Table S1: Profile of the experts participating in the International Society for Human and Animal Mycology (ISHAM) allergic bronchopulmonary aspergillosis (ABPA) working group (n=39)

Variables	Results
Age, years (range)	34-73
Sex	
Men	33 (84.6)
Women	6 (15.4)
Country	
India	19 (48.7)
United Kingdom	6 (15.4)
Germany	3 (7.7)
France	2 (5.1)
Australia	1 (2.6)
Austria	1 (2.6)
Brazil	1 (2.6)
Canada	1 (2.6)
Japan	1 (2.6)
Netherlands	1 (2.6)
Singapore	1 (2.6)
Uganda	1 (2.6)
United States	1 (2.6)
Specialty	
Adult Pulmonary Medicine	19 (48.7)
Infectious Disease	9 (23.1)
Microbiology	5 (12.8)
Allergy-Immunology	2 (5.1)
Pediatric Pulmonology	2 (5.1)
Radiodiagnosis	1 (2.6)
Community Medicine/Public Health	1 (2.6)
Affiliation	
University or teaching hospital	33 (85)
Private practitioner	4 (10)
Laboratory practice	2 (5)
Clinical experience in managing ABPA, years	
1-5	3 (7.7)
6-10	5 (12.8)
11-15	9 (23.1)
>15	19 (48.7)
Not applicable	3 (7.7)
Experience in managing cystic fibrosis-ABPA	20 (51.3)
Number of asthma patients managed per month	
<10	6 (15.4)
10 to 50	14 (35.9)
51 to 100	6 (15.4)
>100	7 (17.9)
Not applicable	6 (15.4)
Number of ABPA patients managed per month	
1 to 5	12 (30.8)
6 to 10	12 (30.8)
11 to 20	5 (12.8)
21 to 50	3 (7.7)
>50	1 (2.6)
None/Not applicable	6 (15.4)

All values are presented as numbers (percentage) unless otherwise specified

Table S2: Questions discussed in the Delphi process and the scores obtained (for the statements not achieving consensus in rounds 1 and 2, we used the level of consensus achieved during the final round)

		Round 1	Round 2	Round 3
FUNGAL SENSITIZATION				
1. Which fungi do you suggest screening for fungal sensitization? (Choose all that you regard as routine)	*Aspergillus fumigatus*	37/39 (94.9%)	-	-
	A. flavus	24/39 (61.5%)	24/39 (61.5%)	
	Candida albicans	15/39 (38.5%)	24/39 (61.5%)	
	Alternaria spp.	24/39 (61.5%)	24/39 (61.5%)	
	Cladosporium spp.	24/39 (61.5%)	15/39 (38.5%)	
	Trichophyton spp.	13/39 (33.3%)	13/39 (33.3%)	
	Other (please list)	5/39 (12.8%)	5/39 (12.8%)	
2. In which of the following situations would you suggest screening for fungal sensitization?	1. All newly referred or newly diagnosed adult asthmatics	18/39 (46.2%)	25/35 (71.4%)	
	2. All newly referred or newly diagnosed children (aged >5 years) with asthma	12/39 (30.8%)	10/37 (27%)	
	3. All children with asthma referred to or managed at tertiary care	22/39 (56.4%)	27/37 (73%)	
	3. Uncontrolled asthma	35/39 (89.7%)	-	
	4. Difficult to treat asthma	36/39 (92.3%)	-	
	5. Severe asthma	36/39 (92.3%)	-	
	6. Peripheral eosinophilia	26/39 (66.7%)	-	
	7. Any other	4/39 (10.3%)	-	
3. Which method do you prefer for documenting fungal sensitization?	Fungal-specific IgE	26/34 (76.5%)	-	
	Skin prick test	1/34 (2.9%)	-	
	Both	11/34 (32.3%)	-	
4. In which of the following situations would you suggest evaluating adults for ABPA? (Choose all that is appropriate)	1. All asthmatic adults managed or diagnosed at primary or secondary care	20/39 (51.2%)	25/35 (71.4%)	
	2. All adults with asthma referred to or managed at tertiary care	23/39 (59%)	23/35 (65.7%)	
	3. Uncontrolled asthma	34/39 (87.2%)	-	
	4. Difficult to treat asthma	36/39 (92.3%)	-	
	5. Severe asthma	36/39 (92.3%)	-	
	6. Peripheral eosinophilia	27/39 (69.2%)	-	
	7. Others	6/39 (15.4%)	-	
5. In which of the following situations would you suggest evaluating	1. All asthmatic children (aged >5 years) managed or diagnosed at diagnosed	4/39 (10.3%)	-	

