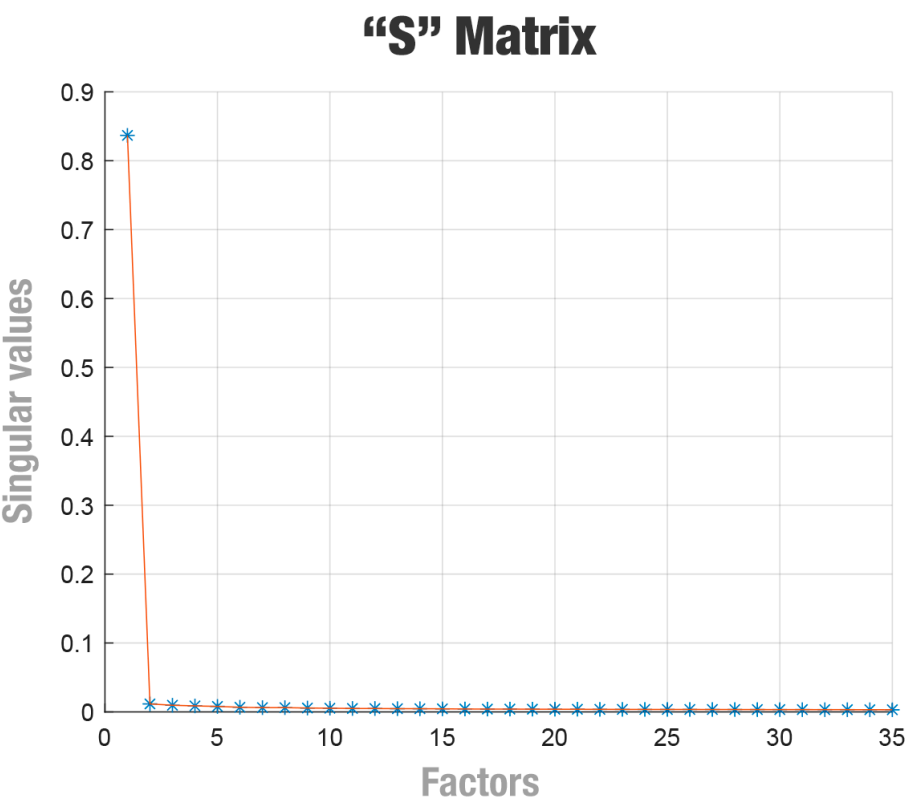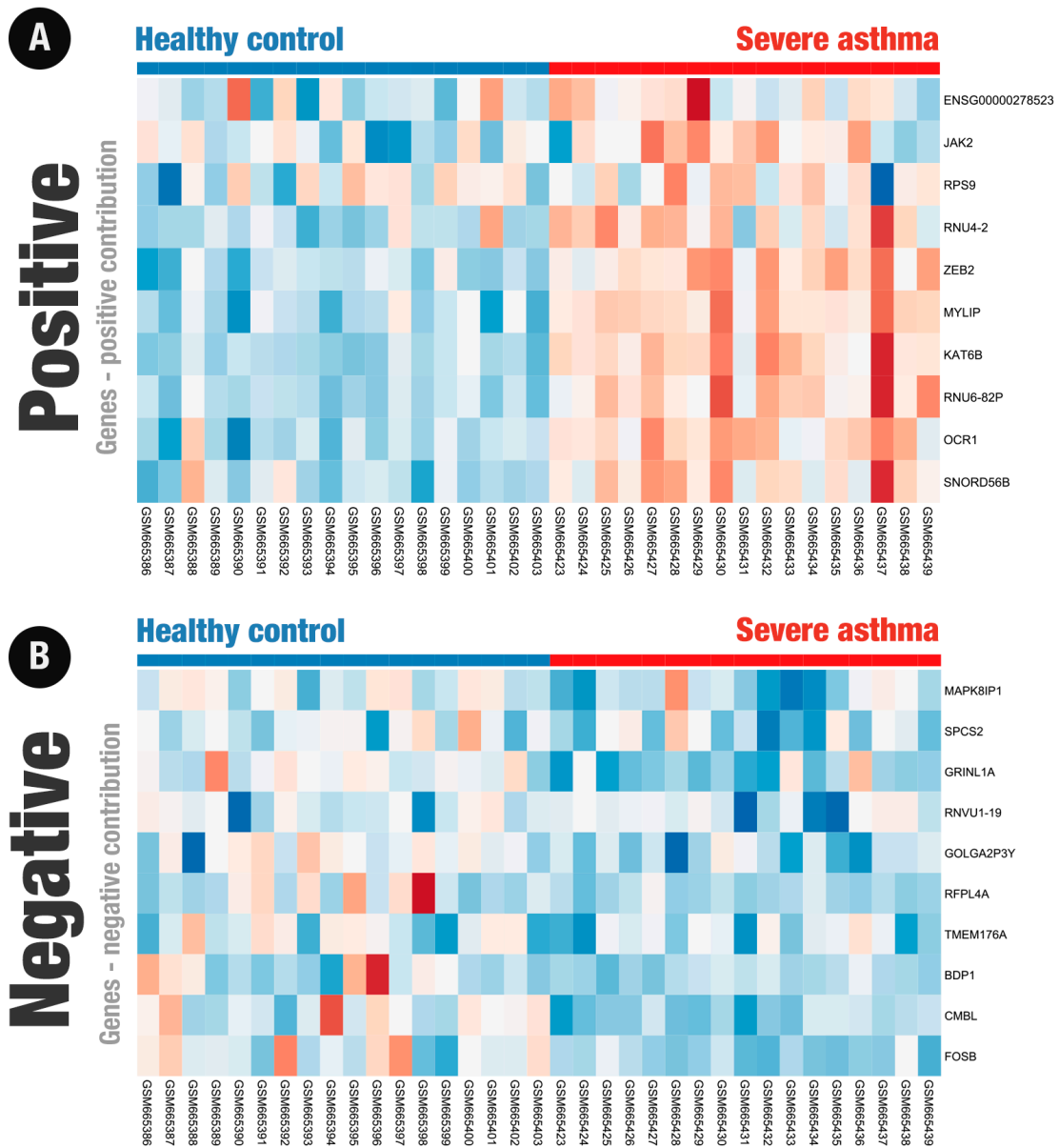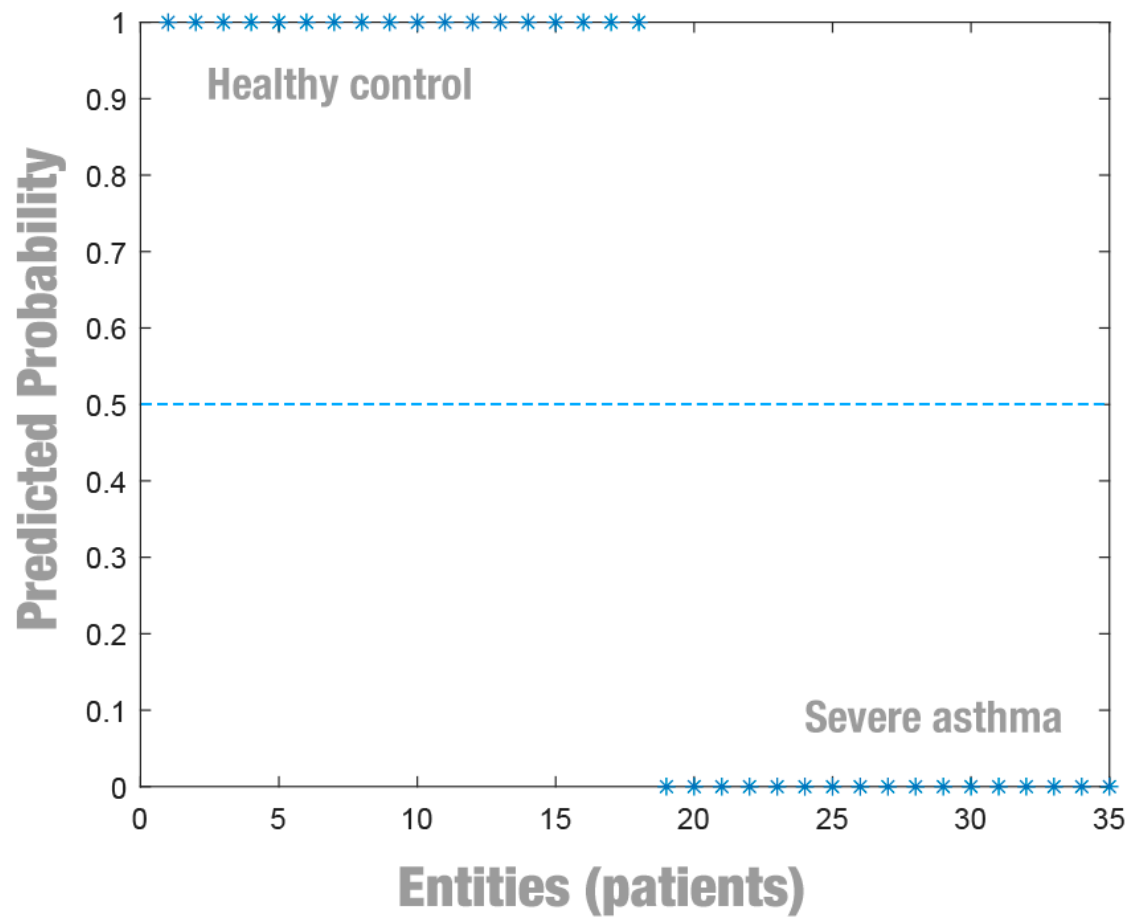# Supplementary material for "Mapping Relevant Genes in Severe Asthma: A Computational Strategy for Biomarker Discovery"

