

Hypersensitivity Pneumonitis: Diagnostic Approach and Challenges

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70 y/o man with 9 months of malaise, dry cough, progressive dyspnea



- Worked in an office for 25 years
- No hobbies
- No farm exposure
- **No pets**
- **No birds in the home (ever)**
- **No bird exposure**
- **No down products in the home**
- No hot tub

The exposure history is critical but difficult to obtain



Standard HP panel was *negative*

Symptoms improved after he retired



The exposure history is critical but difficult to obtain



Types of hypersensitivity pneumonitis

Farmer's Lung (moldy hay)

Tobacco Grower's Lung

Mushroom Worker's Lung

Potato Riddler's Lung

Paprika Slicer's Lung

Wine Maker's Lung

Cheese Washer's Lung

Coffee Worker's Lung

Tea Grower's Lung

Grain dust (cereal industry)

Wood workers lung

Wood pulp/brush/compost

Humidifier Fever

Hot Tub Lung

Lifeguard Lung

Showers/mold in the home

Bird Fancier's Lung

Pigeon Breeder's Lung

Furriers

Lab technicians (rats, gerbils)

Bat droppings

Bible Printer's Lung

Bagpipe Lung

E-cigarettes

Woodwind instruments



Down products alone can cause HP

Author	Total chronic HP patients, n	Down products as only known exposure, n (%)
Silva et al.	18	2 (11%)
Morell et al.	20*	10 (50%)
Tsutsui et al.	23	11 (48%)
Ishizuka et al.	28	11 (39%)
Morisset et al.	70	6 (8.6%)

*Initially diagnosed with IPF; others in cohort have no other known antigen exposure

Clinical presentation of HP

Acute:

Fever, chills, malaise, cough, dyspnea

Fine crackles common; wheezing is not typical

CT abnormalities: ground glass or normal

(RF may be positive)

Subacute:

Productive cough, dyspnea, fatigue, anorexia, and weight loss

CT abnormalities: ground glass, diffuse micro-nodules,

patchy air trapping, early fibrotic changes

Chronic and progressive:

Cough, dyspnea, fatigue, anorexia, and weight loss

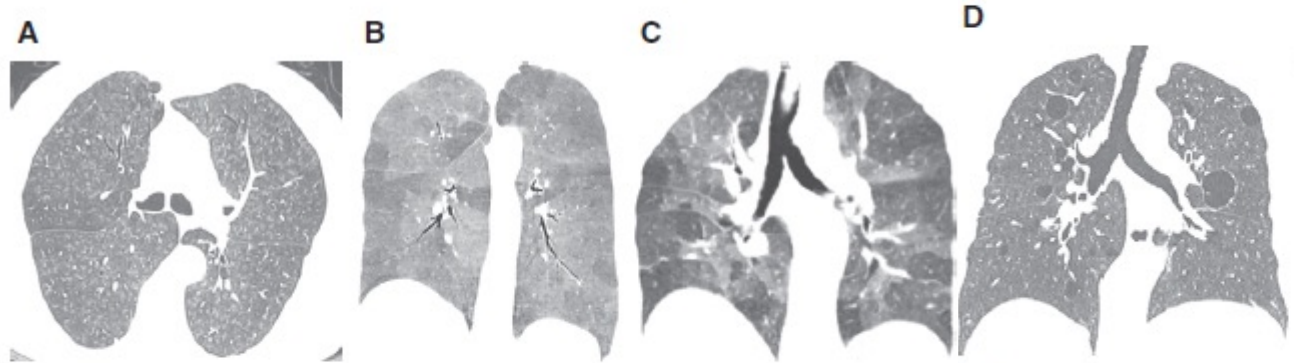
CT abnormalities: significant fibrotic changes, honeycombing,

