

, *

*

:

: 82

, retention index(delayed/early phase)

:

early phase

4.14, delayed phase 2.26 , 1.16 1.09,

3.15 1.94, 1.41 1.31 .

Retention index 0.62, 0.97,

0.66, 0.93 .

early phase delayed phase

(p<0.001), retention index (p<0.001).

:

:

15,18)

(Thallium-201 chloride)

potassium(鉀) 가

4,6,8,28)

Anado 3)

, 1970

:

317-1

Tel: 053) 620-3646, Fax: 053) 628-4020, E-mail: shinds@med.yu.ac.kr

30 early phase , 3
delayed phase

가

(true positive), 가 (false positive), (true negative), 가 (false negative), (positive predictive value, %), (negative predictive value, %), (sensitivity, %), (specificity, %) (diagnostic accuracy, %)

11,12,19,24)

(mirror image) (ROI: region of interest) (Fig. 1)

(Tumor / Normal)

, early phase delayed phase
early phase delayed

1. phase retention index(delayed/early phase)

1996 1 2001 12

82
40 , 42
35.2 , 8 80
25
가 , 19 , 10 , 7 ,
6 , 4 , 3 , 3 ,
3 , 1

Tukey B

2. 82 , 47
17 가

grade I
4 , 3 35
8 가
6 (Table 1.).

PICKER Prism 40 가
2000 Gamma Camera , High Resolution 3
Parallel Hole Collimator 2 , 4 가
3 mCi (TI-201 chloride)

가 1 .
 , 7 가 .
 27 20 가
 75.4%,
 84%, 91.5%, 60%
 78.1% ,
 85.1%, 100%,
 100%, 74.1%, 89.6% .
 early phase 4.14, delayed phase
 2.26 ,
 1.16 1.09, 3.15 1.94,
 1.41 1.31 .

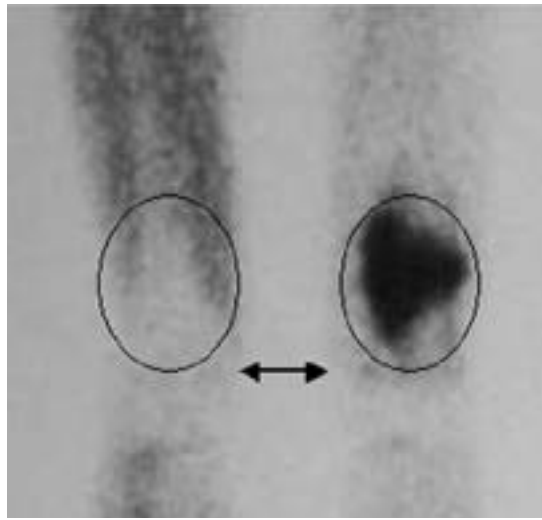


Fig. 1. Region of interest(ROI).

Table 1. The detail results of thallium-201 scintigraphy according to histology in 82 bone tumor patients

	No.	EP	DP	RI	+%
Malignant bone tumors(high grade)					
Osteosarcoma	17	5.1	2.5	0.5	17/17(100)
Metastatic carcinoma	17	3.4	2.0	0.7	17/17(100)
Ewing's sarcoma	2	5.1	3.5	0.6	2/2(100)
Malignant lymphoma	2	2.9	2.4	0.8	2/2(100)
Fibrosarcoma	1	1.8	1.4	0.8	
Hemangioendothelioma	1	3.3	2.3	0.7	
Benign bone tumors					
Fibrous dysplasia	6	1.6	1.1	0.9	2/6(33)
Simple bone cyst	4	1.0	1.0	1.0	0/4(0)
Osteoblastoma	3	1.0	1.1	1.0	1/3(33)
Non ossifying fibroma	2	1.0	1.0	1.0	0/2(0)
Osteochondroma	2	1.0	1.0	1.0	0/2(0)
Osteoid osteoma	2	1.2	1.2	1.0	1/2(5)
Chondroblastoma	2	1.0	1.0	1.0	0/2(0)
Intraosseous lipoma	2	1.0	1.0	1.0	0/2(0)
Aneurysmal bone cyst	1	1.6	1.5	0.9	
Enchondroma	1	1.6	1.3	0.8	
Histiocytosis X	1	1.6	1.5	1.0	
Neurofibromatosis	1	1.0	1.0	1.0	
Giant cell tumor	8	3.2	1.9	0.7	7/7(100)
Low grade malignant bone tumor					
Chondrosarcoma	4	1.2	1.1	0.9	1/4(25)
Chordoma	3	1.7	1.6	1.0	2/3(67)