children for ABPA? (Choose all that is appropriate)	primary or secondary care 2. All children with asthma (aged >5 years) referred to or managed at tertiary care 3. Uncontrolled asthma 4. Difficult to treat asthma 5. Severe asthma 6. Peripheral eosinophilia	17/39 (43.6%) 30/39 (76.9%) 31/39 (79.5%) 22/39 (56.4%) 6/39 (15.4%)	27/37 (73%) - - 20/37 (54.1%) -	
6. Which method do you prefer for screening asthmatic patients for ABPA? (Please choose one)	*A. fumigatus* specific IgE *Aspergillus* skin test Serum total IgE *A. fumigatus*-specific IgG *Aspergillus* precipitins Peripheral blood eosinophil count Sputum for *Aspergillus* culture Chest radiograph CT chest Any other test (please specify)	37/39 (94.9%) 0 8/39 (20.5%) 2/39 (5.2%) 1/39 (2.6%) 0 0 0 1/39 (2.6%) 1/39 (2.6%)	- - - - - - - - - -	
7. Would you recommend evaluating/ screening <u>all</u> complex/difficult/brittle asthmatic adults for ABPA periodically?	Yes, alternate years. Yes, annually. Only if there is a significant deterioration in asthma control	5/36 (13.9%) 13/36 (36.1%) 18/36 (50.0%)	8/37 (21.6%) 12/37 (32.4%) 17/37 (45.9%)	-
8. INVESTIGATIONS FOR ABPA				
Aspergillus skin test	Yes	22/39 (56.4%)	22/39 (56.4%)	
Aspergillus precipitins	Yes	15/39 (38.5%)	13/39 (33.3%)	
Serum total IgE, IU/ml	Yes	35/39 (89.7%)	-	
A.fumigatus-specific IgE, kUA/L	Yes	37/39 (94.9%)	-	
A.fumigatus-specific IgG, mgA/L	Yes	32/39 (82.1%)	-	
Blood eosinophil count, cells/µL	Yes	34/39 (87.2%)	-	
Sputum fungal cultures	Yes	23/39 (59.0%)	24/39 (61.5%)	
Serum galactomannan	No	36/39 (92.3%)	-	
IgE against recombinant *Aspergillus* antigens				
f1	Yes	15/39 (38.5%)	16/39 (41%)	
f2	Yes	16/39 (41%)	16/39 (41%)	
f3	Yes	8/39 (20.5%)	-	

f4	Yes	13/39 (33.3%)	13/39 (33.3%)
f6	Yes	10/39 (25.6%)	-
Aspergillus PCR in sputum	Yes	3/39 (7.7%)	-
9. Cut-off values			
A.fumigatus-specific IgE (kUA/L)			
0.1	Yes	1/38 (2.6%)	
0.35	Yes	34/38 (89.5%)	-
0.5	Yes	1/38 (2.6%)	
Other cut-offs	Yes	2/38 (5.3%)	
Serum total IgE (IU/mL)			
417	Yes	2/38 (5.3%)	2/38 (5.3%)
500	Yes	23/38 (60.5%)	22/38 (57.9%)
1000	Yes	12/38 (31.6%)	13/38 (34.2%)
A.fumigatus-specific IgG (mgA/L)			
27	Yes	16/35 (45.7%)	16/35 (45.7%)
40	Yes	10/35 (28.6%)	11/35 (31.4%)
60	Yes	2/35 (5.7%)	2/35 (5.7%)
Other cut-offs	Yes	7/35 (20.0%)	6/35 (17.1%)
Peripheral blood eosinophil count (cells/µL)			
300	Yes	5/37 (13.5%)	
500	Yes	27/37 (73.0%)	-
1000	Yes	5/37 (13.5%)	
Imaging			
Chest radiograph	Yes	24/39 (61.5%)	-
CT chest	Yes	36/39 (92.3%)	-
MRI thorax	Yes	0	-
10. Bronchoscopy for ABPA			
Do you recommend performing bronchoscopy in ABPA patients for diagnosis?	No	31/36 (86.1%)	-
Do you perform bronchoscopy in the evaluation/management of ABPA patients?	Yes, sometimes	30/35 (85.7%)	-
If the ABPA / asthma diagnosis is uncertain.	Yes	19/37 (51.3%)	