micro-nodules may or may not be present

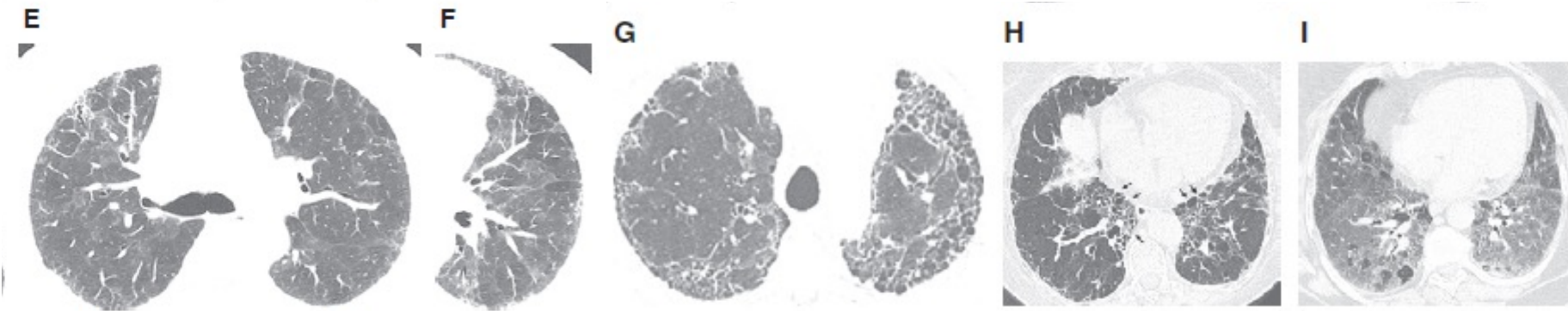


Characteristic CT findings in HP

Typical HP;
Non-fibrotic



Compatible with HP;
Fibrotic



CT findings in fibrotic HP are often non-specific

TABLE 2: CT Features of Patients with Chronic Hypersensitivity Pneumonitis (HP) and Usual Interstitial Pneumonia (UIP)

	No. (%) of Patients		<i>p</i>
	Chronic HP (<i>n</i> = 19)	UIP (<i>n</i> = 33)	
Honeycombing	3 (16)	29 (88)	<.0001
Traction bronchiectasis	10 (53)	28 (85)	.012
Micronodules	8 (42)	2 (6)	.002
Extensive ground-glass attenuation	6 (32)	4 (12)	.087
Irregular lines	16 (84)	32 (97)	.096
Parenchymal distortion	15 (79)	30 (91)	.224
Air-space opacity	2 (11)	6 (18)	.461
Overall extent of isolated ground-glass attenuation (mean ± standard error of the mean)	32 ± 5	26 ± 4	.350
Upper zone predominance	3 (16)	1 (3)	.096
Middle zone predominance	3 (16)	2 (6)	.252
Lower zone predominance	8 (42)	27 (81)	.003
No zone predominance	5 (26)	3 (9)	.097
Peripheral predominance	10 (53)	30 (91)	.002
Peripheral and lower zone predominance	5 (26)	25 (76)	.001
Relative sparing of lower half of lower zone	13 (48)	3 (8)	<.001

Common antigens on our local precipitins panels

***Aspergillus fumigatus* #1, #2, #3, #6**

Aspergillus flavus

Thermoactinomyces candidus

Farmer's Lung

Thermoactinomyces vulgaris

Water contamination, humidifiers

Saccharomonospora viridis

Humidifiers and hay

Micropolyspora faeni

(*Saccharopolyspora rectivirgula*)

Farmer's Lung

Pigeon serum

Aureobasidium pullulans

Black fungus in soil and water



How useful is the HP precipitins panel?

78% of patients with HP had positive precipitins

31% of controls had positive precipitins

TABLE 4. PROBABILITY OF HAVING HYPERSENSITIVITY PNEUMONITIS

Exposure to a Known Offending Antigen	Recurrent Episodes of Symptoms	Symptoms 4–8 h After Exposure	Weight Loss	Crackles, %			
				Serum Precipitins		Serum Precipitins	
				+	-	+	-
+	+	+	+	98	92	93	72
+	+	+	-	97	85	87	56
+	+	-	+	90	62	66	27
+	+	-	-	81	45	49	15
+	-	+	+	95	78	81	44
+	-	+	-	90	64	68	28
+	-	-	+	73	33	37	10
+	-	-	-	57	20	22	5
-	+	+	+	62	23	26	6
-	+	+	-	45	13	15	3
-	+	-	+	18	4	5	1
-	+	-	-	10	2	2	0
-	-	+	+	33	8	10	2
-	-	+	-	20	4	5	1
-	-	-	+	6	1	1	0
-	-	-	-	3	1	1	0

All the predictors are dichotomous variables: '- ' indicates absent; '+ ' indicates present.



