

CT 가 : HRCT 가

1

. . . . 2 . 2 . 3 . 2

CT 가 HRCT .
 가 49 .
 CT 가 HRCT . 3 가 2
 가 . CT ,
 CT HRCT .
 3 .
 : , CT가 75%(110/147), HRCT 가 82%(121/
 147) 가 (p=0.001). CT가 47%(69/147),
 HRCT 가 48%(71/147) (p=0.815). 가 HRCT 가 (25%)
 CT (5%) (p=0.001).
 : CT 가 HRCT 가 ,

(1, 2).

1994 8 1997 12
 CT 가 HRCT ,

49

3cm , 가

2.7cm(1.3-3.0cm) , 63 (21-81) ,

27 22 .
 49 23 (46.9%)

26 (53.1%)

(tuberculoma, n=10), (hamartoma,

n=6), (aspergilloma, n=5), (chondro-

ma, n=1), (round atelectasis, n=1) ,

(adenocarcinoma, n=11), (bronchi-

oloalveolar carcinoma, n=9), (squamous cell carci-

noma, n=5), (atypical carcinoid, n=1)

36 , 10

, 3

CT Somatom Plus-32 scanner(Siemens,
 Erlangen, Germany) GE HiSpeed Advantage(GE Medical
 System, Milwaukee, WI) ,

1mm , 3-5 mm 3-4

1
 2
 3

1998 11 10

1998 12 28

(High-spatial frequency algorithm)
(helical technique)
10mm collimation, pitch 1

137kVp, 145-275mA
(window width) (window center) 1500HU
-700HU, 500HU 30-50HU
가

CT HRCT 가
Cochran-Mantel-Haenszel statistics
chi-square test ,
Bayesian (6-11).

가 HRCT CT HRCT 9
CT 11).

8 17 3가
(definite, probable, possible)
definite 90% , probable
70-90%, possible 50-70%
가 definite 가

147 CT 110 74.8%,
HRCT 가 121 82.3% (p=0.001).
CT 69
46.9%, HRCT 가 71 48.3%
(p=0.815) (Table 1).

(smooth), (spiculation), (lobu-
lation), (pleur-
al tag)
(air-bronchogram),
(internal low density without cavity),
(bubble like lucencies), (areas of
ground-glass attenuation),
(central, diffuse, eccentric, laminated, stippled, nodular, popcorn
like)

CT 147 13
8.8% , HRCT 가 50
34.0% 가
CT
13 8 61.5% HRCT
가 50 36 70.0%
(p=0.001) (Table 2) (Fig. 1).
CT
CT 49.3%,
19.2%, HRCT 가 33.3%,
5.1%
가
CT

Table 1. Percentage of Correct Diagnosis by Disease Entity

Disease	No. of Cases	Helical CT only (%)	Helical CT plus HRCT (%)
Tuberculoma	10	*13/30 (43.3)	20/30 (66.6)
Hamartoma	6	4/18 (22.2)	2/18 (11.1)
Aspergilloma	5	7/15 (46.6)	7/15 (46.6)
Round atelectasis	1	3/3 (100.0)	3/3 (100.0)
Chondroma	1	0/3 (0.0)	0/3 (0.0)
Atypical carcinoid	1	0/3 (0.0)	0/3 (0.0)
Adenocarcinoma	11	25/33 (75.6)	25/33 (75.6)
BAC	9	14/27 (51.9)	12/27 (48.1)
SCC	5	3/15 (20.0)	1/15 (6.7)
Total	49	69/147 (46.9)	71/147 (48.9)

BAC : bronchioloalveolar carcinoma SCC : squamous cell carcinoma

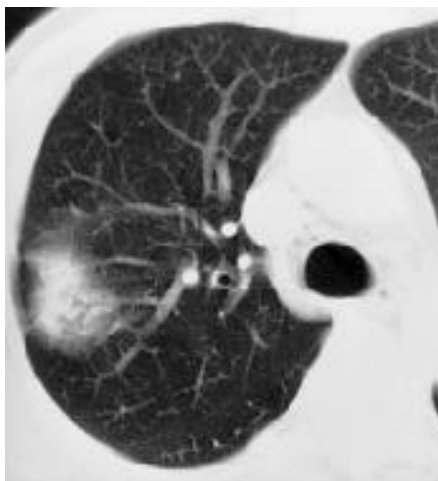
*13/30(43.3) 30 3 10

17.4%, 34.6%, HRCT 가
 21.7%, 37.2% CT
 CT 21.7%, 23.1%, 56.5%, 50.0%, HRCT 가
 HRCT 가 24.6%, 7.7% 56.5%, 57.7% (Fig. 2).
 24.6%, 30.8%, HRCT 가 CT 11.6%,
 30.4%, 52.6% 35.9%, HRCT 가 15.9%, 39.7%
 CT 가 8 , HRCT 가 17 CT
 가 21.7%, 3.8% 5.1%, HRCT 가
 CT 42.0%, 65.4% HRCT 가
 52.2%, 89.7%, odds ratio 2.6 8.0 CT
 CT 14.5%, 17.9%, HRCT 가
 46.4%, 56.4%, HRCT 가 11.6%, 9.0%
 43.5%, 61.5% CT 20.3%,
 가 14.1%, HRCT 가 32.1% HRCT 가 24.6%,
 HRCT 가 , (Fig. 3).
 가 ,

