

Section Editors
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Treating meningitis

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WHAT DID THE AUTHORS STUDY? In their study, “Dexamethasone and long-term survival in bacterial meningitis,” Dr. Fritz and his colleagues carefully evaluated 2 ways to treat bacterial meningitis.¹ They compared steroids (dexamethasone) with placebo. The doctors gave medication (or placebo) *in addition to* antibiotics, the usual treatment for bacteria. In other words, Dr. Fritz et al. compared antibiotics by themselves with antibiotics *plus* steroids.

Dr. Fritz and colleagues compared the mortality (deaths) that occurred in each treatment regimen. They looked at 2 months after the treatment, but also followed the group for an average of 13 years.

HOW WAS THE STUDY PERFORMED? Working at the University of Amsterdam, Dr. Fritz and his colleagues enrolled 301 adults between June 1993 and December 2001. One hundred fifty-seven received dexamethasone plus antibiotics. One hundred forty-four received antibiotics plus placebo. The dexamethasone was initially given before the first dose of the antibiotic, and then continued every 6 hours for 4 days. In 37%, the cause of the meningitis was *Streptococcus pneumoniae*. In 33%, the cause was *Neisseria meningitidis*. The remaining 29% had meningitis due to a variety of other bacteria.

Dr. Fritz and colleagues first looked at the group 2 months (8 weeks) after they were treated for meningitis. At 2 months, 11% of all of the patients had died. Seven percent of the people who were treated with steroids *and* antibiotics died. Fifteen percent of

the people who had antibiotics *without* steroids died. In other words, Dr. Fritz and colleagues found that steroids *plus* antibiotics may help to reduce the risk of dying due to meningitis. They carried this one step further and looked at 1 year after treatment, 2 years, 3 years, 5 years, 10 years, and in some people, 15 years after treatment. They found that for many years after treatment, the risk of dying continued to be less for the group that had been treated with steroids.

WHY WAS THIS STUDY IMPORTANT? The use of steroids in treating meningitis is under debate. Although other studies in adults have been done, the results have not been clear. In some studies, a benefit to using steroids was shown. In other studies, there was no benefit. Most of these studies looked at short-term survival. One reason for this study is that there is very little known about the long-term survival in people who had meningitis.

Based on earlier study results, the Netherlands started the use of steroids in treating bacterial meningitis from 2006 to 2009. Death rates during this time frame were compared with previous death rates. Before using steroids, the overall percentage of deaths due to bacterial meningitis in the Netherlands was 30%. After, the death rate decreased to 20%.

REFERENCE

1. Fritz D, Brouwer MC, van de Beek D. Dexamethasone and long-term survival in bacterial meningitis. *Neurology* 2012; 79:2177–2179.

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About meningitis

WHAT IS MENINGITIS? The strict definition of meningitis is an inflammation of the meninges. The meninges are a covering of the brain (and spinal cord). The meninges are made up of several layers. Each layer has a specific function in protecting the brain. Together, these layers form a very tough covering around the brain and spinal cord. Although tough, the meninges can become infected by certain kinds of bacteria, viruses, and fungi. An infection leads to irritation of the infected area, called inflammation. Most people are familiar with inflammation when it affects the skin: the area becomes tender, swollen, and red.

WHAT ARE THE SYMPTOMS OF MENINGITIS? The characteristic symptoms of meningitis are headache and a stiff neck. In addition, a person may develop a fever, feel nauseous, and experience sensitivity to bright lights (photophobia) and loud noises (phonophobia). In certain kinds of bacterial meningitis (caused by *Neisseria meningitidis*), a person may develop a very specific kind of skin rash. The rash is blotchy, and appears reddish-purple. If the meningitis becomes severe, a person may become confused, and experience loss of consciousness. In most people, the initial symptoms develop over the course of a day. With treatment, meningitis resolves in about 10 days.

WHAT CAUSES MENINGITIS? There are many different causes of meningitis. Bacteria, viruses, fungi, parasites, and certain medications are all known to cause an irritation of the meninges. When a person goes to their doctor (or the Emergency Department) with symptoms of meningitis, one of the first tasks is to determine what is causing the meningitis. Although many tests may be needed, a lumbar puncture (also called a spinal tap) is very helpful in the diagnosis of meningitis. During a lumbar puncture, a small amount of the fluid (called cerebrospinal fluid or CSF) that surrounds the brain and spinal cord is removed. Because this fluid is in contact with the brain and its covering, the lumbar puncture test will show the cause of the meningitis. In some instances, the bacteria can be seen by looking at the fluid under a microscope. In other instances, the CSF undergoes a series of tests, all designed to find the cause of the meningitis.

DIAGNOSIS AND TREATMENT Understanding the cause is critical to starting the best treatment. Antibiotics are used to treat bacterial infections. Antiviral medications are helpful if the cause is a virus. Treating the cause early and aggressively has the best success. Not only does the person feel better sooner, but rapid treatment reduces the risks associated with meningitis. The most serious potential risk is dying. If untreated, some kinds of meningitis cause death in up to 90% of people. For most kinds of meningitis, the risk of dying is about 30%. Neurologic problems can also occur from the meningitis. For instance, some people have hearing problems or trouble thinking, which can last years (or be permanent) after the meningitis has gotten better. The people who are most at risk for developing the more serious problems related to meningitis are people older than 60 (or under 5), and those who are sick from other illnesses such as diabetes or cancer.

Another “treatment” is prevention. Vaccination can prevent meningitis, or make the meningitis milder, if it occurs. Since the 1980s, kids have been immunized against *Haemophilus influenzae* type B. Mumps used to cause meningitis in up to 15% of people; vaccination has eliminated this. Adolescents are given the meningococcus vaccine, which is effective against *Neisseria meningitidis*. *Neisseria* cause outbreaks of meningitis when people live in close quarters, like a dormitory. Many colleges, in order to prevent this from spreading among their students, will ask students to be vaccinated before they start their college enrollment.

THE REASON FOR THE STUDY For many years, there has been debate about using steroids to treat meningitis. Steroid medications (such as dexamethasone) are very powerful in reducing inflammation. One of the reasons that there has been a debate is that the studies do not always show the same results. In some studies, there was a benefit to using steroids. In others, there was no benefit. Some studies have looked at death while others have looked at how steroids affect the rate of developing a long-lasting neurologic problem due to the meningitis. Most of the studies have been in adults. Very few have occurred in kids.

FOR MORE INFORMATION

AAN Patients and Caregivers site

<http://patients.aan.com/go/home>

Meningitis Foundation of America, Inc.

<http://www.musa.org>

National Meningitis Association

<http://www.nmaus.org>

National Institute of Allergy and Infectious Diseases
(NIAID)

<http://www.niaid.nih.gov>

Neurology®

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