If radiology is consistent with TB, to rule out TB, before corticosteroids are given.	Yes	22/37 (59.5%)		
To collect samples for fungal culture, microscopy, and Aspergillus antigen/PCR.	Yes	14/37 (37.8%)		
Only for therapeutic reasons, to remove mucus plugs.	Yes	21/37 (56.8%)		
To investigate hemoptysis.	Yes	24/37 (64.9%)		
Others	Yes	5/37 (13.5%)		
11. DIAGNOSTIC CRITERIA	Modifications suggested and discussed	19/39 (48.7%)	21/39 (53.8%)	25/34 (73.5%)
12. CLINICAL CLASSIFICATION		20/34 (58.8%)	29/34 (85.3%)	-
13. RADIOLOGICAL CLASSIFICATION		18/34 (52.9%)	21/34 (61.8%)	30/34 (88.2%)
14. TREATMENT OF ABPA				
Do you suggest treating asymptomatic or well-controlled asthmatics with ABPA using systemic medications (oral glucocorticoids or triazoles)?	No	30/35 (85.7%)	-	-
What first-line treatment do you suggest for managing new cases of ABPA?	Prednisolone Itraconazole Voriconazole Posaconazole Isavuconazole Prednisolone-itraconazole combination Prednisolone-voriconazole combination Nebulized amphotericin Biologics (anti-IgE, anti-type 2) High-dose ICS	25/32 (78.1%) 19/32 (59.4%) 7/32 (21.9%) 1/32 (3.1%) 1/32 (3.1%) 9/32 (28.1%) 1/32 (3.1%) 1/32 (3.1%) 1/32 (3.1%) 0	- 24/35 (68.6%)	- 25/34 (73.5%)
What treatment do you suggest in those with contraindications to glucocorticoids?	Itraconazole Voriconazole Posaconazole Isavuconazole Nebulized amphotericin Biologics (anti-IgE, anti-type 2)	33/39 (84.6%) 22/39 (56.4%) 9/39 (23.1%) 4/39 (10.3%) 7/39 (17.9%) 17/39 (43.6%)	-	-
What treatment do you suggest in	Prednisolone	28/39 (71.8%)	-	-