BAL patterns seen in HP

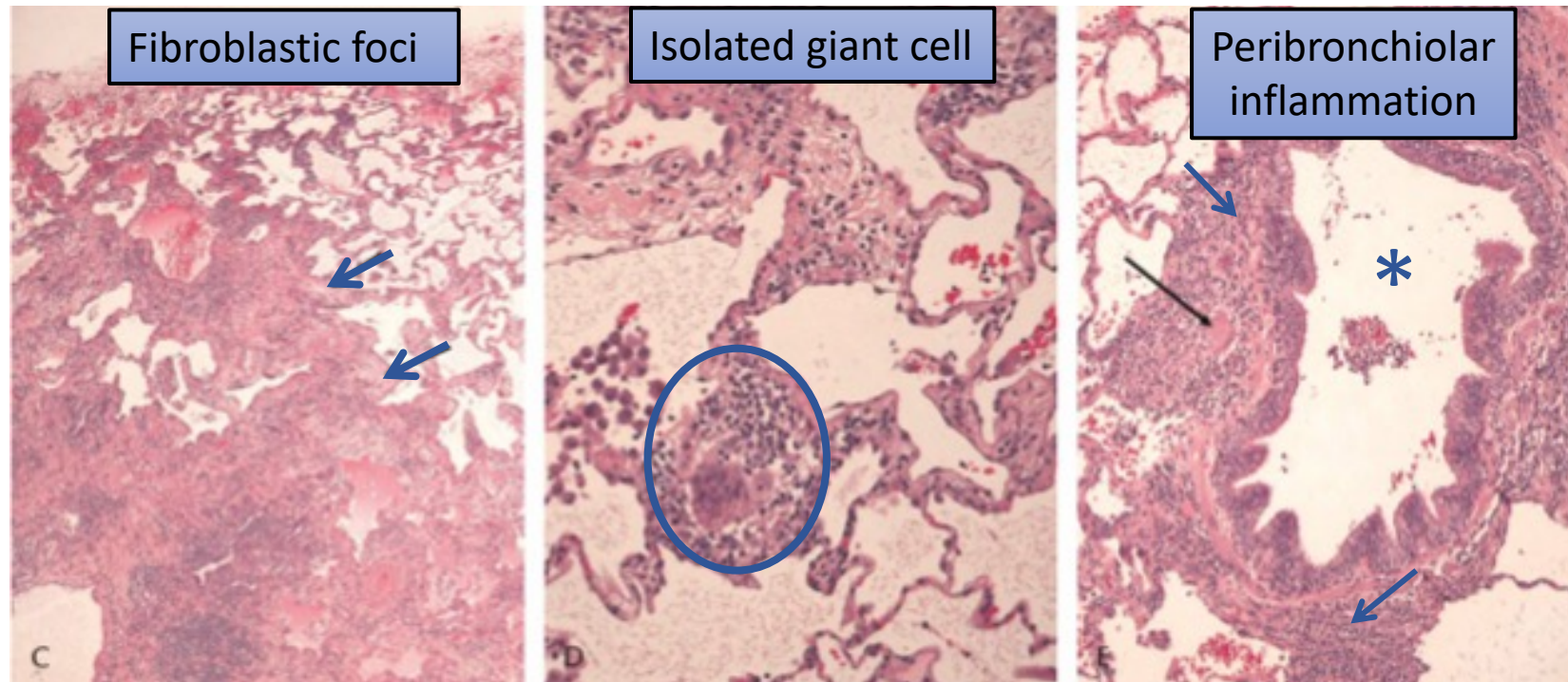
17 patients with HP,
9 with fibrosis on CT
8 without fibrosis on CT

Table 3—Comparison of Cellular Composition of BAL Fluids Between Nonfibrosis Group and Fibrosis Group*

