



INVASIVE ASPERGILLOSIS



Breathing is the greatest pleasure in life

Invasive aspergillosis is a serious infection that primarily affects the lungs in people who have weakened immune systems, chronic respiratory diseases, or severe respiratory viral diseases. Occasionally, it may occur in people in whom no underlying reason is found.

It is caused mainly by the mould *Aspergillus fumigatus*, which is found predominantly in the air as spores and in the earth as a mould. The fungal spores are inhaled into the lung where they can germinate and invade into the lung tissue. Sometimes the nasal sinuses are also affected.

Who can be affected by invasive aspergillosis?

The highest risk of invasive aspergillosis is in individuals undergoing lung transplantation or donor bone marrow transplantation.

People who have either very low numbers of a particular white cell called the neutrophil are also at high risk. This is because neutrophils are the main cells that kill *Aspergillus fumigatus*.

People who have an inherited immunodeficiency called chronic granulomatous disorder also have a high risk as they have neutrophils that do not kill *Aspergillus* as effectively.

Despite the risk of invasive aspergillosis being relatively low, patients with chronic obstructive airways disease are the largest group of individuals who develop invasive aspergillosis.

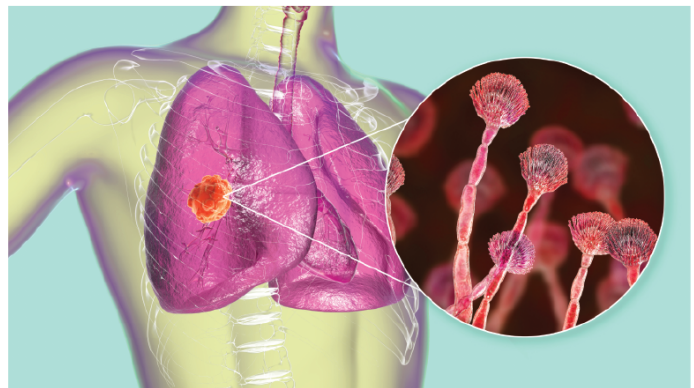
More recently it has been found that patients with severe influenza or COVID-19 are also at risk of Invasive Aspergillosis.

Some newer immune therapies for cancer and autoimmune disease can also increase the risk of Invasive aspergillus, particularly Ibrutinib. This is because it affects the immune signals that respond to *Aspergillus*.

What are the main symptoms of invasive aspergillosis?

Invasive aspergillosis can occur without any symptoms, however if you develop coughing up of blood, fever, chest pain, cough, or shortness of breath this could be indicative, although many other infections will also cause these symptoms.

If the *Aspergillus* spreads to other organs it could lead to other symptoms.



3D illustration of invasion of a lung tissue by mold fungi *Aspergillus*

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How is invasive aspergillosis diagnosed?

Invasive aspergillosis is hard to diagnose. It requires either a biopsy of the affected tissue which can be technically challenging but definitive, or a combination of other evidence.

In the majority of people, a positive growth of *Aspergillus* from either sputum or other samples, and consistent imaging evidence is required in someone who is at risk of invasive aspergillosis.

There is a blood test for an *Aspergillus* antigen called galactomannan that is typically used. It can also be used on airway samples.

The typical features that doctors look for on CT scan images of the lungs are nodules, cavities, hazy areas called ground-glass, and the air crescent sign, where there is a crescent of air seen around a mass in the lung.

How is invasive aspergillosis treated?

The main licensed treatments for invasive aspergillosis are either the triazole antifungals voriconazole, posaconazole or isavuconazole, as well as the polyene Liposomal Amphotericin. Sometimes an echinocandin infusion is used as an additional treatment.

Treatment is typically for at least 6 weeks at which time a repeat CT scan is normally performed to see if there has been a response to treatment.

The doctors will also take into account whether the immune system is working properly to decide if a longer treatment duration is required.

A lot of patients will also receive preventative treatment to stop invasive aspergillosis happening in the first place. This is typically in those people who are at very high risk.

It may also be necessary to adjust or change any immune treatments the person is having to improve the immune systems response to the *Aspergillus*.

Sometimes the doctors may also use immunotherapies which are medications that can boost the immune system.

Rarely, surgery may be required if the infection is not resolving.

Improving outcomes

- Diagnosing and treating the aspergillosis as early as possible
- Making sure drug dosing is optimised
- Making sure the drug is in therapeutic range (if a triazole)
- Assessing if any changes need to be made to immunotherapy
- Excluding any issues with antifungal resistance that could require a different treatment

These aspects will empower patients to ensure their doctors are doing the right things.



You are not alone!
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aspergillosistrust.org