



Sparks

A Non-Profit Organization
Established 2005

HQ: 3265 Marietta St SE, Salem, OR

Phone: 503-585-2781 (24/7)

<https://sparksbrain.org>

Embalming Recommendations for Brain Preservation

Background

Sparks is a non-profit organization dedicated to long-term preservation, either of a person's brain or their whole body. Our goal is to preserve the microscopic structure of a person, including the neural connections believed to encode memories and other aspects of personal identity.

Individuals interested in preservation may elect to undergo arterial embalming before their remains are transferred to a preservation facility. Although this procedure is similar to conventional funeral embalming, the primary objective is preservation of brain structure rather than cosmetic appearance.

The following recommendations are intended to help funeral professionals optimize preservation of brain tissue using conventional embalming techniques. These recommendations are informational and are not intended to replace the embalmer's professional judgment or applicable legal and regulatory requirements. We recognize that practices, equipment, and applicable regulations vary by location. Please contact Sparks at 503-585-2781 (24/7) with any questions.

Timing and Refrigeration

Begin arterial embalming as soon as reasonably possible following death and any required authorizations. If embalming must be delayed, refrigerate the body at approximately 4°C (39°F).

Embalming Fluid

When available, we generally recommend ready-to-use 10% neutral buffered formalin (NBF), which contains approximately 4% formaldehyde. This is a widely used tissue fixative that can be purchased from laboratory suppliers.

Funeral professionals may wish to purchase 10% NBF in advance so that it is available when needed, particularly in locations where obtaining it promptly may be difficult. Many commercial formulations can be stored at room temperature and have manufacturer-specified shelf lives of approximately two years. We suspect that properly stored NBF may remain effective for tissue

fixation for substantially longer, potentially five years or more. We recommend following the manufacturer's storage and expiration guidance when possible.

Other formaldehyde-based embalming solutions may also be suitable, typically at a formaldehyde concentration of 4% or slightly higher (up to 8%). Please document the product and dilution used. When possible, please avoid additional cosmetic dyes or other additives, as their effects on microstructural preservation are not well established.

Please contact us if you would like to discuss the suitability of a particular embalming fluid.

Arterial Injection

Our principal objective is to deliver fixative throughout the brain via its arterial circulation.

- **Injection sites:** When practical, we prefer restricted cervical injection, with both common carotid arteries cannulated toward the head to prioritize brain preservation, followed by separate embalming of the remainder of the body.
- **Venous drainage:** Effective venous drainage is important to allow blood and fixative to exit the cranial circulation. Drainage through one or both internal jugular veins has been found to be effective.
- **Injection volume and duration:** Published human brain perfusion protocols have used a wide range of volumes and durations. As a general reference, approximately 2–8 liters of fixative delivered toward the head/brain over 15–60 minutes may be reasonable for an adult. These are suggested ranges rather than a requirement, and may need to be adjusted on a case-by-case basis.
- **Injection pressure:** Use relatively low injection pressure, with the goal of achieving distribution to the brain without causing excessive tissue swelling. Monitor for venous drainage and other signs of fluid distribution. Avoid unnecessarily high pressure.
- **Pre-injection fluid:** A separate pre-injection solution is not necessarily required. Formaldehyde-containing solutions can also displace blood during arterial perfusion.

We recognize that the optimal approach depends on the condition of the vascular system, available equipment, and the embalmer's professional judgment.

Procedure Documentation

Please record the following information whenever possible:

- Date and approximate time of death, if known
- Date and time the embalming procedure began
- Approximate time when fixative first reached the brain, if known
- Embalmer's name
- Embalming fluid (brand/product)
- Final dilution or concentration

- Injection site(s) and approx injected volume into each
- Injection pressure, if known
- Duration of arterial injection
- Complications or unusual observations

Following Embalming

Please place the body under refrigeration while awaiting further arrangements, unless otherwise directed by the receiving facility. Do **not** freeze the body via storage at less than 0°C.

Brain removal, additional preservation procedures, and transportation should be coordinated with the appropriate receiving facility and authorized parties.

Questions or Complications

We recognize that some of these recommendations may not be feasible in every case. **Timely preservation is nearly always preferable to delaying the procedure in an attempt to achieve ideal conditions.** Funeral professionals should exercise their judgment and comply with applicable laws and professional requirements.

Please contact Sparks if assistance is needed. We appreciate and value your work.

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References

Insausti R, et al. (2023). Ex vivo, in situ perfusion protocol for human brain fixation compatible with microscopy, MRI techniques, and anatomical studies. *Frontiers in Neuroanatomy*, 17, 1149674. <https://doi.org/10.3389/fnana.2023.1149674>

McFadden WC, et al. (2019). Perfusion fixation in brain banking: a systematic review. *Acta Neuropathologica Communications*, 7, 146. <https://doi.org/10.1186/s40478-019-0799-y>