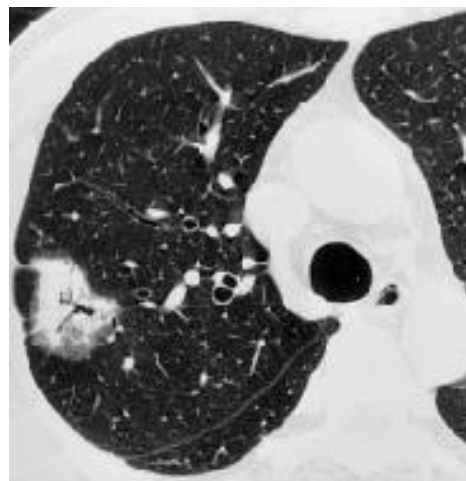
Table 2. Number of Correct Diagnoses Made with a High Level of Confidence by Three Observers

Disease	No. of Cases	Helical CT only		Helical CT plus HRCT	
		Confident Dx.	Correct Dx.	Confident Dx.	Correct Dx.
Tuberculoma	10	1	1	7	7
Hamartoma	6	0	0	0	0
Aspergilloma	5	2	2	6	6
Round atelectasis	1	1	1	1	1
Chondroma	1	0	0	0	0
Atypical carcinoid	1	0	0	0	0
Adenocarcinoma	11	6	1	21	9
BAC	9	3	3	14	13
SCC	5	0	0	0	0
Total	49	13	8	49	36

BAC : bronchioloalveolar carcinoma SCC: squamous cell carcinoma



A



B

Fig. 1. A 65-year-old man with bronchioloalveolar carcinoma.

A. Helical CT scan shows a ill-defined lobulated and spiculated mass in the right upper lobe. Three observers diagnosed this mass as adenocarcinoma with low confidence.

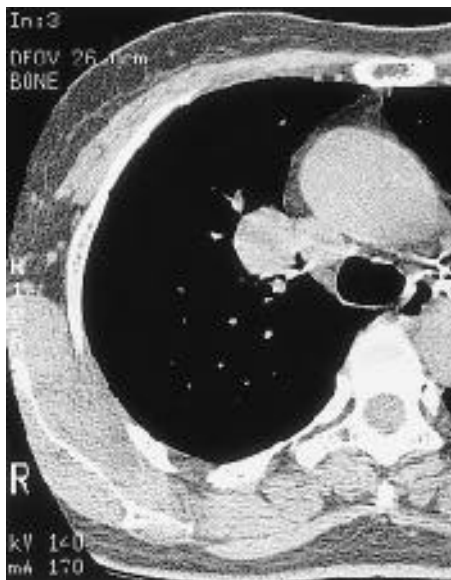
B. Additional high-resolution CT scan shows a well-defined lobulated and spiculated mass with bubble lucencies and air-bronchogram in the right upper lobe. Three observers diagnosed this mass as bronchioloalveolar carcinoma with high confidence.

CT 7.2%, HRCT 가 2.9%
CT
11.6%, 26.9%, HRCT 가 10.1%,
26.9% CT HRCT 가 HRCT 가
26 12 (46.2%)가
2.6cm
3.0cm
($p < 0.05$).
CT
CT
가 82.3% HRCT 가 가 74.8%, HRCT

(Table 3).



A

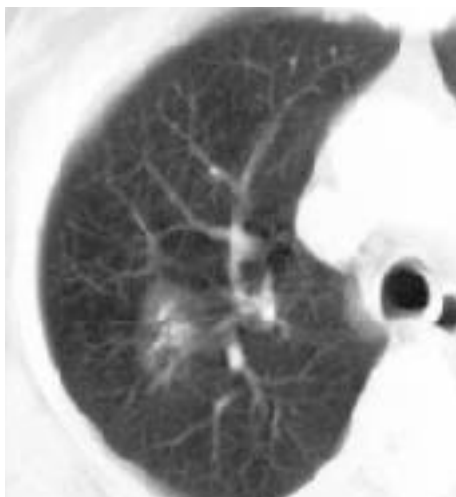


B

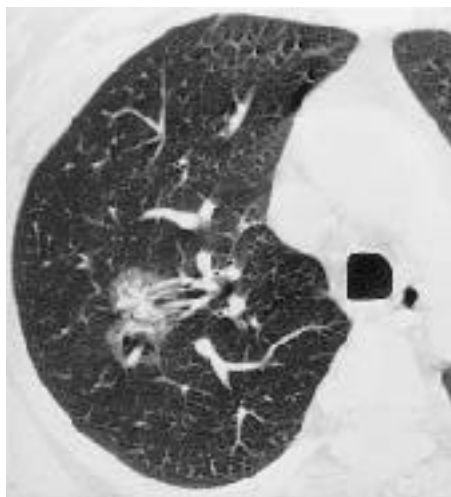
Fig. 2. A 53-year-old man with adenocarcinoma.

