# Willed-Body Safety Initiative: Monitoring Bacterial Presence in Sepsis Cases

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## Abstract

The Willed Body Program at the Institute of Anatomical Sciences at TTUHSC accepts donated bodies for educational and surgical training purposes. Documentation of "sepsis" in a donor's medical record leads to the rejection of 12-20 specimens per year. This study aims to show that sepsis should not be a criterion to reject donated bodies, as the embalming process inactivates or removes infectious organisms. Samples from 28 willed bodies were collected pre- and post-embalming. Samples were incubated and monitored for bacterial or fungal growth, and predominant organisms were identified. Samples pre-embalming were typically positive for growth of normal human flora where growth was largely absent from embalmed samples.

## Introduction

- Medical students, practicing surgeons, researchers, and other healthcare professionals utilize willed bodies to further their understanding, practice surgical techniques, and develop new procedures and treatments. Donors are known as a healthcare professional's "first patient."
- Donor medical records with documentation of "sepsis" lead to the rejection of 12-20 specimens per year, but if the embalming process inactivates or removes infectious organisms, sepsis should not be a criterion for rejection.



*Image 1:The The state-of-the-art Anatomy lab at TTUHSC Institute of Anatomical Sciences, featuring 56 dissection station, across over 6,600 sq ft..*
*(Image courtesy of Dr. Kerry Gilbert)*

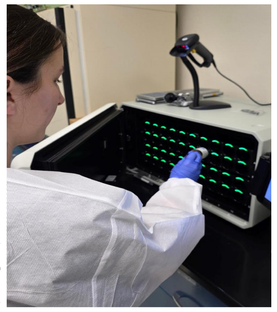
## Methods

- "Pre-embalming" and "Post-embalming" body fluid samples were collected from 28 willed bodies, then incubated in aerobic and anaerobic bottles in the BD Bactec® Blood Culture System.
- Samples were taken from both septic and non-septic bodies provided by the Institute of Anatomical Sciences. Researchers were not aware of their septic status at any point.
- After incubation, bottles with growth were cultured on appropriate nutrient media
- Bacterial growth was identified using the BioMérieux's® API manual identification system strip

*(Image 2)*




*(Image 4)*






*(Image 3)*

*Image 2: BD Bactec® aerobic (left) and anaerobic (right) blood culture bottles.*
*Image 3: BioMérieux's® API manual identification system strip, innoculated with aerobic pre sample, Identifcation: Staphylococcus aureus.*
*Image 4: Research assistant loading a blood culture bottle onto BD Bactec® continuous monitoring incubation system.*

## Discussion

- When handling a willed body, universal precautions and standard laboratory PPE are to be used always, minimizing the risk of infection.
- Based on our results, embalmed septic bodies do not pose any greater risk than non-septic bodies.
- By removing this rejection criteria, there will be a greater number of these invaluable education resources, and the final wishes of willed body participants can be honored.

## Future Studies:

Tissue Phase:

- Samples from the liver, spleen, and muscular tissue will be taken to assess the perfusion of embalming fluid and its microbicidal properties within the tissues themselves.

## Results

- Pre-embalmed samples primarily grew varying species of normal human flora, including: *Staphylococcus, Klebsiella, Proteus, Pseudomonas, Streptococcus, Lactococcus, Escherichia*, and *Enterococcus* genera, as well as the pathogenic organism *Clostridium perfringens*. Samples from embalmed specimens were largely negative after 5 days of incubation.
- The data was analyzed using McNemar's chi-squared test, which compares the change in growth patterns in pre- vs. post-samples. After embalming, there was a significant decrease in bacterial growth rates in both aerobic ($\chi^2 = 21.04$, $p = 4.49 \times 10^6$) and anaerobic cultures ($\chi^2 = 160.06$, $p = 6.15 \times 10^5$), with significance defined as a two-sided p-value of less than 0.05.
- Note that typical human flora are facultative anaerobes and thus can grow in both aerobic and anaerobic conditions. This correlates with the slightly higher growth rates in aerobic post-embalmed cultures.

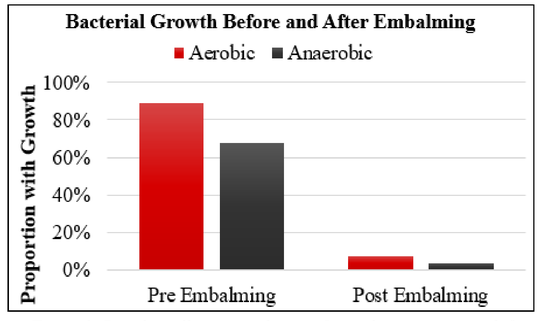



*Figure 1: Bar chart illustrating the significant decrease in growth from post-embalmed specimens*



*Image 5: Bacterial growth shown in aerobic pre sample(left), and negative growth in aerobic post sample (right).*

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## References:

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