Other Important Conditions Associated with Medical Mycology

1. Inhalation of fungal materials to initiate allergy*

2. Ingestion of fungal materials such as mushrooms which produces mushroom poisoning**

3. Ingestion of food products contaminated with fungal toxins

*** mycotic allergies (mold allergies)**
**** mycetismus (mushroom poisoning)**
*****mycotoxicosis (mold toxin poisoning)**

Allergic Conditions

Hypersensitivity to common molds

1. sensitivity in usually atopic individuals (underlying hereditary basis). Usually to low number of allergens*,**

2. sensitivity in individuals chronically exposed to large numbers of allergenic fungal particles. e.g. Farmer's Lung

***asthma-type symptoms - seasonal (fall & spring in Texas; type I hypersesitivity**

1)	***Alternaria***	
2)	***Helminthosporium***	
3)	***Drechslera***	**all**
4)	***Cladosporium***	**form-**
5)	***Hormodendrum***	**genera**
6)	***Penicillium***	**(anamorph names)**
7)	***Aspergillus***	

****usually IgE mediated**

Low dose mold asthmas

1. Childhood type - reaches peak in early adolescence, then subsides

2. Adult - severe form that begins most often at ~>40 yrs. Progressive → emphysema-like induced death at extreme

Chronic large dose

1. **Farmer's Lung - moldy hay***
2. **Bagassosis - sugar cane residue****
3. **Byssinosis - cotton dust****
4. **Lycoperdosis - puff balls & snuff***
5. **Maple bark strippers disease, etc. molds growing under bark***

***mold conditions**
****and its molds**

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1. Farmer's Lung

a. ***Aspergillus* sp.** **e.g., *A. fumigatus***
***A. niger* & *A. flavus*, etc.**

b. ***Penicillium sp****
P. simplicissmum
P. herquei
P. rubrum
P. italicum
P. caseiocolum

c. other form-species
Species not regular air contaminants. Usually thermotolerant species found growing on decaying plant material in barns, storage areas or wet fields, also in compost.

***Penicillium marneffei*, agent of AIDS-related mycosis in SE Asia. See RR (on AIDS-related penicilliocis)**

Mushroom Poisoning
(Mycetismus)

A. **Symptoms after ingestion**
1. **minor gastrointestinal distress**
2. **hallucinations**
3. **delirium**
4. **coma**
5. **death**

B. **Causes - many species**
1. **mostly Holobasidiomycotina of order Agaricales, class Holobasidiomycetes (syn. Hymenomycetes)**
2. **even a few Euascomycota - Discomycetes**

C. **In U.S. -**
- **mostly children (accidental) or -young adults looking for "highs"**
- **foreigners or recent immigrants (mycophiles): most U.S. citizens are mycophobes***

***English (British) legacy. (mycophobia)**
"kickers" vs "pickers"!

Types of Mushroom Poisonings

1. **Cyclopeptide poisonings***
2. **Monomethyhydrazine poisonings**
3. **Coprine poisonings**
4. **Muscarine poisonings**
5. **Ibotenic acid & musamiol poisonings**
6. **Psilocybin & other indol poisonings**
7. **Gastroentestinal irritant poisonings**
8. **Mushroom alcohol sensitivity**

***most common and most serious:**

Amanita **(death caps)^{0}**	**volva -- white spores**
Lepiota **^{00}**	**no volva -- white spores**
Conocybe **^{000}**	**brown spores****
Galerina **^{000}**	

^{0}at best not recommended/not edible & at worst, deadly poinsonous
^{00}some edible and delicious, others poisonous
^{000}not recommended/poisonous

****adage "don't eat small brown mushrooms: may relate to these**

General Clinical Course

1. **Symptoms begin after 8 - 12 hours**
   indicating phallotoxins may be eliminated (degraded) in humans before cause problems.
2. **Nausea, vomiting, cramps, severe diarrhea**
3. **After 2 - 3 day gastrointestinal phase subsides (more quickly with fluid & electrolyte substitution)**
4. **Around day 5 (onset of severe necrosis of liver cells) with release of diagnostic enzymes (alkaline phosphatase*)**,*****

* **effect of α amanitin→inhibits RNA polymerase II****

****terminates protein synthesis (at transcriptional level)**
****also associated with clotting deficiency**
*****often only treatment is a liver transplant**

Mortality Rates

~ 50% in children below age 10

~ 16% or less among older

overall, ~ 20%

-rate related to amount of mushroom ingested vs size of ingestor

-therapy = fluid replacement; liver transplant

-most treatments not real good:

1) **but better if w/in 1-2 to 4-6 hrs., empty stomach by ipecac emesis* & gastric lavage with activated charcoal and try to clean blood**
   a) **haemodialysis** b) **haemoperfusion****
   c) **apheresis*****
2) **increase excretion of toxin**
3) **supportive measures - Pen G (@300-1,000K units/kg/day), throcytic acid, etc.**
4) **Bastion Method - vit. C, etc.**
5) **monitor alkaline phosphotase for liver enzymes & liver function/destruction**

***induced vomiting**
**** cleaning patient's blood with activated charcoal, after which it is returned**
***** separation of patient's blood into components, after which only portion ("cleansed") is returned**

Mycotoxicosis - mold toxin poisonings of humans and animals

1. **Mycotoxicoses are not transmissible**
2. **Drug and antibiotic treatment have little or no effect on the disease.**
3. **In field outbreaks, the trouble is often seasonal.**
4. **The outbreak is usually associated with a specific food or feedstuff.**
5. **The degree of toxicity is often influenced by the age, sex and nutritionals state of the host.**
6. **Examination of the suspected food or feed reveals signs of fungal activity.**
7. **Active mycotoxins usually termed secondary metabolites**

Types of Metabolic Products

a) primary metabolites

b) primary accumulated metabolites (overflow metabolites)

c) secondary metabolites (shunt metabolites)

Why Secondary Metabolites Arise?

1) biochemical pathway lesions

2) biosynthesis of "waste" products.

3) biosynthesis of detoxifying agents from deleterious products

4) biosynthesis of compounds, which are products of chance events (unusual stress conditions)

5) biosynthesis of excess regulators

6) biosynthesis of unusual compounds important for development

7) virus- or plasmid-mediated products of metabolism.

Some Examples of Mycotoxins

Aflatoxins
Ochratoxins
Satratoxins
Cytochalasins
Rubratoxins
Trichothecenes
Vomitoxins
Zeorelonones
Patulins
Etc.