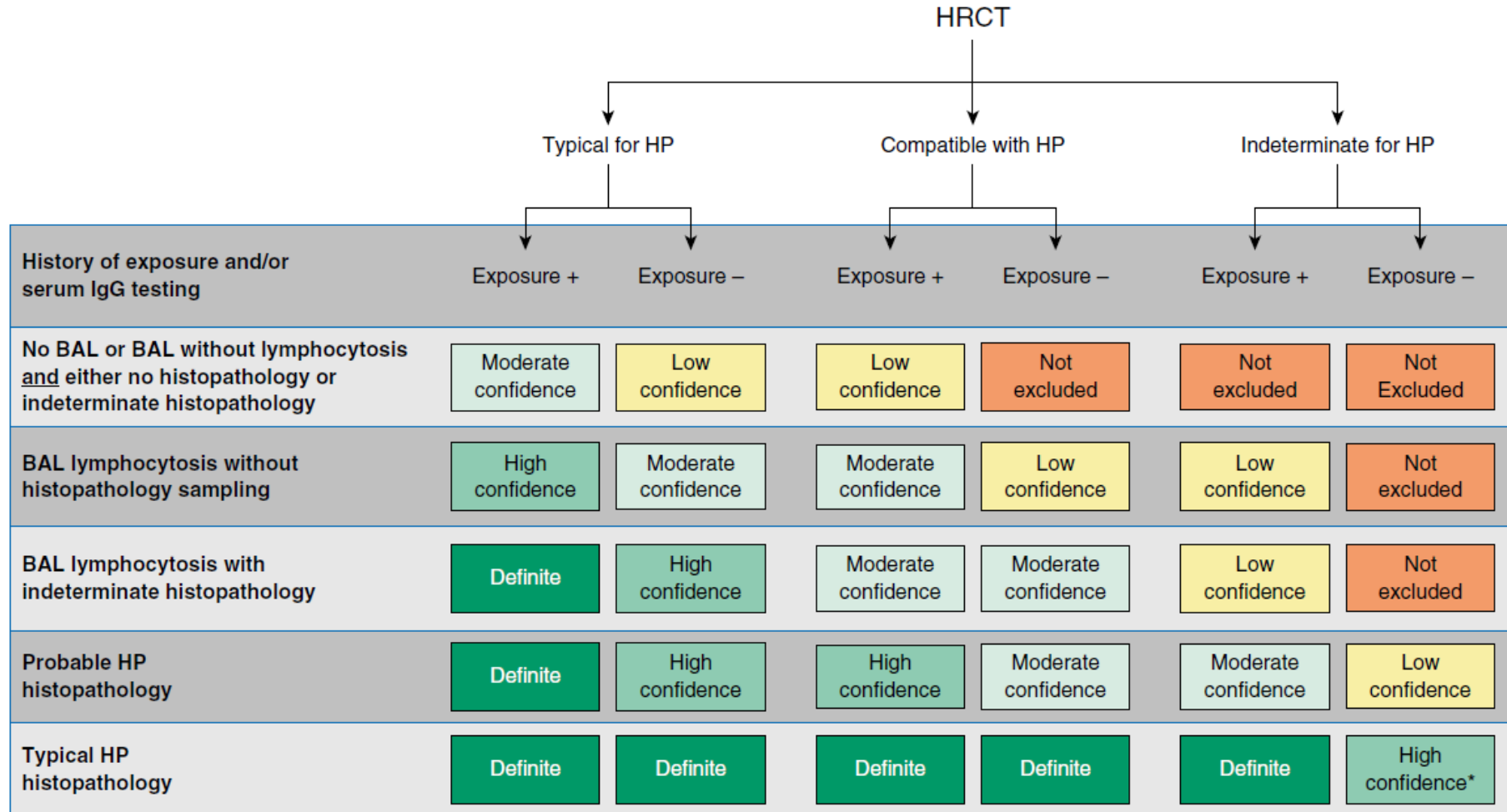
	Nonfibrosis Mean ± SD	Fibrosis Mean ± SD	p Value
Total cell	78.90 ± 25.77	36.39 ± 21.95	0.002†
Macrophages	14.49 ± 6.05	13.77 ± 12.95	NS
Neutrophils	2.60 ± 1.81	1.04 ± 1.04	0.043†
Eosinophils	0.80 ± 0.78	1.39 ± 3.21	NS
Mast cells	0.91 ± 2.01	0.04 ± 0.07	NS
Lymphocytes	59.79 ± 23.23	20.04 ± 17.85	0.001†
T cell	51.64 ± 21.20	17.36 ± 15.49	0.002†
B cell	1.95 ± 1.02	0.95 ± 0.92	NS
CD4	11.35 ± 4.96	9.94 ± 10.81	NS
CD8	37.00 ± 15.83	4.83 ± 4.19	0.000†
CD4/CD8	0.31 ± 0.13	2.59 ± 2.63	0.027†

