

2009-9

2013-9

2016-5

2017-11

4y

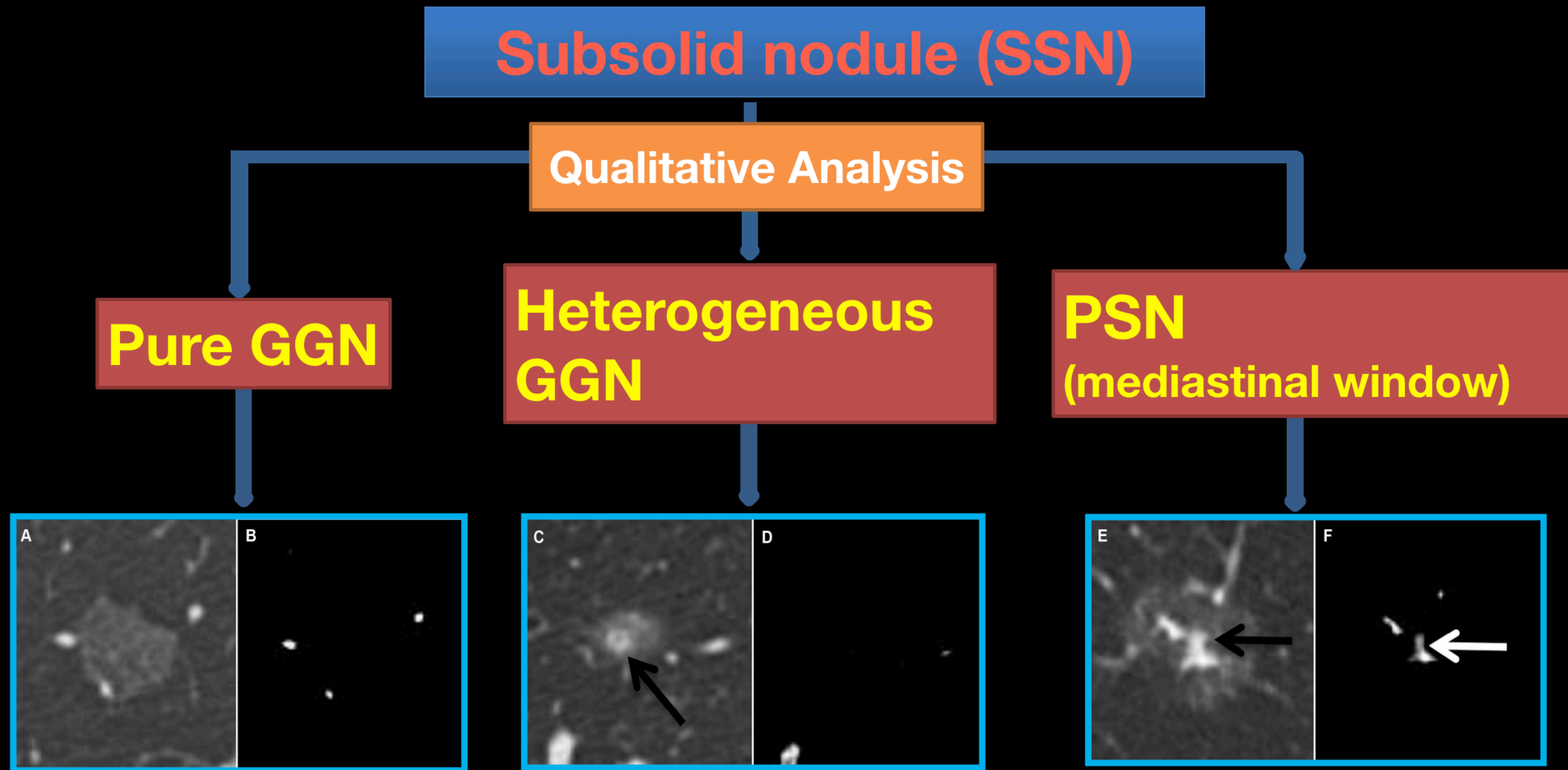
2y8m

1y6m

Nature History of Persistent Pulmonary Sub-solid Nodule

湯恩魁 醫師

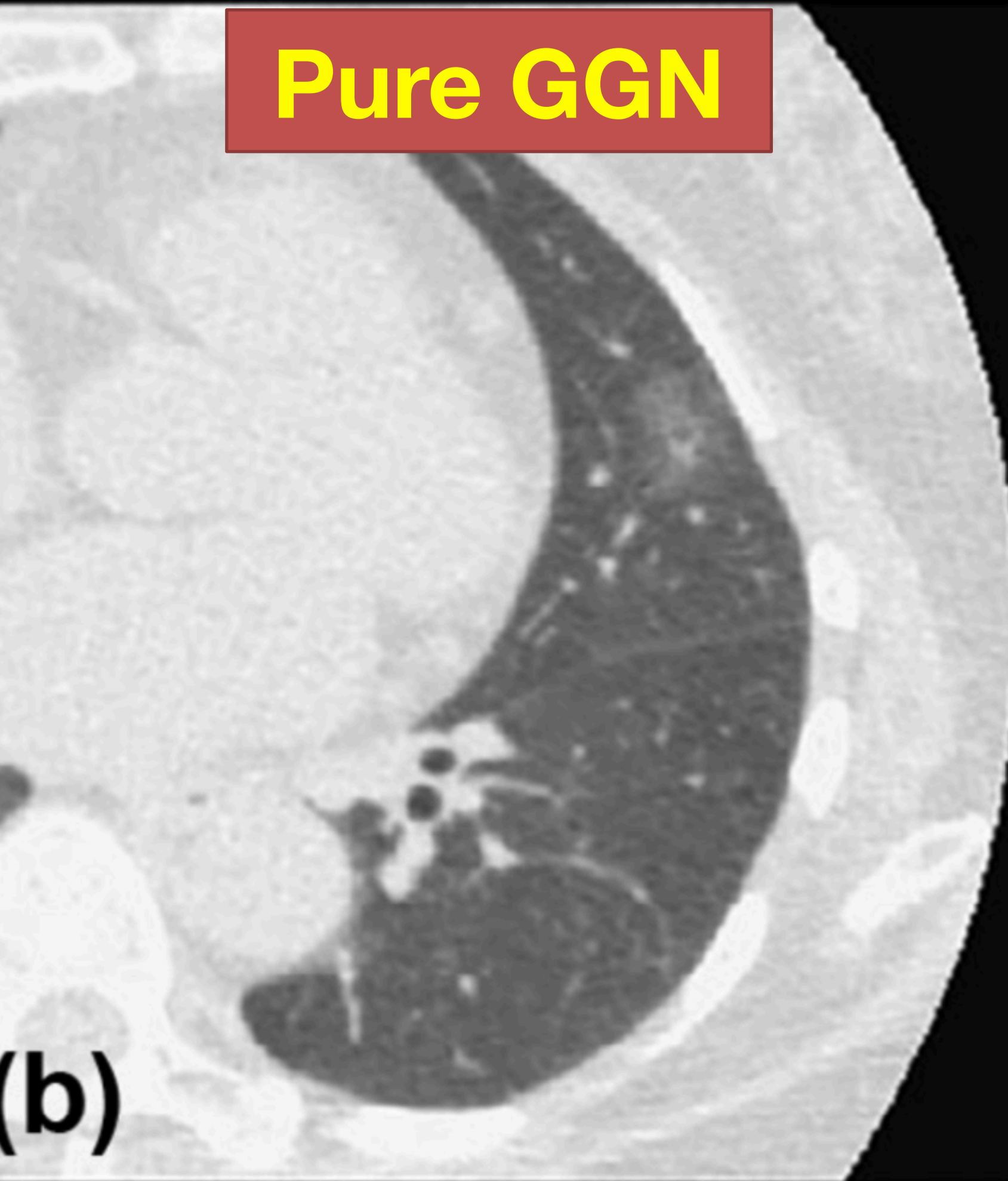
