



Figure S1 Grasshopper definition of lung descendant simulation.

**Table S1** Pulmonary function test and patient-specific lung volume metrics and atelectasis shrinkage calculations

Patient No.	PFT		Volume (full lung)	Volume (atelectasis)	Shrinkage
	FEV1/FVC% pre meas	FVC Pre%Ref	Lung (cm <sup>3</sup> )	Lung (cm <sup>3</sup> )	$a = (F - A) / F \times 100$ (F: full lung, A: atelectasis)
1	71	95	3,119	1,746	44.0
2	73	87	2,038	1,152	43.5
3	89	92	2,274	1,522	40.3
4	64	97	1,567	1,005	35.9
5	77	98	3,687	1,280	65.3
6	79	75	2,274	901	60.4
7	66	108	2,256	863	61.7
8	78	112	2,036	1,028	49.5
9	87	92	2,419	496	79.5
10	75	93	2,472	1,387	43.9
11	71	97	2,164	1,000	53.8
12	69	83	1,922	797	58.5
13	79	69	1,302	864	33.6
14	65	90	3,534	2,076	41.3
15	53	100	2,346	1,562	33.4
16	83	88	2,090	1,061	49.2
17	77	80	2,079	963	53.7
18	77	93	2,253	1,107	50.9
19	74	120	1,963	1,436	26.8
20	67	104	2,929	1,374	53.1

Pearson coefficient  $r$  (FVC, a) = -0.071 (P value = 0.767). Pearson coefficient  $r$  (FEV1/FVC, a) = 0.206 (P value = 0.382). PFT, pulmonary function test; FEV1, forced expiratory volume in the first second; FVC, forced vital capacity.

**Table S2** Number of vectors and faces of 3D lung model

Patient No.	Upper		Lower		Middle		Nodule	
	Vector	Face	Vector	Face	Vector	Face	Vector	Face
1	105,164	210,012	133,170	265,828	69,184	138,160	962	1,920
2	183,474	366,940	200,628	401,256	–	–	2,054	4,104
3	209,080	418,160	206,986	413,968	–	–	1,578	3,152
4	114,988	230,024	138,166	276,388	–	–	18,224	36,460
5	171,402	342,796	109,226	218,400	234,514	468,972	862	1,720
6	206,989	413,968	209,080	418,160	–	–	1,578	3,152
7	299,214	598,036	244,312	488,112	–	–	1,446	2,884
8	81,024	161,700	108,020	215,424	57,432	114,680	1,842	3,676
9	161,682	322,744	153,834	306,984	–	–	314	624
10	125,640	250,852	106,616	212,904	–	–	1,348	2,692
11	95,168	80,297	103,520	206,252	31,412	62,624	3,554	7,124
12	86,092	172,172	102,278	204,464	65,764	131,492	2,034	4,064
13	108,008	215,536	87,014	173,756	–	–	1,334	2,668
14	108,772	217,516	154,060	308,116	78,910	157,808	834	1,664
15	135,714	271,148	108,960	217,544	–	–	332	660
16	78,726	157,092	107,784	215,100	59,774	119,356	646	1,284
17	82,718	165,420	95,906	191,684	68,458	136,912	1,832	3,660
18	82,008	163,776	139,872	279,124	67,072	133,852	1,794	3,668
19	129,202	257,800	134,002	267,388	68,766	137,328	1,210	2,416
20	142,128	283,720	155,936	311,300	66,334	132,676	1,962	3,380