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ANSWERS

1. A, D
2. B, C
3. A, E
4. A, D

FILLER

How many drops of CSF is enough?

Doctors in training are generally taught lumbar puncture at the bedside, at least “in my day”, using a “see one, do one, teach one” approach. The volume of cerebrospinal fluid (CSF) to be taken was elaborated to me as follows: three drops for bacteriology and three drops for biochemistry, and if the first aliquot is bloody then another three drops for bacteriology to try to differentiate traumatic tap from blood in the CSF before puncture.

Since switching from the bedside to the clinical virology laboratory I see CSF samples quite differently. Firstly, I see the CSF as microlitres and not drops. Secondly, our laboratory is asked to perform an increasing number of investigations on the same old volumes of samples. So how much is enough?

To answer this question we need to know what volume is in a drop of CSF. We took a plastic bottle of water and LP needles of varying bore. The volume of a drop is 60 µl and the volume is unaffected by the pressure of the water. That was shown by varying the depth below the meniscus to which the needle is inserted by from 4 to 14 cm. These depths were used as they represent the normal pressure in infants and adults, respectively. Varying the constitution of the water to try to match CSF by using normal saline with 0.45 g/l bovine serum albumin made no difference to the volume of a drop. Neither did varying the bore of the needle from 0.7 mm to 1.2 mm.

A drop of CSF is about 0.06 ml. Table 1 is a guide to the minimum and recommended volume of CSF to be sent for the tests listed in our laboratory.

All the above can be requested on a sample put into a single container; however, a faster turnaround is likely if viral culture/PCR/cryptococcus are put into a separate container from the bacteriology/TB requests.

Note that viral culture and TB investigations are likely to become more sensitive the more CSF is used.

CSF protein and glucose tests in biochemistry require three drops of CSF.

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Table 1 Minimum and recommended volume of CSF sent for the tests listed in our laboratory

Test	Volume of CSF required in drops per sample	
	Minimum	Recommended
Bacteriology*	3	At least 3
TB	3	As much as practical
Viral culture	3	As much as practical
Viral PCR	4	8
Cryptococcus	3	6

*Culture and sensitivity and cell count.