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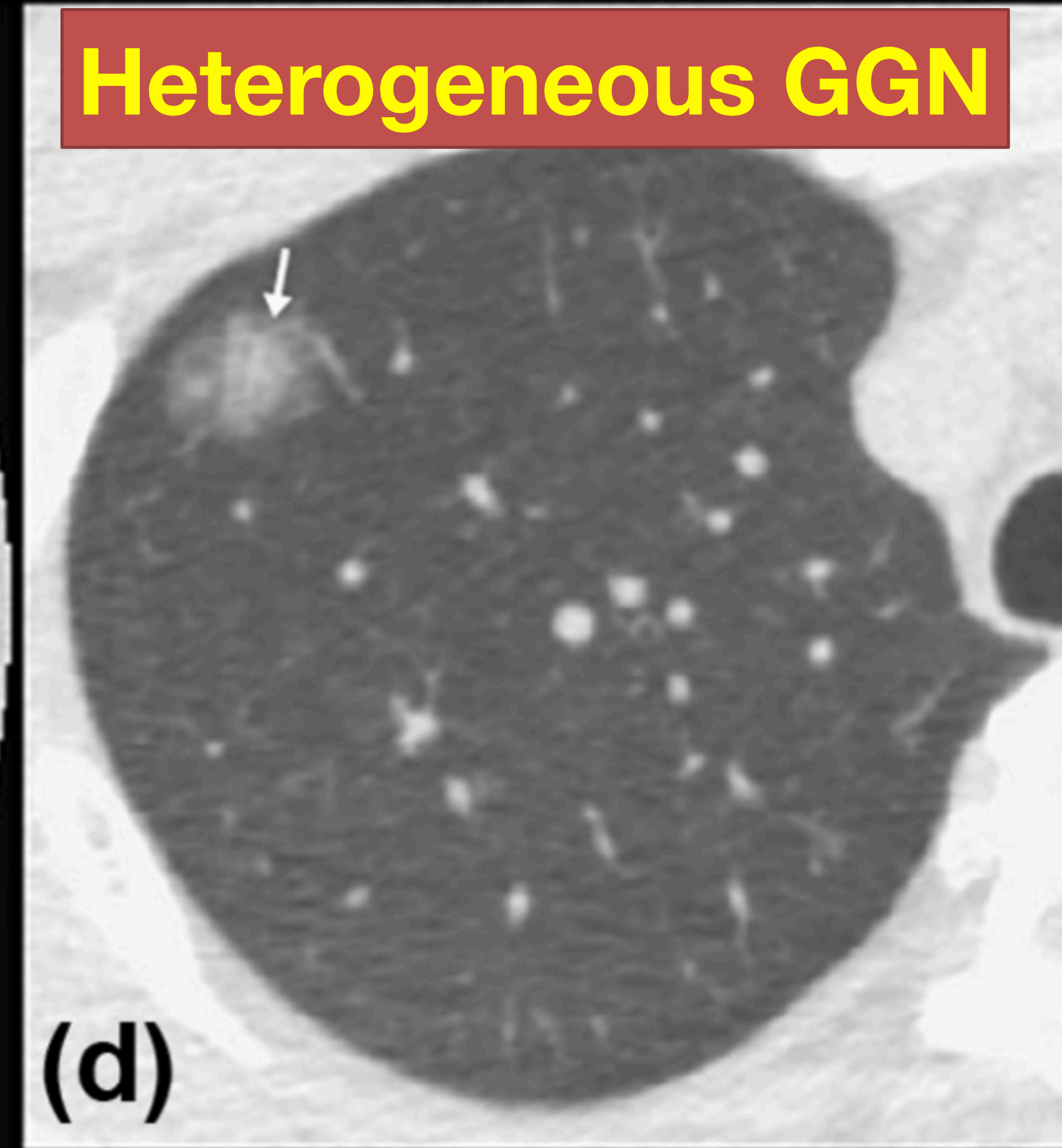
Kakinuma R, et al. Natural History of Pulmonary Subsolid Nodules:
A Prospective Multicenter Study. *Journal of Thoracic Oncology* 2016;11:1012-1028

