In obtaining spinal fluid, it is important that examination of the eye grounds should precede lumbar puncture. If choked discs are seen, small diameter needles should be used and minimal quantities of fluid should be removed slowly. The bevel of the needle should be parallel with the trunk in order to minimize dural tear. A dry tap should alert the physician to the possibility of epidural abscess or other obstruction. Because of penetration of the nucleus pulposus instead of the dural sac, gelatinous fluid with few elliptical cells is occasionally seen in young infants when spinal fluid is obtained by relatively inexperienced physicians. It is important that pressure be recorded and flow carefully controlled during the collection of fluid.

DETERMINATION OF THE TYPE OF INFECTION

Immediate spinal fluid examination in the clinical and bacteriological laboratories should provide rapid and accurate information regarding the general type of central nervous system disease. It is almost always possible to determine whether infection exists, and, if so, whether it is bacterial or viral in origin or is one of the chronic meningitides.

The importance of the clinical and bacteriological laboratories in aiding the physician in deciding whether the infection is bacterial or viral, and, if it is bacterial, in giving a presumptive diagnosis of the specific agent, cannot be overestimated. Bacterial infections characteristically have marked cellular responses, which are predominantly polymorphonuclear in type. Although viral central nervous system infections are occasionally associated with spinal fluid cell counts as high as 2000 cells, most are below 200 cells, and there is usually monocytic predominance. Spinal fluid glucose determinations, most useful in distinguishing between viral and tuberculosis or mycotic infections, are also helpful adjuncts in identifying bacterial infections.

Fulminant meningococcal disease at any age or pneumococcal infections, particularly at the extremes of life may not be associated with appreciable cellular response at the time the patient is first seen. At times, cloudy spinal fluid has been seen in the young infant or in the elderly alcoholic with absolutely no increase in spinal fluid cell count, the cloudiness representing huge numbers of organisms in the fluid. This type of response suggests that Gram-stained spinal fluid sediment must be carefully examined in all patients suspected of central nervous system infection if serious errors are to be avoided.

With bacterial infections, an accurate diagnosis of the specific etiological agent is possible in more than half of the patients within minutes after the fluid reaches the laboratory. In most cases in which organisms are visible, a simple Gram-stain of the centrifuged sediment of the cerebrospinal fluid (CSF) yields accurate etiological information on morphological grounds. Fluorescent antibody techniques and the quelling reaction for *H, influenzae,* Type B, performed on freshly obtained spinal fluid may yield immediate, precise etiological confirmation.

It should be noted, however, that in our experience only 10 per cent more specific diagnoses may be made by including fluorescent antibody staining of the spinal fluid sediment with conventional smear and culture routines. As fluorescent antibody techniques are perfected further, they can be expected to be particularly useful in the neonatal group and in those patients in whom unusual organisms may be anticipated on the basis of the clinical evaluation.

SELECTION OF SPECIFIC THERAPY

In most instances, proper and rational selection of the bactericidal drug or drugs of greatest efficacy is possible at the time of admission. More than one antibiotic is seldom desirable, because specific therapy provides effective treatment with fewer complications and reactions.

The selection of an antimicrobial agent is dependent on rational review of the activity and spectrum of each of the various agents currently available. It seems obvious that, at least on theoretical grounds, bactericidal rather than bacteriostatic agents should be selected. Inasmuch as impaired circulation may result in delayed absorption from intramuscular sites, the intravenous route should be used when possible in order to assure maximal serum and CSF levels. Therapy should be as specific as possible because apparent antibiotic interference, a phenomenon suggested by Jawetz, was seen in at least one prospective study (5). Due consideration must be paid, however, to the uncertainties concerning the specific agent in the neonatal period or in patients with particular types of