.H. Using Accumulated Degree Days to Estimate the Postmortem Interval From Decomposed Human Remains. *J Forensic Sci*. 2005;50(3):618-26.

Decomposition, Chemotherapy, Total Body Score