Pathology in fibrotic HP

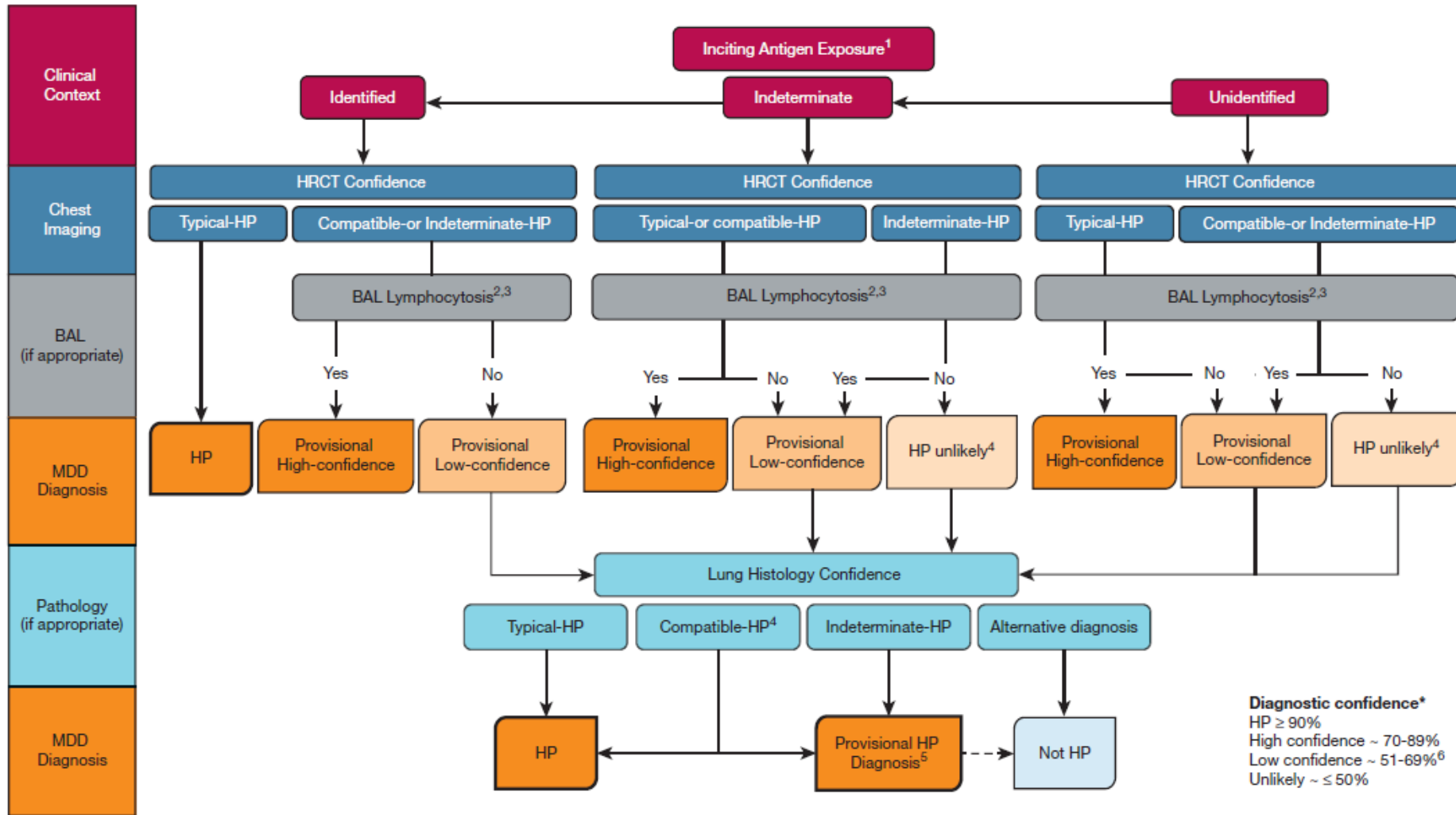
6/13 had only giant cells without any granulomas
9/13 patients had **UIP** on some areas of pathology
4/13 had areas of **NSIP**



Diagnostic algorithm--ATS



Diagnostic algorithm--ACCP



Mimics of HP

Inhalation Fever: “Metal fume fever,” “Monday morning miseries”

Injury to pulmonary cells leads to cytokine release

Fevers, chills, malaise, dyspnea, cough 4-12 hours after exposure

Organic Dust Toxic Syndrome: “Pulmonary mycotoxicosis”

Mycotoxins and endotoxins from *Fusarium* (aflatoxin)

Intense exposure in a single day

Fevers, chills, myalgias, dyspnea

Get infiltrates, reduced DLCO

Path shows obliterative bronchiolitis or DAD

Asthma triggered by dust, mold, etc.

Rarely have wheezing with HP



Summary

- HP can be challenging to diagnose!
- The exposure history is critical and can be extremely difficult to elicit.
- Although “classic” features may exist, the radiographic and pathologic findings are frequently non-specific.