GGN = ground-glass nodule; PSN = part-solid nodule; SSN = sub-solid nodule

Pure GGN



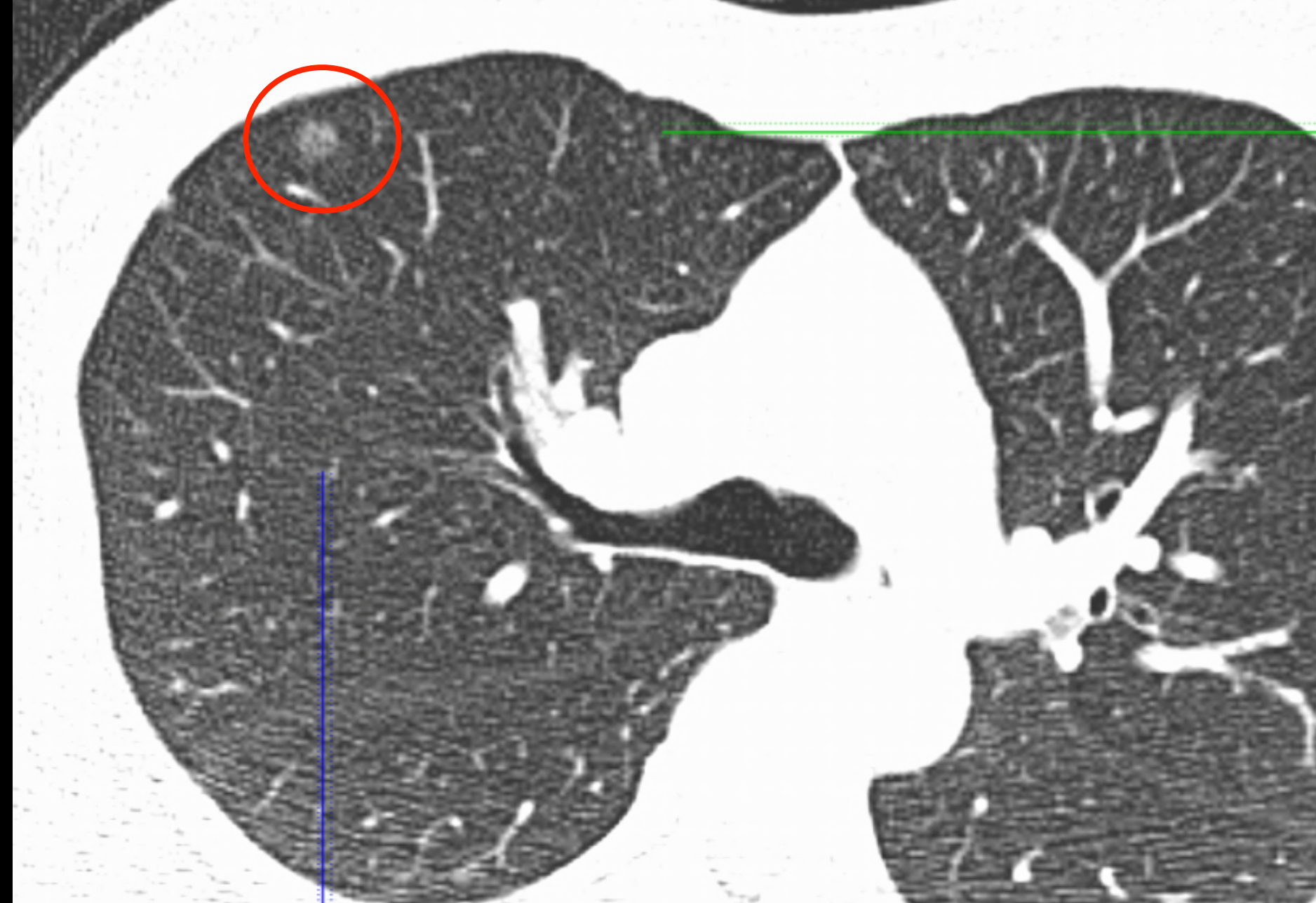
Heterogeneous GGN



PSN



JTO 2016, Vol. 11 No. 7: 1012-1028



8 mm

2009-12

8y3m



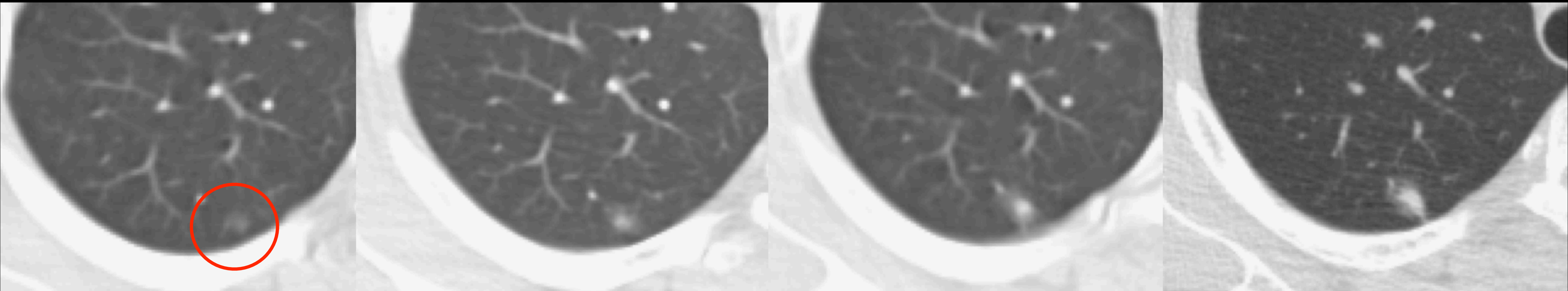
2018-2

9 mm



AIS

adenocarcinoma in situ



2009-9

2013-9

2016-5

2017-11

4y

2y8m

1y6m



1.4 cm (solid part 0.5 cm)

Papillary predominant adenocarcinoma
pT2aN0M0, stage IB
(1.3 cm, **PL1)**

The long-term natural course of subsolid nodules (SSNs) need to be clarified.

Previous studies have investigated the natural course of ground-glass nodules (GGNs) mainly based on minimal growth of **2 mm or more**.

Development of follow-up guideline and management strategy of pulmonary SSNs in the lung cancer screening program.

Background

Methods

Retrospective study, form January 2002 to August 2016

- (1) persistent SSNs for more than one year after the with/without pathologic proof,
- (2) SSNs ranging in diameter of 3 cm or smaller on the initial CTs,
- (3) thin-section CT images with slice thickness of 2.5 mm or less,
- (4) resected SSNs showing adenocarcinoma spectrum included,
- (5) multiple SSNs, and only the major dominant SSN with was selected.

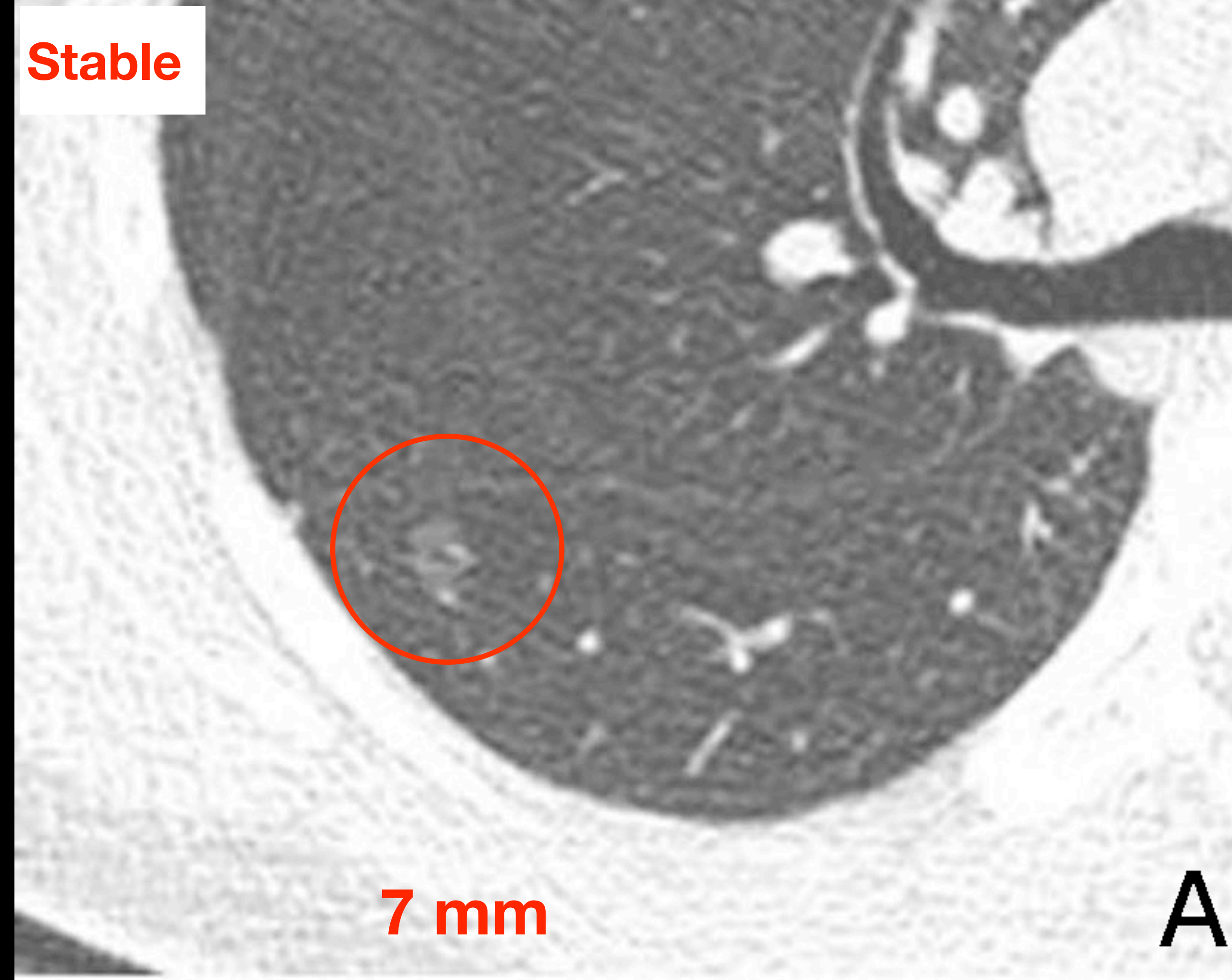
Mean follow-up period was 3.6 ± 2.9 years

