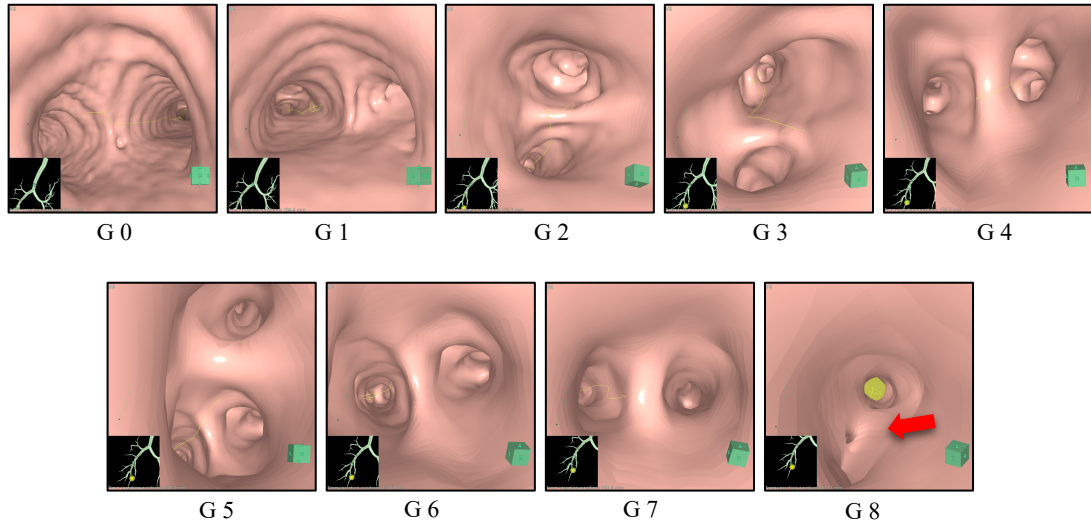
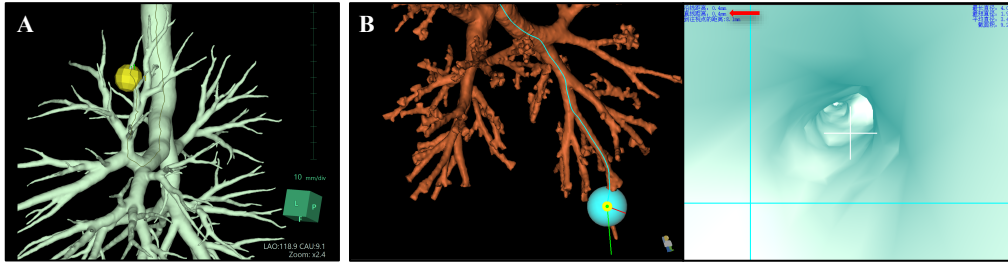


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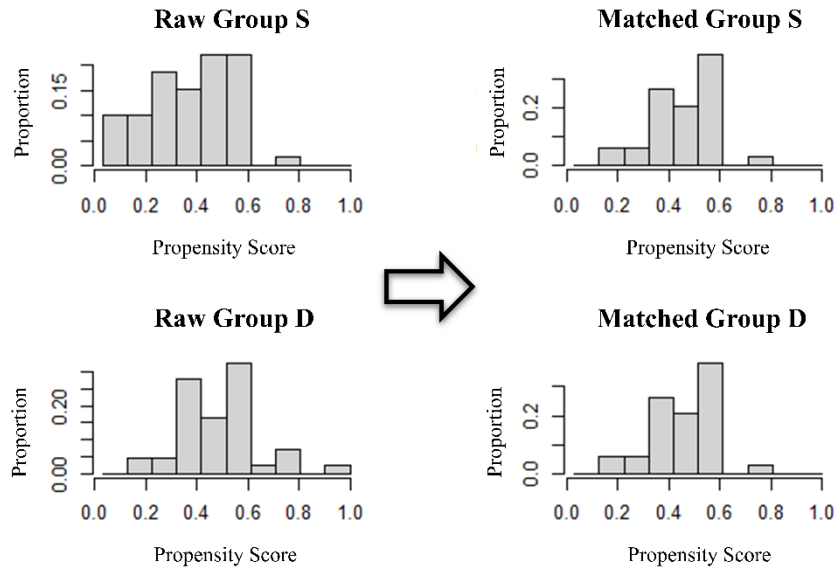
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**Supplementary Figure 1** Most distantly visible and optimal bronchial branch generation. MVG was 8 generation and OG was 7 generation due to indistinguishable bronchial bifurcation (red arrow). (G: Generation)



**Supplementary Figure 2** The distance from the navigation endpoint to the center of the lesion. A (Synapse 3D system): For the navigation endpoint crossing the lesion along the navigation pathway, DEC was the negative of the sum of the distance from the navigation endpoint to target lesion edge and the semidiameter of that (in this case, DEC was -12.6mm); B (DirectPath system): DEC was shown on VB image (in this case, DEC was 0.4 mm) (red arrow).