those with contraindications to azoles?	Nebulized amphotericin Biologics (anti-IgE, anti-type 2)	18/39 (46.2%) 18/39 (46.2%)		
What treatment do you suggest for managing ABPA during pregnancy?	Prednisolone Itraconazole Voriconazole Posaconazole Isavuconazole Prednisolone-itraconazole combination Prednisolone-voriconazole combination Nebulized amphotericin Biologics (anti-IgE, anti-type 2)	27/37 (73%) 0 0 0 0 1 (2.7%) 0 8/37 (21.6%) 5/37 (13.5%)	-	-
What dosing protocol would you recommend for glucocorticoids in treating ABPA?				
Oral prednisolone: 0.5 mg/kg/d, 0.25 mg/kg/d, 0.125 mg/kg/d, each, for 4 weeks; then taper by 5 mg/week to complete four months.	Yes	19/34 (55.9%)	21/35 (60.0%)	25/35 (71.4%)
Oral prednisolone 0.5 mg/kg/day for two weeks followed by 0.5 mg/kg/day for alternate days for eight weeks. Then taper by 5 mg every two weeks and discontinue over 3-5 months.	Yes	10/34 (29.4%)	14/35 (40.0%)	10/35 (28.6%)
Any other protocol	Yes	5/34 (14.7%)	-	-
What should be the dosing protocol for azoles in treating ABPA?				
Itraconazole (or Voriconazole) 200 mg bid for 4 months	Yes	29/34 (85.3%)	-	-
Do you suggest therapeutic drug monitoring while using antifungal azoles?	Yes	32/35 (91.4%)	-	-
When to assess treatment response?	4 weeks 6 weeks 8 weeks 12 weeks	5/35 (14.3%) 9/35 (25.7%) 9/35 (25.7%) 12/35 (34.3%)	8 (20.5%) 8 (20.5%) 16 (41.0%) 5 (12.8%)	
How do you recommend assessing	Symptoms	36/36 (100%)	-	-

response to treatment (choose more than one if required)?	Chest radiograph (chest imaging)	19/36 (52.8%)	22/35 (62.9%)	-
	CT chest	12/36 (33.3%)	10/35 (28.6%)	-
	Serum total IgE	33/36 (91.7%)	-	-
	Serum *A. fumigatus* specific IgE	0	-	-
	Serum *A. fumigatus* specific IgG	0	-	-
	Peripheral blood eosinophil count	13/36 (36.4%)	12/35 (34.2%)	9/34 (26.4%)
	Spirometry	25/36 (69.4%)	-	
	HRQoL questionnaire	22/36 (61.1%)	25/35 (71.4%)	
How do you recommend diagnosing ABPA exacerbations in practice?	Clinical	0	-	
	Clinical and immunological	4/37 (10.8%)		
	Clinical and radiological	0		
	Clinical, radiological, and immunological	33/37 (89.2%)		
What would you recommend for treating the first ABPA exacerbations?	Prednisolone	25/35 (71.4%)	-	-
	Itraconazole	12/35 (34.3%)		
	Voriconazole	7/35 (20.0%)		
	Posaconazole	0		
	Isavuconazole	0		
	Prednisolone-itraconazole combination	16/35 (45.7%)		
	Prednisolone-voriconazole combination	3/35 (8.6%)		
	Nebulized amphotericin	0		
	Biologics (anti-IgE, anti-type 2)	2/35 (5.7%)		
What do you recommend for treating the subsequent ABPA exacerbations?[a]	Prednisolone	11/35 (31.4%)	3/36 (16.7%)	-
	Itraconazole	8/35 (22.9%)	4/36 (11.1%)	-
	Voriconazole	5/35 (14.3%)	1/36 (2.8%)	-
	Posaconazole	0	-	-
	Isavuconazole	0	-	-
	Prednisolone-itraconazole combination	23/35 (65.7%)	21/36 (58.3%)	25/35 (71.4)
	Prednisolone-voriconazole combination	9/35 (25.7%)	5/36 (13.9%)	-
	Nebulized amphotericin	3/35 (8.6%)	1/36 (2.8%)	-
	Biologics (anti-IgE, anti-type 2)	11/35 (31.4%)	2/36 (5.6%)	-
What should be the optimal duration for treating ABPA exacerbations?	2 months	3/34 (8.8%)	10/36 (27.8%)	32/32 (100%) for assessment at 8-12 weeks
	3 months	6/34 (17.6%)	12/36 (33.3%)	
	4 months	16/34 (47.1%)	9/36 (25%)	
	6 months	7/34 (20.6%)	5/36 (13.9%)	
	others (please specify duration)	2/34 (5.9%)	0	
Do you recommend using biological agents for treating ABPA in your				