"S" Matrix

Supplementary Figure S1. Importance of singular values by total factors (principal components).

Supplementary Figure S2. Expression levels for the top 20 most important genes according to the weight distribution (α) derived from the logistic regression model. Values were normalized by row. Details are available at Supplementary Table S2 and S3.

Supplementary Figure S3. Classification probabilities obtained by Logistic Regression. Scores close to 1: healthy control; scores close to 0: severe asthma.

Supplementary Table S1. Expression levels of the top 10 most important genes by the Information Gain algorithm (HC: Healthy control; SA: Severe asthma)

#	Class	ID	7944525	8005829	8157727	7907531	7968295	8117018	8144512	7928489	8103620	8151411
1	HC	GSM665386	6.89	4.85	6.06	6.08	3.88	4.68	2.75	6.79	2.44	7.77
2	HC	GSM665387	6.74	4.25	5.86	6.34	3.32	4.03	2.84	6.86	2.57	7.26
3	HC	GSM665388	6.94	5.51	6.04	6.58	4.40	5.42	2.65	7.45	2.44	7.68
4	HC	GSM665389	6.85	4.79	5.47	6.26	3.71	4.49	2.63	6.92	2.44	7.67
5	HC	GSM665390	6.77	4.35	5.65	6.30	3.64	3.38	2.74	7.28	2.53	7.28
6	HC	GSM665391	6.82	5.20	6.19	6.83	3.84	5.50	2.62	7.16	2.68	7.63
7	HC	GSM665392	6.27	4.90	5.69	5.95	3.80	4.83	2.64	7.09	2.47	7.02
8	HC	GSM665393	6.39	5.28	6.35	6.70	3.73	4.72	2.62	7.04	2.51	7.62
9	HC	GSM665394	6.57	4.04	5.97	6.05	3.32	3.79	2.70	6.87	2.32	7.47
10	HC	GSM665395	6.41	5.04	6.03	5.64	3.60	4.59	2.64	6.77	2.34	7.33
11	HC	GSM665396	6.53	5.02	5.16	6.02	3.45	4.73	2.64	6.84	2.60	7.59
12	HC	GSM665397	6.95	5.10	6.23	6.72	4.09	5.92	2.73	7.52	2.76	7.54
13	HC	GSM665398	6.38	4.00	5.75	6.11	3.58	4.39	2.72	7.05	2.49	7.38
14	HC	GSM665399	6.62	5.13	6.04	6.72	3.91	4.93	2.65	7.27	2.51	7.64
15	HC	GSM665400	6.78	4.86	6.10	6.29	4.18	5.59	2.66	7.69	2.49	7.53