**Supplementary Figure 3** Distribution plot of before and after PSM

**Supplementary Table 1** Demographic and chest CT scan data characteristics of the patients

	Patients (n=289)
Sex	
Female	148 (51.2%)
Male	141 (48.8%)
Age, Mean $\pm$ SD, years	55 $\pm$ 14
Chest CT scan sequence	
Plain scan sequence	207 (71.6%)
Contrast-enhanced scan sequence	82 (28.4%)
Image reconstruction parameter <sup>‡</sup>	
1mm*1mm, L (L-type CT data)	169 (58.5%)
1mm*0.8mm, LARGE-FC 56/55 (FC-type CT data)	64 (22.1%)
0.67mm*0.67mm, B (B-type CT data)	56 (19.4%)

<sup>‡</sup>reconstruction slice thickness\*slice interval, algorithm

**Supplementary Table 2** Characteristics of pulmonary nodules in the patients

	Nodules (n=289)
Lesion size (diameter on CT)	
Median (Q1, Q3), mm	9.5 (7.0, 14.0)
$\leq 10$ mm	157 (54.3%)
10- $\leq 20$ mm	103 (35.6%)
20- $\leq 30$ mm	29 (10.0%)
Texture on CT	
Solid	145 (50.2%)
Part-solid	53 (18.3%)
Pure ground glass	91 (31.5%)
Lobe location	
Upper lobe	128 (44.3%)
Middle lobe (Lingula)	65 (22.5%)
Lower lobe	96 (33.2%)
Bronchus sign	
Absent	150 (51.9%)
Present	139 (48.1%)
Nodule location from the hilum	
Peripheral 1/3	213 (73.7%)
Inner 2/3	76 (26.3%)

**Supplementary Table 3** Bronchial tree reconstruction quality for two VBN systems

	Level	Group S	<i>P</i> value	Group D	<i>P</i> value	<i>P</i> value
Total	Good	148 (52.1%)		40 (14.1%)		<0.001
	Medium	90 (31.7%)		126 (44.4%)		
	Poor	46 (16.2%)		118 (41.5%)		
Chest CT scan sequence						
Plain scan sequence	Good	107 (51.7%)	1.000	30 (14.5%)	0.438	<0.001
	Medium	68 (32.9%)		94 (45.4%)		
	Poor	32 (15.5%)		83 (40.1%)		
Contrast-enhanced scan sequence	Good	41 (53.2%)		10 (13.0%)		<0.001
	Medium	22 (28.6%)		32 (41.6%)		
	Poor	14 (18.2%)		35 (45.5%)		
Image reconstruction parameter						
1mm*1mm, L (L-type CT data)	Good	82 (49.4%)*	0.041	13 (7.8%)*	<0.001	<0.001
	Medium	55 (33.1%)		88 (53.0%)		
	Poor	29 (17.5%)		65 (39.2%)		
1mm*8mm, LARGE-FC 56/55 (FC-type CT data)	Good	43 (69.4%)*		1 (1.6%)*		<0.001
	Medium	9 (14.5%)		10 (16.1%)		
	Poor	10 (16.1%)		51 (82.3%)		
0.67mm*0.67mm, B (B-type CT data)	Good	23 (41.1%)*		26 (46.4%)*		0.088
	Medium	26 (46.4%)		28 (50.0%)		
	Poor	7 (12.5%)		2 (3.6%)		

‡ Pairwise comparison; Bonferroni correction,  $P < 0.0167$

\* Pairwise comparison; Bonferroni correction,  $P > 0.0167$

**Supplementary Table 4** Demographic and chest CT scan data characteristics in two groups

	Group S (n=56)	Group D (n=42)	<i>P</i> value
Age, median (Q1, Q3), years	64 (56, 68)	64 (54, 71)	0.288
Sex			
Female	37.5% (21)	23.8% (10)	0.149
Male	62.5% (35)	76.2% (32)	
Chest CT scan sequence			
Plain scan sequence	53.6% (30)	33.3% (14)	0.046
Contrast-enhanced scan sequence	46.4% (26)	66.7% (28)	
Chest CT Scanner			
Toshiba	14.3% (8)	14.3% (6)	0.588 <sup>#</sup>
Philips	80.4% (45)	73.8% (31)	
United Imaging	5.4% (3)	11.9% (5)	

<sup>#</sup> Fisher's exact test

**Supplementary Table 5** Characteristics of pulmonary nodules and transbronchial biopsy of peripheral pulmonary nodules in two groups

	Group S (n=59)	Group D (n=43)	<i>P</i> value
Lesion size (diameter on CT)			
Median (Q1, Q3), mm	22.0 (16.5, 26.5)	22.5 (19.0, 26.5)	0.260
≤20mm	44.1% (26)	30.2% (13)	0.156
20-≤30mm	55.9% (33)	69.8% (30)	
Texture on CT			
Solid	89.8% (53)	86.0% (37)	0.558
Ground glass	10.2% (6)	14.0% (6)	
Lobe location			
Upper lobe	42.4% (25)	48.8% (21)	0.645
Middle lobe (Lingula)	13.6% (8)	16.3% (7)	
Lower lobe	44.1% (26)	34.9% (15)	
Bronchus sign			
Absent	11.9% (7)	9.3% (4)	0.929*
Present	88.1% (52)	90.7% (39)	
Nodule location from the hilum			
Inner 2/3	57.6% (34)	60.5% (26)	0.774
Peripheral 1/3	42.4% (25)	39.5% (17)	
Bronchoscope type			
BF-1T260/1TQ290	18.6% (11)	18.6% (8)	0.509#
BF-260/Q290	49.2% (29)	44.2% (19)	
BF-P260F/P290	32.2% (19)	32.6% (14)	
BF-MP290F	0 (0)	4.7% (2)	
Lesion confirmation technique			
X-ray fluoroscopy	8.5% (5)	2.3% (1)	0.073#
R-EBUS	79.7% (47)	95.3% (41)	
R-EBUS + X-ray fluoroscopy	11.9% (7)	2.3% (1)	
Number of sampling methods			
One method	18.6% (11)	23.3% (10)	0.337#
Two methods	18.6% (11)	27.9% (12)	
Three methods	52.5% (31)	46.5% (20)	
Four methods	10.2% (6)	2.3% (1)	

\* Continuity correction

# Fisher's exact test