EP: mean thallium uptake ratio in early phase, DP: mean thallium uptake ratio in delayed phase, RI: retention index, +%: percentage of positive case.

Retention index

0.62,

0.97,

0.66,

0.93

early phase

delayed phase

(p<0.001), retention index

(p<0.001). Early phase

, Na-K ATPase system

(p<0.05),

delayed phase

1,2,10,28)

(p<0.05). Retention index

가

(p<0.05).

10,25)

Higuchi

10)

22

early phase 4.7(2.0~11.1), delayed

phase 2.2(1.4~3.6)

5.8(2.4~11.5), 2.7(2.0~4.3)

early phase 1.19(0.98~1.5) delayed

phase 1.1(1.0~1.3)

early phase delayed phase

4.14 2.26

7 가

early phase

가

delayed phase

1.16

1.09

9,10,16,25)

9,23,25,27)

Kostakoglu 16)

3.8±1.1

1.3±0.3

1.5

. Retention index

가 (wash out)

El-Gazzar 7) 1.7

2.4

, Black 5) 2.0 20),

(p<0.001)

(p<0.05)

2.67 가

(plana image)

(mirror image)

가 semiquanti
tive method

가

SPECT 가 14,16)
Abdel-Dayem1) planar image

SPECT image
planar 1.7 1.6 가

SPECT 4.7 2.96 13,17,21,22,26)

, planar image , ,

가

SPECT image

control

가

가

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(72)
3 mCi
(69-83Jev.)
가 가
era system Multihead gamma cam-
SPECT

FDG-PET (fluorodeoxyglucose-positron
emmission tomography)

가 , MRI

FDG가

가 가

26)

, CT,

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Quantitative Analysis of Thallium-201 Scintigraphy in Bone Tumor

Duk Seop Shin, M.D., Ihn Ho Cho, M.D.*

Department of Orthopaedic Surgery, Nuclear Medicine,
College of Medicine, Yeungnam University, Taegu, Korea*

Purpose: This study was designed to know the ability of thallium-201 scintigraphy to discriminate malignant bone tumor from benign by analysing the quantitative thallium uptake ratio.

Materials and Methods: We took thallium-201 scintigraphy prospectively with other imaging studies in 82 bone tumor suspecting patients. The results of scintigraphy were read qualitatively and calculated quantitatively, and retention indexes were estimated. For the statistical analysis the patients were divided as four group; high grade malignant bone tumor, benign bone tumor, giant cell tumor and low grade malignant bone tumor.

Results: The mean thallium uptake ratio was 4.14 in early phase and 2.26 in delayed phase in high grade malignant bone tumor group, 1.16 and 1.09 in benign bone tumor, 3.15 and 1.94 in giant cell tumor, and 1.41 and 1.31 in low grade malignant bone tumor.

Retention indexes were 0.62, 0.97, 0.66, 0.93 in same order. The thallium uptake ratio and retention indexes were statistically correlated in high grade malignant bone tumor and benign bone tumor group($p < 0.001$).

Conclusion: Thallium-201 scintigraphy proved as useful imaging study to discriminate malignant bone tumor from benign, but had exception in giant cell tumor and low grade malignant bone tumors.

Key Words: Bone tumor, Thallium-201 scintigraphy, Quantitative analysis

Address reprint requests to

Duk Seop Shin, M.D.

Department of Orthopedic Surgery, Yeungnam University Hospital

317-1 Daemyung-dong, Nam-gu, Taegu, 705-035, Korea

TEL : 82-53-620-3646, FAX : 82-53-628-4020, E-mail : shinds@med.yu.ac.kr