Nature History of Pulmonary SSN

Table 1. Definition of different growth pattern of subsolid nodules

True growth	<div>1. increase of 2 mm or more in size of SSN</div> <div>2. increase of 2 mm or more in solid part of PSN</div> <div>3. new developing solid part less than 2 mm with GGN</div>
Substantial growth	<div>1. increase of 5 mm or more in size of SSN</div> <div>2. increase of 5 mm or more in solid part of PSN</div> <div>3. new developing solid part 2 mm or more within GGN</div>
Stage shift	base on information of follow-up CT scan or pathologic confirmation

GGN = ground-glass nodule; PSN = part-solid nodule; SSN = sub-solid nodule

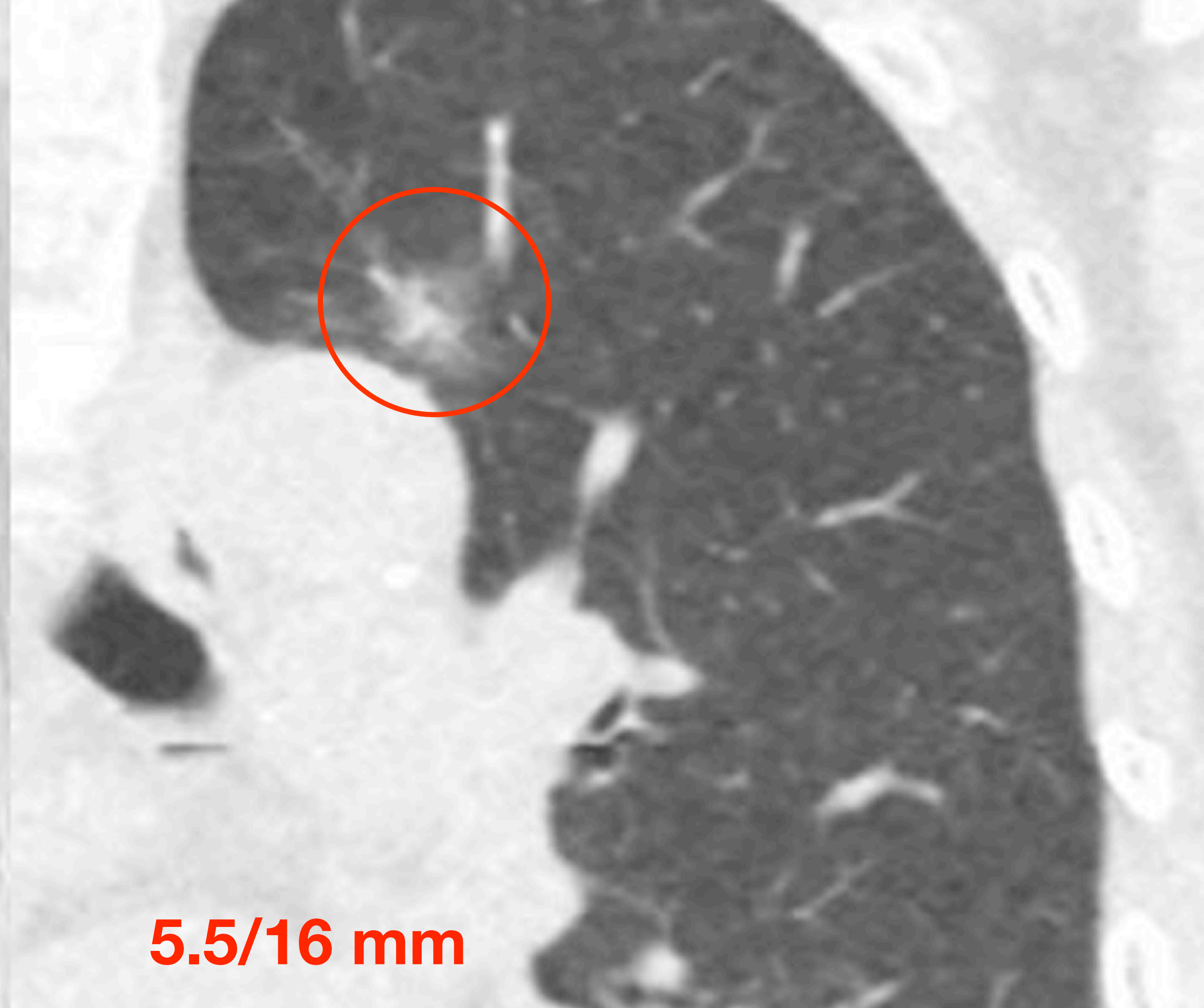


48/F, GGN over RLL, stable for 90 months
AIS

True growth

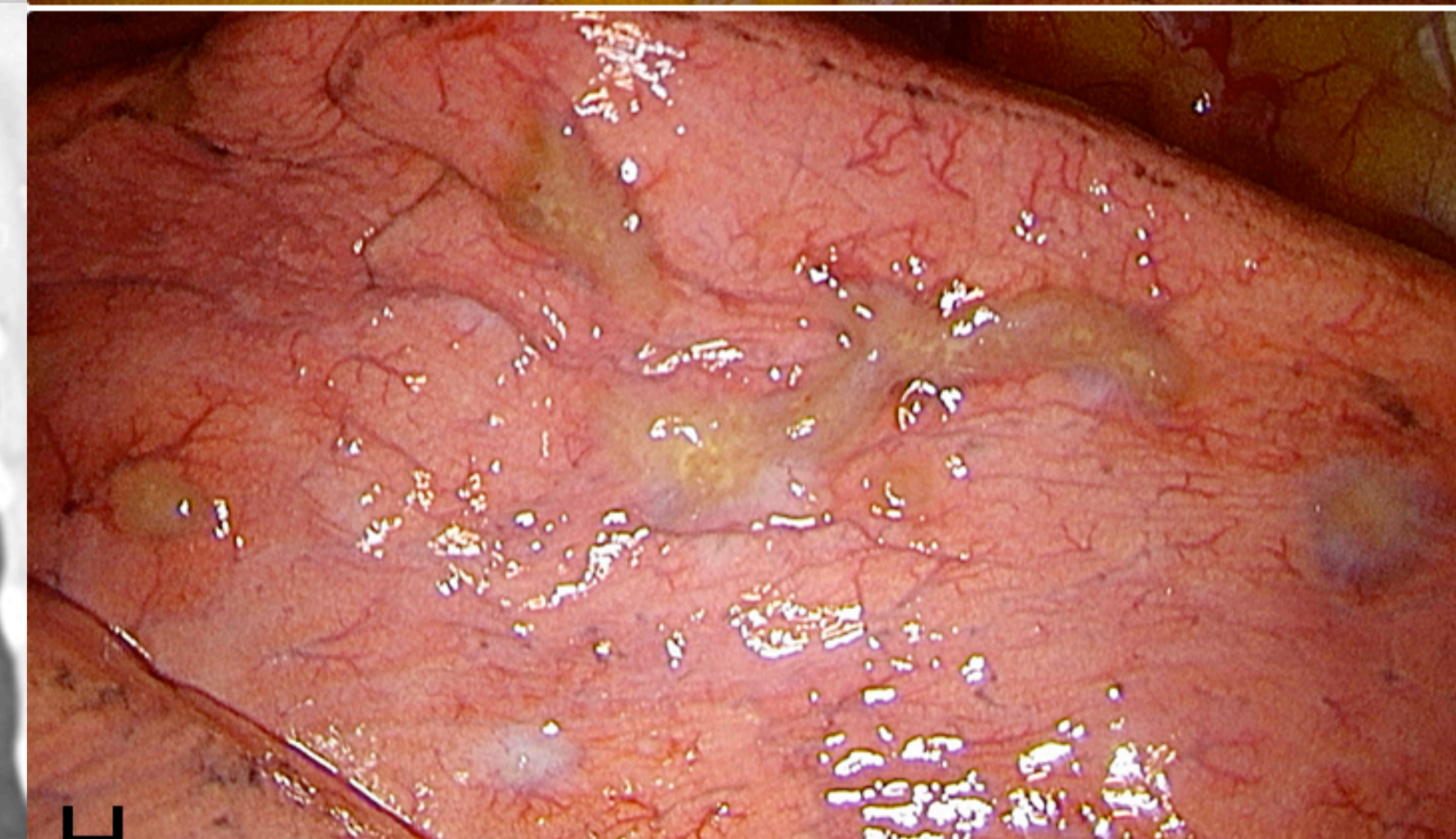
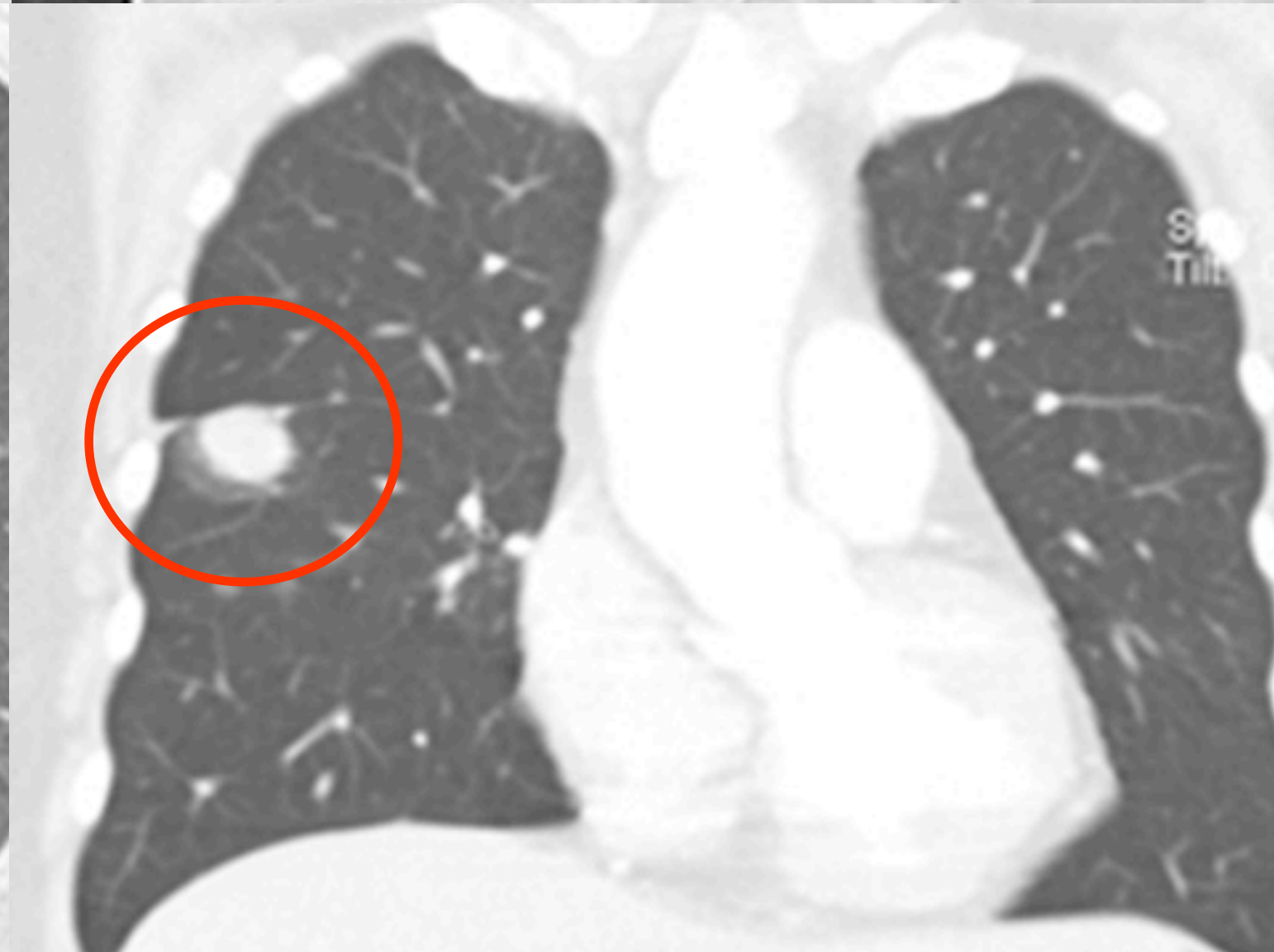
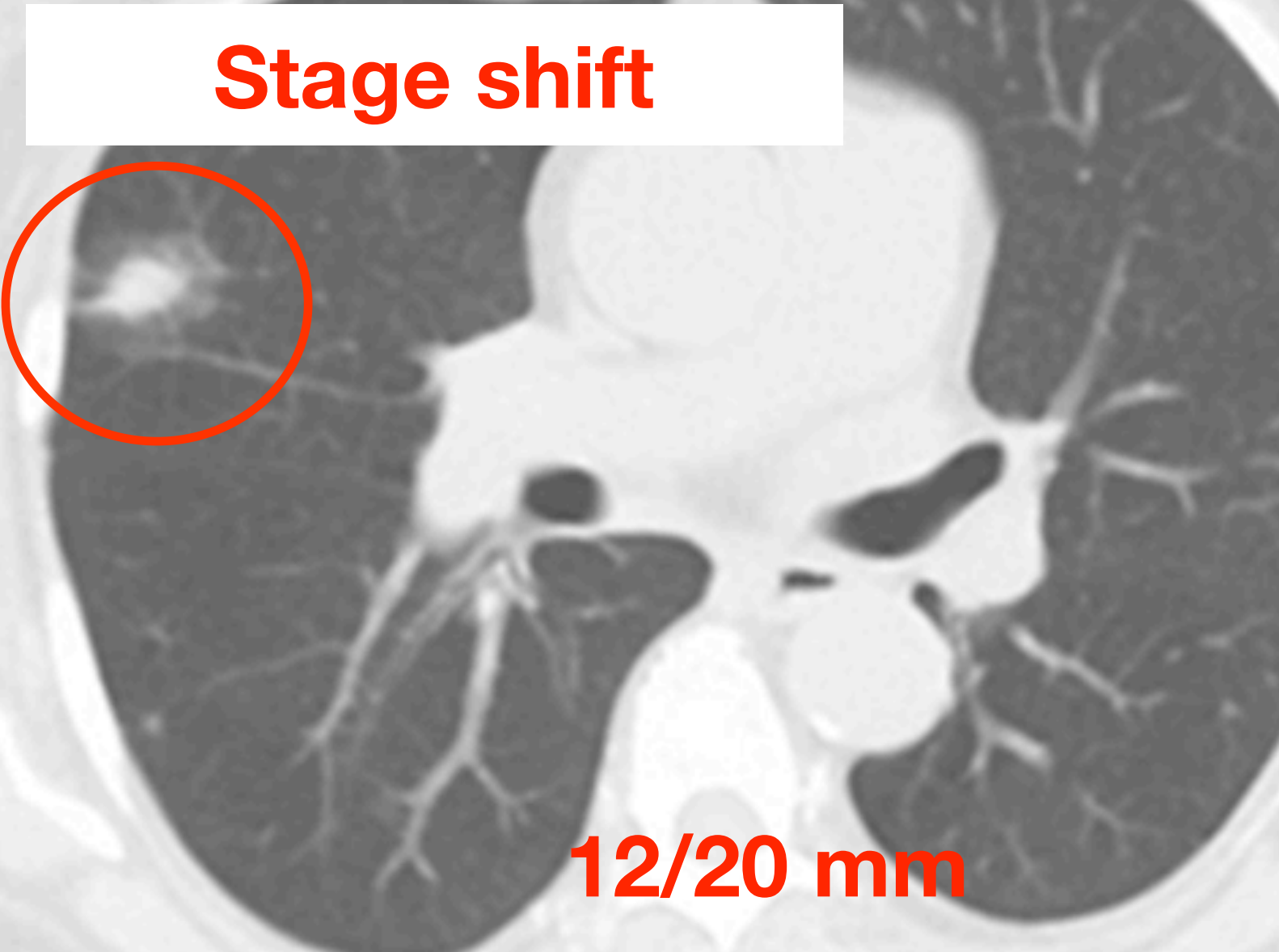


