

Lumbar infusion test

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[Lumbar infusion test for idiopathic normal pressure hydrocephalus diagnosis.](#)

Technique

Technique: Here's an outline of the procedure for performing the lumbar infusion test:

1. Patient Preparation:

[Lateral decubitus position](#)

[Local anesthesia](#) is applied to the lower back to minimize discomfort.

A [sterile](#) field is prepared to reduce the risk of infection.

2. Lumbar Catheter Insertion:

A small needle or catheter is inserted into the lumbar subarachnoid space (between L3 and L4 or L4 and L5 vertebrae).

Once in place, baseline CSF pressure (also called the opening pressure) is measured. This is typically done using a manometer attached to the catheter to record the pressure in mmHg or cmH₂O.

3. CSF Infusion:

Artificial CSF or saline solution is slowly infused into the lumbar space at a controlled rate. The infusion rate can vary depending on the protocol, but it is typically around 1-2 ml per minute. The infusion increases the volume of CSF, thus raising the intracranial pressure (ICP).

4. Pressure Monitoring: As the CSF volume increases, the intracranial pressure (ICP) rises. The pressure is continuously monitored and recorded throughout the infusion. A graph of pressure vs. time is generated to assess how the patient's CSF system responds to the increasing volume.

5. Calculation of Resistance to CSF Outflow (**Rout**): The test measures how much the pressure increases in response to the infused volume. Using the change in pressure and the infusion rate, the Rout (resistance to outflow) can be calculated using specific formulas. Higher-than-normal Rout indicates that CSF is not being absorbed efficiently, which is common in patients with normal pressure hydrocephalus (NPH).

6. Interpretation of Results: Normal results: A low Rout indicates that the body is absorbing CSF normally, and the likelihood of NPH is reduced. Abnormal results: A high Rout suggests poor CSF absorption, which supports the diagnosis of NPH and can help predict whether the patient will benefit from a shunt procedure.

7. Post-Procedure: Once the test is complete, the catheter is removed. The patient is monitored for any side effects, which may include headaches, discomfort, or, rarely, CSF leakage.

Fluoroscopy-guided lumbar puncture in patients with increased body mass index or difficult spine anatomy ¹⁾.

¹⁾

Matys T, Massoud TF, Czosnyka M, Czosnyka Z. **Cerebrospinal Fluid Pressure** Measurement and **Infusion** Studies Using **Lumbar Puncture**. Neuroimaging Clin N Am. 2025 Feb;35(1):27-40. doi: 10.1016/j.nic.2024.08.002. Epub 2024 Sep 10. PMID: 39521525.

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Last update: **2025/03/04 09:19**

