Dimorphic fungi

Are fungi that can exist in the form of both mold and yeast. This is usually brought about by change in temperature and the fungi are also described as **thermally dimorphic fungi**. An example is *Talaromyces marneffei*, a human pathogen that grows as a mold at room temperature, and as a yeast at human body temperature. Generally the mycelial form grows at 25° C, and the yeast-like pathogenic form at 37° C. This dimorphism is important in the identification of mycoses, as it makes rapid identification of many pathogenic organisms possible.

Several species of dimorphic fungi are important pathogens of humans and other animals, including *Coccidioides immitis*, *Paracoccidioides brasiliensis*, *Candida albicans*, *Blastomyces dermatitidis*, *Histoplasma capsulatum*, *Sporothrix schenckii*, and *Emmonsia* sp. Some diseases caused by the fungi are:

- sporotrichosis
- blastomycosis
- histoplasmosis
- coccidioidomycosis
- paracoccidioidomycosis
- talaromycosis
- Candidiasis

Environmental factors control the dimorphism

1- Temperature –dependence dimorphism :

Examples :

a- *Blastomyces dermatitidis* 35 - 37c°

b-* *Paracoccidioides brasiliensis **37c°**

The mycelial form of *P. brasiliensis* can be converted to the yeast form in vitro by growth on brain heart infusion agar or blood-glucose-cysteine agar when incubated for 10–20 days at 37 °C, Under these conditions, hyphal cells either die or convert to transitional forms measuring 6–30 µm in diameter, which ultimately detach or remain on the hyphal cells, yielding buds . New buds develop mesosomes and become multinucleated. In contrast, yeast-like cultures can be converted to the mycelial form by

reducing the incubation temperature from 37 to 25 °C. Initially it, nutritional requirements of both the yeast and mycelial phases of *P. brasiliensis* were thought to be identical; however, later studies demonstrated the yeast form to be auxotrophic, requiring exogenous sulfur-containing amino acids including cysteine and methionine for growth

Note

The main component of the cell wall in yeast cells is **α-1,3-glucan** while the mycelium is **β-Glucan** as well as the presence of other components such as chitin .

2- Temperature and nutrient–dependence dimorphism :

Examples :

Histoplasma capsulatum

This fungus grows mycelial form at temperature 25c°, but raise the temperature to 37c° is not enough to turn into yeast, Only if processing of culture media amino acid (cysteine) .

3- Nutrient–dependence dimorphism :

Examples :

Candida albicans

Candida tropicalis

The dimorphism here depends on the specific nutrition , such as cysteine , NH4CL ,Glucose ,*Candida albicans* grow as yeast at a temperature of 37 or 25 c° when a carbon source of glucose, but in the case to replace the carbon source starch or glycogen consists the mycelium