A. On helical CT scan, the mass of RUL shows homogeneous density.

B. On additional high-resolution CT scan, density of mass is also homogeneous.



A



B

Fig. 3. A 47-year-old woman with bronchioloalveolar carcinoma.

A. Helical CT scan shows a well-defined mass in the right upper lobe. But internal characteristics of this mass are uncertain.

B. Additional high-resolution CT scan shows bubble lucencies within the mass.

(p = 0.001).

Volterrani (12) 98.2% , (13) CT (odd ratio 0.8), HRCT 가 (13) (14) (odd ratio 1.8).

CT 77.8% (13) 가

CT 46.9%, HRCT 가 48.3% (p = 0.815). (13) CT 41.7% CT (odds ratio 1.1), HRCT 가 (odds ratio 0.3). Zwirewich (2) 66.6% , HRCT 가 , Heitzman (15)

CT 22.2%, HRCT 가 11.1% , 6 Heitzman CT HRCT 가

CT 가 (Table 1). CT odds ratio가 0.5 가 (2, 13, 16-18). HRCT 가 가

147 13 (8.8%) 가 8 (5.4%) HRCT 36 가 , HRCT 가 가

가 50 (34.0%) 가 (24.5%) 가

(p = 0.001). 10 , 30 1 7 , CT (odd ratio 0.6), (odd ratio 5 , 15 2 6 , 11 , HRCT 가 (odd ratio 1.4). CT (odd ratio 1.3), HRCT 가 (odd ratio 0.8). CT 33 1 9 , 9 , 27 가 (Table 2). CT

3 13 HRCT 가

Table 3. Accuracy of CT features to Predict Malignant Pulmonary Nodule

CT Findings	Sensitivity (%)		Specificity (%)	
	H only	H+ HRCT	H only	H+ HRCT
Marginal characteristics				
Well defined	70.5	89.7	24.6	17.4
Poorly defined	34.6	6.4	76.8	89.9
Smooth	19.2	5.1	50.7	66.7
Spiculation	34.6	37.2	82.6	78.3
Lobulation	23.1	7.7	78.3	75.4
Spiculation & Lobulation	30.8	52.6	75.4	69.6
Pleural tag	56.4	61.5	53.6	56.5
Internal characteristics				
Homogeneous	50.0	57.7	43.5	43.5
Air-bronchogram	35.9	39.7	88.4	84.1
Cavitation	5.1	3.8	85.5	78.3
Low density without cavity	17.9	9.0	85.5	88.4
Bubble lucencies	14.1	32.1	79.7	75.4
Fat density	0.0	0.0	92.8	97.1
Ground-glass attenuation	26.9	26.9	88.4	89.9

H only : helical CT only

H+ HRCT : helical CT plus high-resolution CT

HRCT 가

CT
(odd ratio 0.8), HRCT 가
(odd ratio 1.2).

Zwirewich (2)
(9%) (25%)
(50%)
(19) 60% 가
40.7%, HRCT 가 70.4%

CT
(odd ratio 0.8), HRCT 가
(odd ratio 1.0).

Zwirewich (2)
(13)

CT HRCT 가
(2, 13, 14).

3cm 가
가
가

가

CT HRCT 가
(p=0.001), 5 가
(p=0.001).

가

가

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CT Evaluation of Solitary Pulmonary Nodule : Value of Additional HRCT Scan¹

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Purpose : The aim of our study was to evaluate the usefulness of high-resolution CT scans in addition to helical CT for characterizing a solitary pulmonary nodule.

Materials and Methods : Our study included 49 patients with a solitary pulmonary nodule ; in each patient this was evaluated by both additional high-resolution CT and helical scanning. Images were evaluated by three independent observers, each of whom read them twice : initially with helical CT images only and then with helical images plus high-resolution CT images. After analysis, the observers recorded the following : histologic diagnosis, benignancy or malignancy of a nodule, and confidence in their diagnosis (three scales).

Results : In differentiating benign and malignant nodules, the accuracy of helical scans only was 75% (110/147 readings) whereas that of helical plus high-resolution CT scans was 82% (121/147 readings) ($p=0.001$). Correct histologic diagnosis was made in 47% of cases (69/147 readings) when helical scans only had been evaluated and in 48% of cases (71/147 readings) for which both helical and high-resolution CT scans were available ($p=0.815$). Diagnosis was more often highly confident on the basis of additional high-resolution CT scans (25%) than helical scans only (5%) ($p=0.001$).

Conclusion : By enhancing differential diagnostic accuracy between benign and malignant nodules and by increasing confidence in the histologic diagnosis of a pulmonary nodule, additional high-resolution CT scans are valuable for the evaluation of a solitary pulmonary nodule.

Index words : Lung, nodule

Lung, CT

Computed tomography (CT), comparative studies

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