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Tuberculosis

Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis* (M.Tb.) Most of the exposure to TB occurs in childhood as a result of breathing in the bacteria from someone who is already infected. The bacterium then multiplies in the lungs causing an inflamed area and then M.Tb bacteria infect the lymph glands in the lungs, which can enlarge. This is known as Primary TB which in the majority of cases does not progress any further. In a small number of people the bacteria can spread to other parts of the body causing very serious disease. However, in most cases the body's immune system is able to contain the organism within the lungs, but the bacteria can persist for years in a dormant state (so called latent infection). These 'latent' bacteria can reactivate and some people develop disease during the first few years after infection, but with others it may take many more years, or even decades for them to reactivate. This is known as reactivation TB and occurs in about 10% of those ever exposed.

For someone with HIV, the risks of developing disease due to TB are greater, for a number of reasons. Firstly people with HIV who have never been exposed to M.Tb are at risk of developing progression to serious disease immediately following primary TB, as the immune system is damaged and cannot fight off infections. Secondly, for those who are exposed previously to M.Tb. and have 'latent infection', organisms are more likely to overcome the immune system's 'surveillance', and cause reactivation TB, and thirdly, the immune 'memory' for the BCG immunisation (the vaccination against TB) may be lost, and once again the person is vulnerable to primary infection with TB. Active TB can increase HIV viral load. In itself, it can cause a fall in CD4 cells, which improves with TB treatment.

Transmission
M.Tb is transmitted through the air, usually by coughing, rarely shouting or talking and sneezing, but only people with ***active*** TB, in the lungs or throat or with open wounds, are potentially infectious to other people. People who have already been exposed to M.Tb, but in whom the organisms are ***latent***, are not infectious. It is not easy to say how long and what level of intensity of exposure is required for M.Tb to be transmitted, when someone is coughing persistently, however some situations which *may* lead to transmission include: Sleeping in the same room overnight, travelling together in a long car journey, and holding someone while they cough continually. Someone who is suspected of having active TB should be nursed in a single room, (not on an open ward) with negative pressure (where the air is not allowed to escape into the rest of the hospital), to reduce the risk of infection to others.

Symptoms
The most usual symptoms of TB in the lungs are:
- coughing (phlegm or blood)
- shortness of breath
- weight loss
- fevers
- night sweats
- fatigue

If TB spreads from the lungs it can occur in almost any part of the body. The following sites are common places for TB infection; symptoms in brackets:

- lymph nodes (swelling and fever)
- the Intestines (diarrhoea and fever)
- the Liver (jaundice, which is rare and fever)
- the Brain (meningitis and confusion, gradual loss of consciousness)

If you have any of the symptoms already described, then check with a clinician as soon as possible, as some of them can have alternative causes.

Diagnosis- Sputum Microscopy

Diagnosis of TB is made by using a number of tests, the most effective one of which is to see if M.Tb can be grown from a sample of fluid or tissue (usually sputum). Fluid can also be taken directly from the lungs using a *bronchoscope* (a flexible telescope that is passed through the mouth and throat, and into the lungs, usually under a local anaesthetic or sedation). A Chest x-ray of someone with TB may look similar to one of PCP, so this would not be conclusive proof on its own. Another method is to use a TB blood test or Elispot. A positive result means the person has been exposed to M.Tb, but it is not necessarily active and causing disease. A negative result is harder to interpret, because someone with HIV may not respond to this kind of test even though they might be infected with M.Tb.

Treatment

Treatment for TB is with a combination of drugs. This is because the M.Tb may be resistant to one or more drugs. The drugs used include: *isoniazid, rifampicin, pyrazinamide, and ethambutol. Streptomycin and amikacin* can also be used. The most important thing is to take the drugs diligently to reduce the chances of resistance occurring. Sometimes drug therapy is started as soon as TB is suspected, and then the treatment regime may be modified to ensure the best combination is being used to fight the particular M.Tb organisms. These drugs are then taken for a long time, usually for 6 and months, it is essential to make sure that that the treatment has been effective. There are side effects to all the drugs, and for this reason, careful monitoring during treatment is important.

For patients who are taking Protease Inhibitors and non-nucleosides, there are particular difficulties if rifampicin is prescribed. This drug is particularly effective against M.Tb, however it interacts with some of the Protease Inhibitors and NNRTI's consequently, the HIV treatment regimen for them must be modified. These options should be discussed with your clinician.

Multi-Drug Resistant TB (MDR-TB) and XDR (Extensively Drug Resistant)

During the last few years, strains of TB have emerged that are resistant to some of the drugs used in treatment. These are called Multi-Drug Resistant (MDR) TB if resistant to rifampicin and isoniazid at least or most drugs resistant to XDR TB. They have infected people with or without HIV. MDR-TB can be fatal, unless treatment begins soon after infection. TB can become resistant if you are not treated for long enough, do not receive the right drugs or if you take your medication improperly. You can also become infected with MDR-TB directly.Patients with MDR-TB may have to be hospitalised and isolated because of the complexity of their management.

Prevention

In this country it tends to be only those people at most risk, who are given treatment as prevention against TB, such as close friends, or family members of those with active TB disease. Treatment is usually with isoniazid, for up to one year, to prevent the infection from becoming active. Rifampicin, or rifampicin & isoniazid can also be used and can be taken for shorter periods.

This information was prepared by Dr Pozniak and produced by the Information Exchange. The Information Exchange is part of the HIV/GU Medicine Directorate of the Chelsea and Westminster Hospital. For more information please call 020 3315 5929. Updated September 2010