

of their normal levels should also be given a boost of OCS prior to surgery. High-maintenance doses of corticosteroids may be a contraindication to surgery because of increased risks of infection and delayed wound healing.

**Bronchopulmonary Aspergillosis** Bronchopulmonary aspergillosis (BPA) is uncommon and results from an allergic pulmonary reaction to inhaled spores of *Aspergillus fumigatus* and, occasionally, other *Aspergillus* species. A skin prick test to *A. fumigatus* is always positive, whereas serum *Aspergillus* precipitins are low or undetectable. Characteristically, there are fleeting eosinophilic infiltrates in the lungs, particularly in the upper lobes. Airways become blocked with mucoid plugs rich in eosinophils, and patients may cough up brown plugs and have hemoptysis. BPA may result in bronchiectasis, particularly affecting central airways, if not suppressed by corticosteroids. Asthma is controlled in the usual way by ICS, but it is necessary to give a course of OCS if any sign of worsening or pulmonary shadowing is found. Treatment with the oral antifungal itraconazole is beneficial in preventing exacerbations.

## 310 Hypersensitivity Pneumonitis and Pulmonary Infiltrates with Eosinophilia

Praveen Akuthota, Michael E. Wechsler

### HYPERSENSITIVITY PNEUMONITIS

#### INTRODUCTION AND DEFINITION

Hypersensitivity pneumonitis (HP), also referred to as extrinsic allergic alveolitis, is a pulmonary disease that occurs due to inhalational exposure to a variety of antigens leading to an inflammatory response of the alveoli and small airways. Systemic manifestations such as fever and fatigue can accompany respiratory symptoms. Although sensitization to an inhaled antigen as manifested by specific circulating IgG antibodies is necessary for the development of HP, sensitization alone is not sufficient as a defining characteristic, because many sensitized individuals do not develop HP. The incidence and prevalence of HP are variable, depending on geography, occupation, avocation, and environment of the cohort being studied. As yet unexplained is the decreased risk of developing HP in smokers.

#### OFFENDING ANTIGENS

HP can be caused by any of a large list of potential offending inhaled antigens (Table 310-1). The various antigens and environmental conditions described to be associated with HP give rise to an expansive list of monikers given to specific forms of HP. Antigens derived from fungal, bacterial, mycobacterial, bird-derived, and chemical sources have all been implicated in causing HP.

Categories of individuals at particular risk in the United States include farmers, bird owners, industrial workers, and hot tub users. Farmer's lung occurs as a result of exposure to one of several possible sources of bacterial or fungal antigens such as grain, moldy hay, or silage. Potential offending antigens include thermophilic actinomycetes or *Aspergillus* species. Bird fancier's lung (also referred to by names corresponding to specific birds) must be considered in patients who give a history of keeping birds in their home and is precipitated by exposure to antigens derived from feathers, droppings, and serum proteins. Occupational exposure to birds may also cause HP, as is seen in poultry worker's lung. Chemical worker's lung is provoked by exposure to occupational chemical antigens such as diphenylmethane diisocyanate and toluene diisocyanate. Mycobacteria may cause HP rather than frank infection, a phenomenon observed in hot tub lung and in HP due to metalworking fluid.

TABLE 310-1 EXAMPLES OF HYPERSENSITIVITY PNEUMONITIS

Disease	Antigen	Source
<b>Farming/Food Processing</b>		
Farmer's lung	Thermophilic actinomycetes (e.g., <i>Saccharopolyspora rectivirgula</i> ); fungus	Grain, moldy hay, silage
Bagassosis	Thermophilic actinomycetes	Sugarcane
Cheese washer's lung	<i>Penicillium casei</i> ; <i>Aspergillus clavatus</i>	Cheese
Coffee worker's lung	Coffee bean dust	Coffee beans
Malt worker's lung	<i>Aspergillus</i> species	Barley
Miller's lung	<i>Sitophilus granarius</i> (wheat weevil)	Wheat flour
Mushroom worker's lung	Thermophilic actinomycetes; mushroom spores	Mushrooms
Potato riddler's lung	Thermophilic actinomycetes; <i>Aspergillus</i> species	Moldy hay around potatoes
Tobacco grower's lung	<i>Aspergillus</i> species	Tobacco
Wine maker's lung	<i>Botrytis cinerea</i>	Grapes
<b>Birds and Other Animals</b>		
Bird fancier's lung (also named by specific bird exposures)	Proteins derived by parakeets, pigeons, budgerigars	Bird feathers, droppings, serum proteins
Duck fever	Duck feathers, serum proteins	Ducks
Fish meal worker's lung	Fish meal dust	Fish meal
Furrier's lung	Dust from animal furs	Animal furs
Laboratory worker's lung	Rat urine, serum, fur	Laboratory rats
Pituitary snuff taker's lung	Animal proteins	Pituitary snuff from bovine and porcine sources
Poultry worker's lung	Chicken serum proteins	Chickens
Turkey handling disease	Turkey serum proteins	Turkeys
<b>Other Occupational and Environmental Exposures</b>		
Chemical worker's lung	Isocyanates	Polyurethane foam, varnish, lacquer
Detergent worker's lung	<i>Bacillus subtilis</i> enzymes	Detergent
Hot tub lung	<i>Cladosporium</i> species; <i>Mycobacterium avium</i> complex	Contaminated water, mold on ceiling
Humidifier fever (and air conditioner lung)	Several microorganisms including: <i>Aureobasidium pullulans</i> ; <i>Candida albicans</i> ; thermophilic actinomycetes; <i>Mycobacterium</i> species; <i>Klebsiella oxytoca</i> ; <i>Naegleria gruberi</i>	Humidifiers and air conditioners (contaminated water)
Machine operator's lung	<i>Pseudomonas</i> species; <i>Mycobacteria</i> species	Metal working fluid
Sauna taker's lung	<i>Aureobasidium</i> species; other antigens	Sauna water
Suberosis	<i>Penicillium glabrum</i> ; <i>Chrysonilia sitophila</i>	Cork dust
Summer-type pneumonitis	<i>Trichosporon cutaneum</i>	House dust mites, bird droppings
Woodworker's lung	<i>Alternaria</i> species; <i>Bacillus subtilis</i>	Oak, cedar, pine, mahogany dusts