16	HC	GSM665401	6.12	4.56	5.90	5.98	3.38	3.62	2.74	7.04	2.53	7.65
17	HC	GSM665402	6.63	4.96	6.15	6.50	3.92	5.54	2.78	7.10	2.49	7.51
18	HC	GSM665403	6.57	4.35	5.71	6.06	3.25	3.82	2.57	6.64	2.74	7.68
19	SA	GSM665423	7.36	5.82	6.90	7.32	4.28	5.92	2.93	8.26	2.40	7.93
20	SA	GSM665424	6.47	5.42	6.36	6.73	4.49	6.09	2.84	8.06	2.43	7.72
21	SA	GSM665425	7.03	5.55	6.84	7.11	5.19	6.57	2.98	8.20	2.33	7.76
22	SA	GSM665426	7.02	5.39	6.26	6.97	4.72	6.52	2.85	7.84	2.38	7.69
23	SA	GSM665427	7.00	6.04	6.94	7.28	5.13	6.34	2.87	8.51	2.42	8.09
24	SA	GSM665428	7.11	6.04	6.76	6.76	4.60	6.24	2.82	8.26	2.35	7.86
25	SA	GSM665429	7.13	5.87	6.91	6.84	4.40	5.84	2.72	8.21	2.30	8.04
26	SA	GSM665430	7.68	6.73	7.49	7.83	6.00	7.64	2.96	8.94	2.40	8.19
27	SA	GSM665431	7.25	4.72	6.07	6.60	4.17	5.51	2.93	7.52	2.28	7.93
28	SA	GSM665432	7.35	6.68	7.19	7.71	5.35	7.16	2.96	8.90	2.42	7.88
29	SA	GSM665433	7.32	5.36	6.29	7.00	5.03	6.00	3.08	8.57	2.41	7.56
30	SA	GSM665434	7.04	5.83	6.91	7.32	5.04	6.00	2.90	8.23	2.23	7.65
31	SA	GSM665435	7.12	5.90	7.02	7.22	4.44	6.06	2.93	7.86	2.53	8.00
32	SA	GSM665436	7.06	5.56	7.09	7.17	4.46	5.87	2.79	7.71	2.38	8.07
33	SA	GSM665437	7.73	7.05	7.70	7.88	6.29	7.70	3.12	9.51	2.43	8.62
34	SA	GSM665438	7.21	5.57	6.67	7.08	4.59	6.46	3.02	7.97	2.42	7.86
35	SA	GSM665439	7.44	6.73	7.13	7.64	5.58	6.40	2.92	8.02	2.38	7.95

Genes: 7944525: *RNU6-1123P*; 8005829: *PYY2*; 8157727: *GPR21*; 7907531: *GPR52*; 7968295: *RNU6-82P*; 8117018: *RNU6-522P*; 8144512: *RNU6-682P*; 7928489: *KAT6B*; 8103620: *RNU6-1336P*; 8151411: *TCEB1*.

Supplementary table S2. Expression levels of the top 10 genes that contribute most negatively (Healthy controls class) to the model, according to the logistic regression model

