

## Performing a Lumbar Puncture on Neurology

1. Review brain imaging for herniation risk. Check labs for PTT, INR < 1.5, plts > 50.
2. Obtain informed consent, place in chart.
3. A low-dose benzodiazepine can be used for anxious patients.
4. Gather what is not in the LP kit:
  - a. sterile gloves (bring an extra pair)
  - b. non-sterile gloves
  - c. pen
  - d. extra lidocaine (only 2mL is in the kit; write an order for either a 1% or 2% 5mL bottle, and ask the nurse to get it out of pyxis)
  - e. sprotte needle
  - f. betadine
  - g. plenty of extra 4 x 4 gauze.
  - h. chuck pad
  - i. sterile towels (optional)
  - j. yellow face mask
5. Place the yellow sticker from the LP kit on the card inside the red binder at the nurses station.
6. Place all equipment on a food tray table, with a trash can at arms length.
7. Adjust the height of the bed to your comfort level.
8. Positioning is key. If opening pressure is needed, the patient needs to be in the lateral decubitus position. Otherwise LPs are often easier when sitting up, particularly for the obese. If sitting up, have the patient rest his/her legs on the side of the bed, then have them lean over the food tray table.
9. Wash your hands.
10. Put on your non-sterile gloves. Mark with your pen the exact location where you will insert the spinal needle. The superior iliac crest lines up with the L4 spinous process. With the pad of your thumb you should be able to simultaneously feel both the spinous process and the interspace. Get a feel for the interspace along both the vertical and horizontal plane. Always make your first attempt at L4-L5 before moving up to L3-L4.
11. Tuck the chuck pad under the patients back and buttocks so the betadine will not get on the bed.
12. Open the LP kit and the sterile glove packet.
13. Open the betadine bottle and pour into the reservoir inside the kit. Make sure you squirt away from yourself. Betadine will stain and ruin your clothes.
14. Open the top of the lidocaine bottle (the larger one that did not come with the kit) and place on the outer sterile white covering that surrounds the kit. Make sure to not touch the top of the bottle with your non-sterile hands.
15. Open up the extra gauze packets and drop them into the sterile field.
16. Put on your face mask, then sterile gloves.
17. Unscrew the caps of all of the CSF collection tubes and place them in order that they are to be collected.
18. Set up the manometer and turn the stopcock 180o away from the narrower end.
19. Using all of the pink sponges in the kit, apply betadine in concentric circles.
20. Take a large piece of gauze from your sterile field and use it to pick up the non-sterile lidocaine bottle
21. Draw lidocaine into the syringe.
22. Clean off the betadine directly above the chuck and the patient's back with a sterile piece of gauze.
23. There are two sterile drapes in the LP kit. Take the tape off the blue drape (the one with a square in the middle), and stick it directly on the patient's back where you have just removed the betadine.
24. Slightly fold the blue drape so the middle square is not exposed. This drape will lie over the chuck and will serve as a sterile area where you can rest your hands.
25. Place the white sterile drape over the iliac crest, this will allow you to find your interspace while still remaining sterile.
26. In the interim the patient has likely moved and the markings you have previously made with your pen will no longer be accurate. Find your spot once again.
27. Apply lidocaine to the exact spot overlying the desired interspace.
28. Cut the skin with the needle included in the sprotte needle packet.
29. Reconfirm the spot of the intervertebral space. Use your nondominate thumb as a guide, having the middle aspect of the pad of your thumb on the spinous process, and the tip of your thumb simultaneously pressing deeply into the interspace.

30. The needle should be inserted immediately adjacent to the tip of your thumb, at 15 degrees cephalad, as if aiming at the patient's umbilicus.
31. The needle will pass through, in order, the skin, subcutaneous tissue, supraspinous ligament, interspinous ligament between the spinous processes, ligamentum flavum, epidural space (location of the internal vertebral venous plexus), dura, arachnoid, and into the subarachnoid space between the nerve roots of the cauda equina.
32. As the needle passes through the ligamentum flavum, you may feel a popping sensation.
33. If attempt is unsuccessful and bone is encountered, withdraw the needle to the subcutaneous tissue, without exiting the skin, and redirect the needle. Make sure the stylet is hubbed against the needle whenever you pull out and redirect.
34. Once you are in the space, withdraw the stylet in 2-mm intervals to assess CSF flow. If flow is poor, you may rotate the needle 90o, since a nerve may be obstructing the opening.
35. If the tap is traumatic, the CSF may be tinged with blood. The blood should clear as additional CSF is collected, unless the source of the blood is a subarachnoid hemorrhage. If you encounter frank blood and you are uncertain of being in the subarachnoid space, you have probably hit a vein in the internal vertebral venous plexus. Pull out the needle and redirect.
36. Use the flexible tube to connect the manometer (stopcock already turned toward you) to the hub of the needle. A measurement can be made after the column of fluid stops rising.
37. After measuring the opening pressure, turn the stopcock 180o toward the patient so the CSF in the manometer can be collected in your first tube.
38. Remove the manometer and collect 3-4 cc of CSF in each tube. ~10 cc should be collected for either cytology or Trotter studies.
39. Put the stylet back into the LP needle and remove the needle. Make sure the stylet has not been contaminated.
40. Betadine left on the patient's body is irritating to the skin. Thoroughly clean the betadine off the patient's back by using hand foam and paper towels.
41. Write a procedure note in Compass. Print it, sign it, and place in chart. If someone supervised, they need to write an addendum to that effect and also sign it.
42. Label all tubes. All labels must be initialed and dated/timed by you.
43. Write order for labels to be made, or make up requisitions yourself. Cytology requires a different form.
44. Hand deliver all CSF to the lab.

Following are the labs where each study goes. You will need to send separate tubes to each lab, but you can get multiple labs on the same tube if they are going to the same place (except separate cell counts). Call 2-1470 or 2-1108 with specific questions):

<b>Test</b>	<b>Tube</b>	<b>Location</b>
Cell Count/Diff	1 & 4	Hematology
Glucose/Protein	2 or 3	Chemistry
Cultures	2 or 3	Microbiology
Trotter Studies	2 or 3	Chemistry
Viral PCR studies	2 or 3	Microbiology
Arbovirus Panel	2 or 3	Chemistry
VDRL	1 or 4	Hematology
FTA-Ab	2 or 3	Chemistry
ACE level	2 or 3	Chemistry
Cytology*	Any	Surgical Pathology
14-3-3/NSE	2 or 3	Chemistry, Don't forget special form***
NMO Antibody	2 or 3	Chemistry
Flow cytometry	Any	Hematology

\* Cytology can only be done on weekdays before 3 pm.  
**DON'T FORGET TO REQUEST TO SAVE A TUBE!**