

## La plastinación como técnica de conservación de cadáveres para el estudio de la anatomía humana

### Plastination as a Preservation Technique for Cadavers in the Study of Human Anatomy

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**Cite as:** Reyes Flores C, Martínez Enamorado M. Plastination as a Preservation Technique for Cadavers in the Study of Human Anatomy. Medimay [Internet]. 2026 [cited: access date];33:e2731. Available at: <https://medimay.sld.cu/index.php/rcmh/article/view/2731>

Dear Editor:

According to Hippocrates: "The study of the structure of the human body is the basis of medicine". Ancient anatomy studied only the form of the organism and was limited to the description of structures. Modern anatomy, however, not only aims to clarify how the organism is structured but also why it has such a structure. It investigates the laws that govern its development, its functions, and its relationships with the surrounding environment, that is, it explores the organism's relationships both internal and external.<sup>(1)</sup>

Cadavers for the study of human anatomy, in the medical education of future health professionals, provide a three-dimensional model that basic textbooks cannot offer. Students are able to observe and recognize how organs, tissues, and organ systems are arranged, which facilitates the teaching-learning process regarding their functions and relationships.

The need to preserve tissues for extended periods without decomposition has been encouraged. To achieve this goal, various fixation and preservation techniques have been developed to maintain the morphological characteristics of tissues over prolonged periods in a state similar to that of a living individual, ensuring that the body's structures remain visible during dissection.<sup>(2)</sup>

In 1974, Dr. Gunther von Hagens developed the plastination method, where water and lipids are replaced with polymers such as silicone, epoxy, and polyester. Tissue quality and structure are preserved with a dry appearance. Its most significant application lies in skin, muscles, blood vessels, and bones, making it

the most suitable method for working with cadaveric specimens.<sup>(3)</sup>

This technique can generally be described as a process of removing tissue fluids through the use of acetone, alcohol, and similar solvents, which are then replaced with a polymeric chemical derived from silicone, polyester, or epoxy to fix the chemical within the tissue.<sup>(4)</sup> The result is dry, odorless, and non-toxic specimens of nearly any animal tissue.<sup>(5)</sup>

This process consists of the following steps: fixation with 5% formalin, dehydration, forced impregnation, and curing or hardening of the polymers. The final properties of the specimen depend on the type of polymer used. Silicone allows for flexible pieces and delivers good results with minimal equipment requirements. On the other hand, silicone-epoxy copolymer produces rigid pieces that can be polished but are prone to fractures.<sup>(2)</sup>

The use of this technique has transformed the way anatomy is studied and presented, making it an attractive alternative to traditional preservation methods and inspiring everyone to appreciate the complexity and perfection of the human body. Despite this, it is costly and requires technical expertise to prevent tissues from losing their shape and structure.

It holds significant importance for the scientific and educational communities. Plastinated specimens can be used in classrooms, laboratories, and museums for learning this science without deterioration over time. They facilitate the analysis of diseases and congenital malformations, avoiding the drawback of decomposition. This method is highly valuable because

Received: 30 /12/2024 | Accepted: 28/12/2025 | Published: 05/02/2026

it utilizes bodies donated to science for educational purposes and reduces the need for large quantities of formalin, which is known for its toxic properties.

An aspect that must not be overlooked is the ethics of plastination. The donor's understanding of the technique—after their passing—must be based on timely and voluntary informed consent; lack of consent may lead to legal conflicts. There should always be respect for human remains, including how they are displayed to the public, as some may perceive certain displays as disrespectful and potentially leading to serious misconduct. Addressing this issue can be complex, particularly for individuals with diverse cultural and religious perspectives on death and the human body. It should always be viewed as a method for preserving cadavers for medical education.

Plastination has transformed the way human remains are preserved. Its major advantages include the nearly natural state achieved by replacing biological fluids with polymers and the elimination of foul odors. The durability of plastinated specimens allows them to be used for many years in the education of human medicine.

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### Conflict of Interest.

The authors declare that there are no conflicts of interest regarding the publication of this article.

### Authorship Contribution.

Participation according of the order agreed upon by each of the authors of this work.

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#### Translation and edition.

Beatriz Barranco González.✉ Bachelor's Degree in Translation and Interpreting. Provincial

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Conceptualization, formal analysis, investigation, writing (original draft, review, and editing).

Investigation, methodology, writing (original draft, review, and editing).

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