class	Negative										
	gene	8137264	7983890	8110971	7904967	8106025	7985431	8031570	8007848	8029693	7914180
Healthy control	GSM665386	6.23	7.20	6.39	9.55	4.30	5.84	3.02	5.23	8.45	4.96
Healthy control	GSM665387	7.64	6.63	7.03	9.43	3.72	6.95	3.63	6.06	9.03	3.87
Healthy control	GSM665388	9.29	6.54	5.61	9.02	3.48	4.89	3.34	6.18	7.86	4.45
Healthy control	GSM665389	7.24	8.23	5.66	9.32	2.16	6.82	3.44	5.98	7.94	4.89
Healthy control	GSM665390	7.60	6.61	6.10	6.58	2.55	7.01	4.49	4.76	7.83	4.19
Healthy control	GSM665391	8.77	7.10	5.95	8.24	2.17	7.30	4.99	5.80	6.92	3.57
Healthy control	GSM665392	8.32	7.45	5.23	9.47	2.55	6.31	3.43	6.09	9.84	4.71
Healthy control	GSM665393	6.21	7.18	6.04	8.83	2.32	7.49	4.86	4.31	7.33	4.80
Healthy control	GSM665394	8.42	7.06	7.73	8.45	1.76	6.97	3.31	5.49	7.98	5.01
Healthy control	GSM665395	8.48	7.37	5.94	8.64	4.26	6.77	5.60	5.17	7.45	5.03
Healthy control	GSM665396	8.18	7.23	6.77	8.75	5.44	6.29	3.66	6.25	8.88	3.00
Healthy control	GSM665397	7.37	6.74	6.31	9.30	2.73	6.61	4.85	6.29	9.73	5.03
Healthy control	GSM665398	6.38	6.81	5.69	7.08	3.42	7.07	6.93	4.93	6.80	5.61
Healthy control	GSM665399	5.91	7.22	5.64	8.66	3.24	6.64	3.76	5.28	6.51	3.95
Healthy control	GSM665400	7.78	7.04	6.53	9.49	2.51	6.99	3.06	6.17	8.22	6.21
Healthy control	GSM665401	8.44	6.93	6.30	9.69	2.35	6.58	3.46	6.10	7.89	4.76
Healthy control	GSM665402	8.46	7.56	6.32	8.38	2.75	6.75	3.31	5.08	7.86	3.35
Healthy control	GSM665403	6.15	6.37	6.59	8.96	2.22	6.00	3.97	5.18	8.77	4.85
Severe asthma	GSM665423	6.20	5.84	5.01	9.03	2.44	6.46	3.56	4.35	7.34	3.94
Severe asthma	GSM665424	5.74	7.15	5.30	9.30	2.37	5.75	2.92	3.98	7.28	3.23
Severe asthma	GSM665425	8.01	5.92	5.45	9.02	1.99	6.53	3.33	5.32	8.05	4.92
Severe asthma	GSM665426	7.60	6.17	5.47	9.20	2.38	5.80	3.63	5.09	7.42	5.13
Severe asthma	GSM665427	8.00	6.28	5.95	9.27	2.10	6.39	4.38	5.11	7.11	3.45
Severe asthma	GSM665428	6.64	6.51	5.36	8.90	2.55	4.85	3.23	7.34	6.93	5.85
Severe asthma	GSM665429	8.09	6.15	5.33	9.42	2.68	6.08	3.27	5.20	7.12	5.00
Severe asthma	GSM665430	7.86	6.43	5.63	8.81	2.88	6.96	3.63	5.46	7.68	3.46
Severe asthma	GSM665431	5.74	5.99	5.02	6.42	2.62	6.74	3.17	4.70	6.74	4.25
Severe asthma	GSM665432	8.25	5.91	5.46	8.30	2.91	6.24	3.35	4.08	6.69	2.57

Severe asthma	GSM665433	6.57	7.40	5.37	9.21	2.40	5.48	3.43	3.60	7.31	3.35
Severe asthma	GSM665434	7.77	6.14	6.02	6.84	2.43	6.53	3.99	3.87	6.91	2.96
Severe asthma	GSM665435	7.88	6.61	5.96	6.55	2.56	5.58	3.35	4.62	6.88	5.27
Severe asthma	GSM665436	8.69	7.85	5.94	9.36	3.15	5.32	3.26	5.77	7.07	3.53
Severe asthma	GSM665437	7.88	6.47	5.64	9.53	2.50	6.32	3.51	6.02	7.03	4.93
Severe asthma	GSM665438	6.02	6.35	5.77	9.56	2.46	6.31	3.17	5.80	8.26	4.64
Severe asthma	GSM665439	6.76	6.40	5.81	8.52	2.30	6.55	3.30	4.93	6.62	3.43

Supplementary table S3. The top 10 genes that contribute most positively (Severe asthma class) to the model, according to the logistic regression model

