

Atypical mycobacteria

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These are mycobacteria that are primarily **primarily / occasionally** pathogenic to saprophytic. Acid-resistant, immobile, non-sporulating aerobic rods.

They cause diseases that are analogous to tuberculosis = **mycobacteriosis**. They occur in the range of **3-7 % - in water, soil** (the usual source of infection). There is no transmission between people.

Representatives

Due to the large number of representatives of mycobacteria, we present only the most important.

- *Mycobacterium kansasii*
- *Mycobacterium gordonae*
- *Mycobacterium xenopi*
- *Mycobacterium avium*
- *Mycobacterium intracellulare*
- *Mycobacterium scrofulaceum*
- *Mycobacterium ulcerans*

Atypical mycobacteria grow at temperatures **from 38 to 42 °C**.

Classification of mycobacteria

Runyon classification

1. **Photochromogenic** – mycobacteria are unpigmented in the dark, after lighting they are yellow (eg. *Mycobacterium kansasii*).
2. **Scotchomogenic** – mycobacteria are orange or yellow pigmented even in the dark (eg. *Mycobacterium gordonae*).
3. **Nonchromogenic** – mycobacteria are not pigmented (eg. *Mycobacterium avium*).
4. **Fast-growing** – mycobacteria with fast growth within a maximum of 5 days^[1] (eg. *Mycobacterium fortuitum*, *Mycobacterium chelonae*).

Clinically important representatives

Complex MAI/MAIS

Mycobacterium avium + *Mycobacterium intracellulare* = (complex **MAI**); + *Mycobacterium scrofulaceum* = (complex **MAIS**)

Occurrence mainly in birds and pigs. In humans they cause *cervical lymphadenitis* and tuberculosis cause similar lung diseases. When penetrating tissues, they can cause leprosy-like disease.

Mycobacterium xenopi

Causes lung disease.

Mycobacterium ulcerans

It causes the so-called **Buruli ulcer**, which is a painless nodular formation that changes into a large skin lesion.

Mycobacterium kansasii

A relatively common cause of the disease, it causes chronic lung diseases that mimic tuberculosis.



Mycobacterium kansasii



Buruli ankle ulcer

Diagnosis

The diagnosis of mycobacterial diseases is based on an overall evaluation of symptoms, X-ray findings, isolation and identification of mycobacteria. The clinical signs of mycobacteriosis are very similar to those in tuberculosis and without the species specification of the causative agent, the disease cannot be distinguished.

Significant symptoms:

- general weakness;
- cough;
- shortness of breath;
- lack of appetite;
- weight loss;
- elevated temperature;
- perspiration.

Orofacial areas are frequently affected in children. Nodal involvement (mainly immunocompromised patients and patients with HIV infection) is rare in adult patients. The skin, bones, soft tissues, digestive tract, liver and spleen are sometimes affected.

We perform **microscopic** and **cultivation**. A positive culture finding may correspond to infection, asymptomatic colonization, or just environmental contamination.



Buruli hand ulcer

Along with the clinical and x-ray images **at least two culture-positive findings** from separate sputum examinations or at least one culture-positive finding obtained by bronchial washing or lavage are necessary. The diagnosis can also be made by transbronchial or other lung biopsy with evidence of granulomatous inflammation or acid-fast rods, supplemented by at least one positive sputum or bronchial lavage result for non-tuberculous mycobacteria.

If we suspect atypical mycobacteria and not all basic diagnostic criteria are met, it is necessary to monitor the patient in terms of clinical, X-ray and microbial.

The basis and gold standard of laboratory tests is the cultivation of mycobacteria on liquid and solid mediums with subsequent species identification of the strain. Molecular genetic engineering, based on the detection of microbial DNA, is a highly sensitive and rapid method that can be used in the diagnosis of *M. kansasii*, *M. goodii*. BACTEC or biochemical tests (eg with niacin) distinguish between tuberculosis and non-tuberculous mycobacteria.

Cultivation

Slow growth in special mediums. In solid mediums (**Lowenstein-Jensen, Ogawa**) it grows in larger smooth gray-white colonies. In liquid mediums (**Šulc's**) we observe amorphous sediment with milky turbidity.

During cultivation we evaluate:

- cultivation rate;
- colony size;
- the appearance of the colonies;
- pigmentation;
- enzyme production.

Staining

Due to the high content of lipids in the body, mycobacteria cannot be **Gram-stained**. So we use **Ziehl-Neelsen** staining.

Therapy

Treatment of mycobacteriosis is difficult (except for *M. kansasii*). The effect of the treatment is often very slow, caverns and sputum culture positives can persist for a long time. Treatment with classic antitubercotics, in combination with HRES (isoniazid, rifampicin, ethambutol, streptomycin), is often started, and only then is the treatment adjusted according to the sensitivity found.

There is no single treatment regimen for mycobacterial disease. We use various combinations of antitubercotics.

The vast majority are **resistant** to a number of antitubercotics.

Links

References

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