SUPPLEMENTARY MATERIAL

Supplementary Table 1 Patient characteristics across the two clustered groups (N = 83)

	Total (n = 83)	Cluster 1 (n = 35)	Cluster 2 (n = 48)	p
Age, years	7.5 (6.5-9.7)	7.4 (6.5-9.6)	7.8 (6.4-10.1)	0.699
Male sex, n (%)	26 (31.3)	24 (68.6)	33 (68.8)	0.986
Atopy, n (%)	29 (82.9)	29 (82.9)	38 (79.2)	0.674
Sputum inflammatory phenotype, n (%)				
Eosinophilic	27 (32.5)	8 (22.9)	19 (39.6)	
Neutrophilic	32 (38.6)	14 (40.0)	18 (37.5)	0.281
Mixed	13 (15.7)	8 (22.9)	5 (10.4)	
Paucigranulocytic	11 (13.3)	5 (14.3)	6 (12.5)	
Pulmonary function parameters				
FEV1, % predicted	96.8 ± 16.2	96.1 ± 16.9	97.3 ± 15.8	0.735
FEV1/FVC	0.81 (0.74-0.86)	0.81 (0.74-0.84)	0.83 (0.74-0.86)	0.369
Post BD FEV1, % predicted	105.7 ± 15.8	105.5 ± 16.3	105.9 ± 15.5	0.911
Post BD FEV1/FVC	0.85 (0.81-0.91)	0.83 (0.80-0.89)	0.87 (0.83-0.91)	0.122
BDR assessing Δ FEV1	29 (34.9)	13 (37.1)	16 (33.3)	0.719
BHR assessing challenge test	62 (74.7)	23 (69.7)	39 (48.8)	0.161

FEV1, Forced expiratory volume in one second; FVC, forced vital capacity; BD, bronchodilator; BDR, bronchodilator response; Δ, the change of before and after bronchodilator; BHR, bronchial hyperresponsiveness response.

Supplementary Table 2 Correlation analysis between the dominant genera in each cluster and inflammatory cytokines

	Neisseria	Haemophilus	Prevotella	Veillonella	Actinomyces	Streptococcus	Granulicatella	Ralstonia
CD40	0.158	0.188	-0.046	-0.175	-0.178	0.131	-0.253	**-0.342**[*]
	0.356	0.271	0.791	0.309	0.300	0.445	0.137	0.041
GM-CSF	0.269	-0.082	-0.359	-0.302	-0.100	0.166	-0.244	-0.247
	0.183	0.691	0.072	0.133	0.625	0.417	0.230	0.223
Granzyme B	0.073	-0.013	0.130	0.021	0.077	0.121	-0.203	-0.106
	0.582	0.923	0.323	0.875	0.559	0.357	0.120	0.419
INF-α	0.359	**0.810**[*]	-0.500	0.405	0.214	-0.071	0.143	-0.209
	0.382	0.015	0.207	0.320	0.610	0.867	0.736	0.620
IFN-γ	0.320	0.309	-0.153	-0.218	-0.202	0.060	-0.112	-0.329
	0.065	0.075	0.386	0.216	0.252	0.737	0.527	0.057
IL-1α	-0.083	-0.177	0.049	0.175	**0.281**[*]	0.109	-0.076	-0.242
	0.519	0.168	0.702	0.173	0.027	0.400	0.556	0.058
IL-1β	-0.020	0.004	-0.045	-0.067	0.082	0.056	-0.077	-0.053
	0.879	0.976	0.731	0.607	0.524	0.668	0.554	0.681
IL-1Ra	-0.082	-0.124	0.028	**0.274**[*]	0.142	0.180	0.046	-0.236
	0.528	0.336	0.830	0.031	0.270	0.162	0.724	0.065
IL-2	0.065	0.161	-0.001	-0.024	-0.187	0.090	-0.165	-0.280
	0.697	0.335	0.997	0.886	0.261	0.592	0.322	0.089
IL-4	**-0.545**[*]	0.138	0.094	0.051	0.230	-0.227	0.289	-0.008
	0.016	0.573	0.701	0.835	0.344	0.351	0.230	0.973
IL-6	0.158	0.230	0.130	-0.053	0.019	-0.169	-0.097	-0.051
	0.319	0.142	0.411	0.741	0.903	0.285	0.542	0.747
IL-8	0.115	0.040	0.198	0.041	-0.034	0.025	**-0.258**[*]	-0.227
	0.374	0.755	0.124	0.755	0.795	0.846	0.043	0.076

IL-10	0.221	0.009	-0.157	-0.258	-0.076	0.238	-0.129	-0.295
	0.250	0.962	0.417	0.176	0.695	0.215	0.504	0.120
IL-12p70	-0.053	0.339	-0.028	0.296	0.014	-0.127	0.194	-0.342
	0.870	0.282	0.931	0.350	0.965	0.695	0.546	0.277
IL-13	-0.011	0.186	**-0.581**[*]	0.182	0.058	0.204	0.130	0.034
	0.963	0.447	0.009	0.455	0.813	0.401	0.596	0.889
IL-15	0.323	0.399	**-0.776**[*]	-0.339	-0.164	0.418	0.035	-0.330
	0.192	0.101	<0.001	0.169	0.515	0.084	0.891	0.182
IL-17A	-0.328	0.475	**-0.759**[*]	-0.093	0.093	0.080	-0.031	-0.308
	0.355	0.165	0.011	0.799	0.799	0.826	0.933	0.387
IL-33	0.226	0.309	**-0.574**[*]	**-0.424**[*]	-0.419	-0.070	0.336	0.068
	0.311	0.161	0.005	0.049	0.052	0.757	0.126	0.763
MCP-1	**0.357**[*]	0.157	-0.271	-0.157	-0.191	0.127	-0.076	-0.199
	0.013	0.285	0.062	0.287	0.194	0.389	0.607	0.174
MIP-1α	0.154	0.231	0.005	0.077	-0.108	**0.264**[*]	-0.077	**-0.403**[*]
	0.258	0.087	0.974	0.571	0.430	0.049	0.574	0.002
MIP-1β	0.131	0.130	-0.147	-0.145	-0.012	0.040	-0.242	-0.155
	0.309	0.314	0.253	0.261	0.923	0.758	0.058	0.230
PD-L1	**0.445**[*]	**0.450**[*]	**-0.438**[*]	-0.291	-0.075	0.172	-0.037	-0.243
	0.016	0.014	0.017	0.126	0.700	0.372	0.848	0.205
TNF-α	0.397	0.488	0.029	0.206	0.068	-0.063	-0.170	-0.187
	0.143	0.065	0.919	0.462	0.810	0.825	0.545	0.505

CD, cluster of differentiation; GM-CSF, granulocyte-macrophage colony-stimulating factor; INF, interferon; IL, interleukin; CXCL, C-X-C motif chemokine; MCP, monocyte chemoattractant protein; MIP, macrophage inflammatory proteins; PD-L, programmed death-ligand.

*Spearman correlation analysis $p < 0.05$