59/F, GGN over LLL, 39-month interval
acinar adenocarcinoma, stage IA2



58/F, GGN to PSN, in 48-month interval
acinar adenocarcinoma, stage IA2

Stage shift



64/F, PSN to solid tumor, 12-month interval
adenocarcinoma, stage IVa

Results

136 SSNs / 70 surgery / 8 exclusion:

4 / cryptococcus infection

3 / focal interstitial fibrosis

1 / mucosa-associated lymphoid tissue of lung

SSN / ground-glass nodule **GGN** / part-solid nodule **PSN**

128 SSNs / 62 resected

Nature History of Pulmonary SSN

Table 2. Clinical and radiologic features of 128 dominant SSNs based on SSN classification

Characteristics	GGN (N=93)	PSN (N=35)	<i>P</i> Value
Age	58.5±11.5	66.2±11.8	0.001
Female	62 (66.7%)	25 (71.4%)	0.386
Initial nodule size	7.1±4.5	17.5±8.7	<0.0001
Initial solid part size	0	7.8±6.9	<0.0001
True SSN growth	37 (39.8%)	23 (65.7%)	0.008
Substantial SSN growth	17 (18.3%)	23 (65.7%)	<0.0001
Stage shift	4 (4.3%)	6 (17.1%)	0.025
Lesion multiplicity (%)	34 (36.6%)	14 (40%)	0.436

Table 2. Clinical and radiologic features of 128 dominant SSNs based on SSN classification

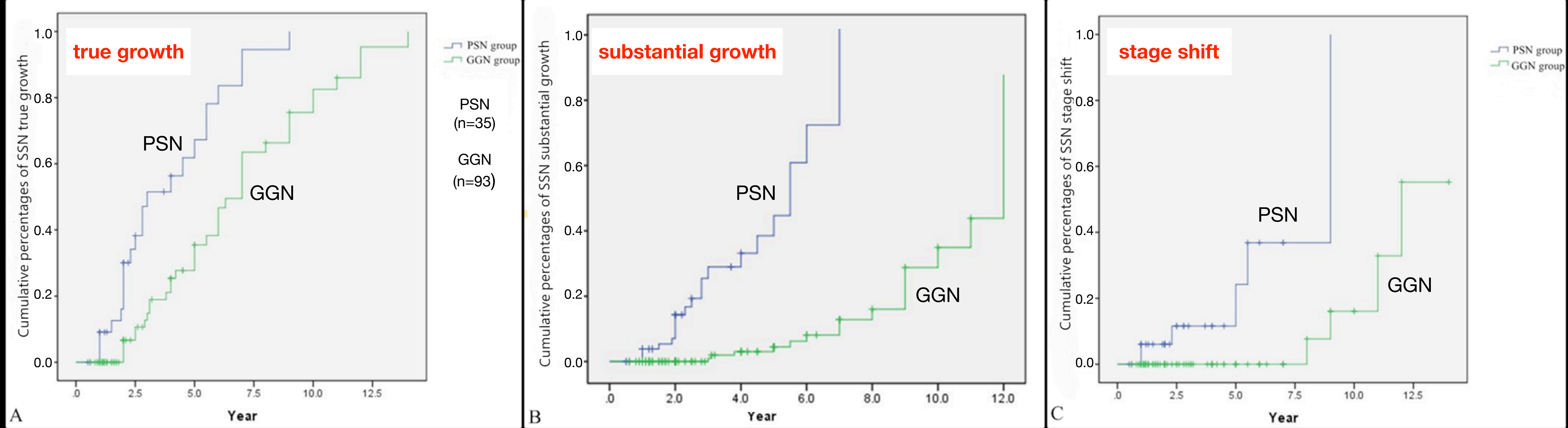
Characteristics	GGN (N=93)	PSN (N=35)	<i>P</i> Value
Follow up duration (years)	3.8±3.1	3.0±2.1	0.137
Frequency of follow up visits	3.1	2.8	
Lung-RADS distribution			<0.0001
1	0	0	
2	92	5	
3	1	4	
4	0	26	
Histology of 62 resected SSNs			
AAH	1	0	
AIS	4	0	
MIA	6	3	
Invasive adenocarcinoma	25 (69.4%)	23 (88.5%)	

Table 3. Relationships between follow-up period and growth pattern for GGN and PSN

Characteristics	GGN (N=93)		PSN (N=35)	
Time interval of detection of ture growth	Stable	Progression	Stable	Progression
< 2 years	40	4 (9.1%)	8	9 (52.9%)
2-4 years	9	9 (50.0%)	4	6 (60.0%)
4-6 years	4	8 (66.7%)	0	5 (100%)
6-8 years	1	7 (87.5%)	0	2 (100%)
> 8 years	2	9 (81.8%)	0	1 (100%)

Table 3. Relationships between follow-up period and growth pattern for GGN and PSN

Characteristics	GGN (N=93)		PSN (N=35)	
Time interval of detection of stage shift	Stable	Progression	Stable	Progression
< 2 years	44	0	15	2 (11.8%)
2-4 years	18	0	9	1 (10.0%)
4-6 years	12	0	3	2 (40.0%)
6-8 years	7	1 (12.5%)	2	0
> 8 years	8	3 (27.3%)	0	1 (100%)



Kaplan-Meier plot for time to SSN growth according to the nodule type classification in the SSNs.