practice?	Yes	28/34 (82.4%)	-	
Omalizumab	Yes	25/30 (83.3%)	26/33 (78.8%)	
Mepolizumab	Yes	19/30 (63.3%)	14/31 (45.2%)	
Benralizumab	Yes	18/30 (60.0%)	17/32 (53.1%)	
Dupilumab	Yes	16/30 (53.3%)	15/29 (51.7%)	
Tezepelumab	Yes	7/30 (23.3%)	6/27 (22.2%)	
If yes, please suggest the indications for biologics:				
New ABPA cases	Yes	1/32 (3.1%)	-	
ABPA exacerbations	Yes	5/32 (15.6%)		
For treatment dependent ABPA as maintenance therapy after response	Yes	23/32 (71.9%)		
Contraindications to oral glucocorticoids	Yes	26/32 (81.2%)		
Contraindications to oral azoles	Yes	23/32 (71.9%)		
Intolerance to oral azoles	Yes	24/32 (75.0%)		
Do you suggest using nebulized amphotericin B (NAB) for ABPA?	Yes	18/33 (54.5%)	15/35 (42.9%)	
Where do you suggest using NAB?				
New ABPA cases	Yes	0		
ABPA exacerbations	Yes	1/27 (3.7%)	-	
Treatment-dependent ABPA as maintenance therapy after response	Yes	10/27 (37.0%)		
Contraindications to oral glucocorticoids	Yes	7/27 (25.9%)		
Contraindications to oral azoles				
Intolerance to oral azoles	Yes	16/27 (59.3%)		
	Yes	16/27 (59.3%)		
Would you recommend routinely treating all patients of serologic ABPA (ABPA without bronchiectasis) with systemic medications (oral glucocorticoids or triazoles)?	No	26/34 (76.4%)	-	-
If yes, when	Severe asthma	27/34 (79.4%)	-	-
	Recurrent ABPA exacerbations	29/34 (85.3%)		

	Any other			
Management options for treatment dependent ABPA	Long term itraconazole	-	-	31/31 (100%)
	Biologics			22/31 (71%)
	Nebulized amphotericin B			31/31 (100%)

All values are presented as numbers (percentage) unless otherwise specified.
[a]Multiple options allowed in the first round of Delphi

Table S3: Detailed imaging acquisition protocol for chest computed tomography (CT)

Parameters	**CT chest**
Scanning mode	Helical
Patient position	Supine, in deep suspended inspiration
Scan area	The whole chest (from apices to domes of the diaphragm)
Scan acquisition	Volumetric, non-contrast
Tube potential (kVp)	Appropriate to patient size; 120 (standard) and lower tube potential for small, thin, or pediatric patients
Tube current (mA)	<200, AEC modulated mA is preferred over fixed mA
Collimation	Thinnest possible (e.g., 0.6 mm)
Slice thickness, millimeter	0.625-1.5
Scan (rotation) time, seconds	Shortest possible (<0.5s)
Pitch	0.75-1.5
Matrix	512 x 512
Reconstruction technique	IR blended with FBP (when available), else FBP
Reconstruction algorithm/kernel/filter	High spatial resolution (also called sharp/bone) algorithm
Window level/width	Lung window: -600 to -700 HU/1000-1500 HU; mediastinal window: 50/350 HU
Post Processing	MPR, MIP, minIP or VRT
Effective Radiation Dose	3-7 mSv
The acquired CT images are then reconstructed in the soft tissue window (20-30 kernel) and lung window (sharp/bone or high-spatial frequency algorithm, 60-80 kernel) with 0.625-1.25 mm slice thickness. The 60-80 kernel reconstruction becomes the high-resolution CT, without a need for separate non-sequential high-resolution CT scan, as was previously done. The post-processing of the acquired volumetric CT data can be performed on various workstations.	

AEC = Automated exposure control, IR = Iterative reconstruction, FBP = filtered back projection, MPR = multiplanar reconstruction, MIP = maximum intensity projection, minIP = minimum intensity projection, VRT = volume rendered technique

Figure S1: Use of sputum eosinophil counts to choose drug therapy in allergic bronchopulmonary aspergillosis (ABPA) patients with exacerbation of respiratory symptoms