class	gene	Positive									
		8117018	7908861	7967028	7928489	8052581	8154211	7968295	8031152	8055639	7975453
Healthy control	GSM665386	4.68	6.95	6.01	6.79	4.34	7.01	3.88	3.96	5.72	3.73
Healthy control	GSM665387	4.03	6.16	6.20	6.86	4.14	6.44	3.32	2.77	5.82	4.00
Healthy control	GSM665388	5.42	8.51	6.21	7.45	3.54	7.04	4.40	5.10	6.92	6.02
Healthy control	GSM665389	4.49	6.95	6.86	6.92	3.71	5.96	3.71	3.99	6.30	4.78
Healthy control	GSM665390	3.38	5.77	6.23	7.28	5.96	6.14	3.64	5.72	5.76	4.06
Healthy control	GSM665391	5.50	7.04	7.04	7.16	3.07	6.61	3.84	4.33	6.45	4.82
Healthy control	GSM665392	4.83	6.87	6.44	7.09	4.99	7.07	3.80	3.42	6.67	5.35
Healthy control	GSM665393	4.72	7.42	5.45	7.04	2.80	6.49	3.73	5.58	6.50	4.21
Healthy control	GSM665394	3.79	6.39	6.08	6.87	4.69	5.53	3.32	4.41	6.40	3.84
Healthy control	GSM665395	4.59	7.51	5.78	6.77	3.45	6.97	3.60	5.84	6.39	4.58
Healthy control	GSM665396	4.73	6.75	6.08	6.84	3.89	4.98	3.45	5.26	6.80	4.69
Healthy control	GSM665397	5.92	7.35	7.62	7.52	3.96	5.11	4.09	5.35	6.59	4.44
Healthy control	GSM665398	4.39	6.84	6.41	7.05	4.12	5.98	3.58	4.13	6.07	3.58
Healthy control	GSM665399	4.93	7.63	6.39	7.27	3.17	5.79	3.91	5.67	7.00	4.91
Healthy control	GSM665400	5.59	6.90	6.26	7.69	4.39	7.16	4.18	5.12	6.14	4.14
Healthy control	GSM665401	3.62	7.21	8.48	7.04	5.52	5.55	3.38	5.10	6.10	4.34
Healthy control	GSM665402	5.54	7.36	6.14	7.10	3.93	6.86	3.92	5.44	6.45	4.22
Healthy control	GSM665403	3.82	7.17	6.19	6.64	3.72	6.64	3.25	3.78	6.08	4.31
Severe asthma	GSM665423	5.92	8.19	8.26	8.26	5.43	5.23	4.28	5.00	7.03	5.32
Severe asthma	GSM665424	6.09	8.07	7.98	8.06	5.23	7.08	4.49	4.45	6.68	4.77
Severe asthma	GSM665425	6.57	8.36	8.80	8.20	4.33	6.66	5.19	5.65	7.00	5.95
Severe asthma	GSM665426	6.52	7.71	7.35	7.84	4.49	6.67	4.72	4.10	7.29	5.25
Severe asthma	GSM665427	6.34	9.20	8.38	8.51	4.78	8.10	5.13	5.00	7.17	6.31
Severe asthma	GSM665428	6.24	8.41	8.29	8.26	4.84	7.43	4.60	6.44	7.12	6.14
Severe asthma	GSM665429	5.84	8.11	7.23	8.21	6.60	7.90	4.40	4.81	7.86	5.29
Severe asthma	GSM665430	7.64	9.05	8.28	8.94	3.89	6.89	6.00	5.91	7.95	6.39
Severe asthma	GSM665431	5.51	8.88	5.92	7.52	4.47	7.40	4.17	5.84	6.75	4.75
Severe asthma	GSM665432	7.16	8.81	7.98	8.90	3.84	7.77	5.35	4.43	7.86	5.65

Severe asthma	GSM66 5433	6.00	7.55	6.71	8.57	4.16	6.67	5.03	5.39	7.09	5.56
Severe asthma	GSM66 5434	6.00	7.67	7.85	8.23	5.04	6.89	5.04	5.79	7.39	4.74
Severe asthma	GSM66 5435	6.06	8.34	6.64	7.86	3.85	6.80	4.44	4.84	7.78	5.54
Severe asthma	GSM66 5436	5.87	8.56	7.66	7.71	4.90	7.75	4.46	5.48	7.31	4.79
Severe asthma	GSM66 5437	7.70	9.19	9.48	9.51	4.71	6.15	6.29	2.55	8.13	7.08
Severe asthma	GSM66 5438	6.46	8.85	7.88	7.97	3.97	5.73	4.59	5.14	6.90	5.69
Severe asthma	GSM66 5439	6.40	7.50	6.69	8.02	3.51	5.99	5.58	5.33	7.78	5.17