Nature History of Pulmonary SSN

<div>SSN type (median)</div> <div>growth pattern</div>	GGN (n=93) (mean 7.1 mm)	PSN (n=35) (mean 17.5 mm)
True growth	7 (year)	3
Substantial growth	9	3
Stage shift	12	9

Median Progression Time

Table 4. Multivariate logistic analyses for the risk factors in prediction of **true growth**

Characteristics	OR	CI	<i>P</i> Value
Age	1.071	1.018-1.128	0.009
Male	2.413	0.797-7.304	0.119
Initial nodular size	0.915	0.832-1.006	0.066
Initial solid part size	1.071	0.936-1.224	0.318
SSN type			
GGN	1		
PSN	5.408	1.298-22.526	0.02
Follow-up duration	1.716	1.358-2.169	<.0001

GGN = ground-glass nodule; PSN = part-solid nodule; SSN = subsolid nodule;
OR = odds ratio; CI = confidence interval

Long-Term Active Surveillance of Screening Detected Subsolid Nodules is a Safe Strategy to Reduce Overtreatment



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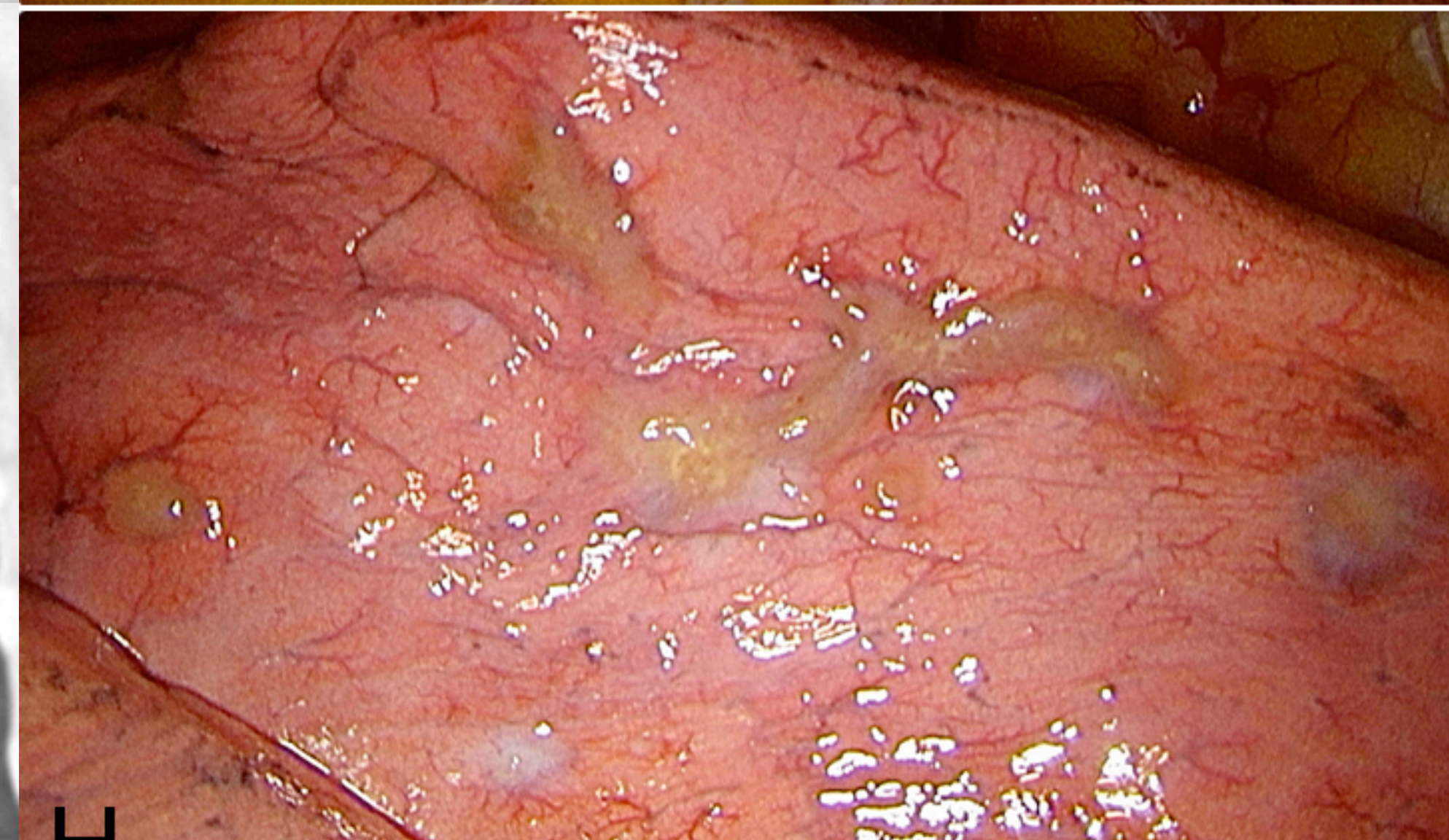
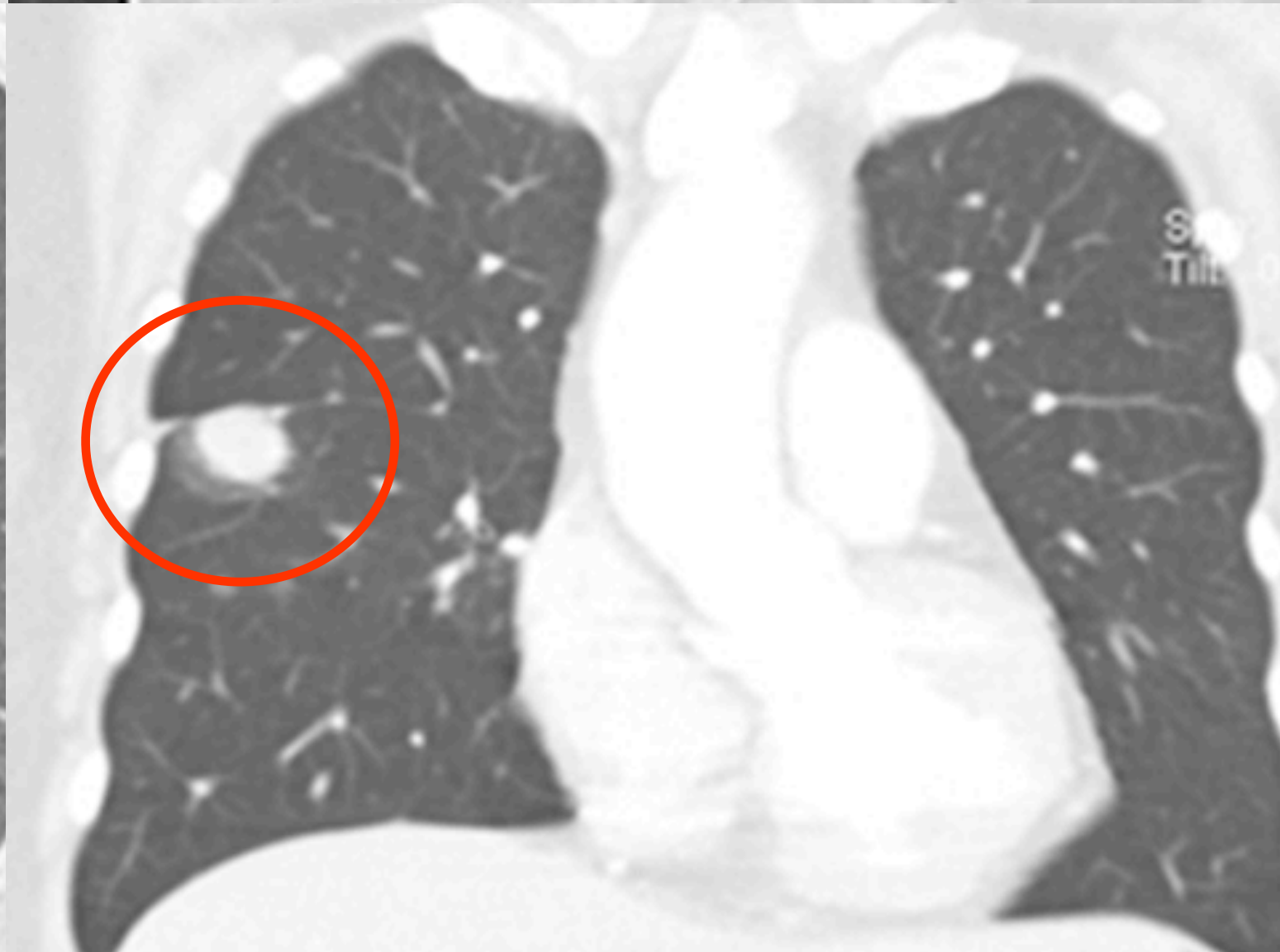
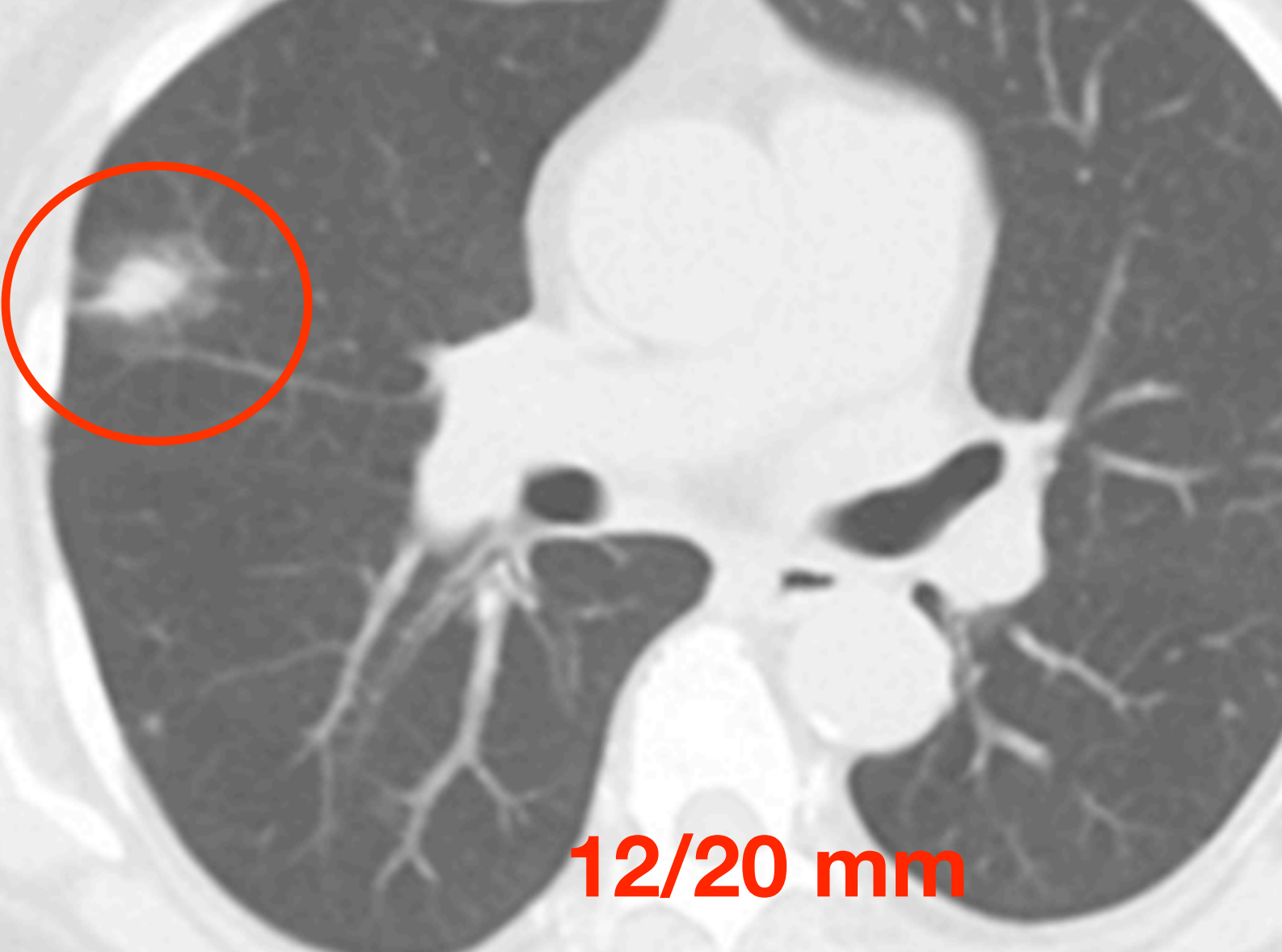
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64/F, PSN to solid tumor, 12-month interval
adenocarcinoma, stage IVa

Retrospectively designed / dependent on the physician's professional authority

Follow-up CT interval / not uniformly

Only 62 subjects / surgical resection or tissue biopsy

Limited number of subjects

It is important to study in a large-scale cohort population

Limitations

GGN 7.1 mm / PSN 17.5 mm

Median True growth / GGN 7 year / PSN 3 year

PSN / solid-predominant / pleural attachment

PSN / 3~6 months / 3 year follow-up or more

GGN / 6~12 months / 7 year follow-up or more

Take Home Message

Thanks for your listening