

CT

1

2

CT
 : 가 5 cm 40 60
 CT 10 CT CT
 CT CT) / (CT CT CT
 CT CT) × 100]

60% 50%

: 29 () 11 ()
 66.7%(n=29) , 21.8%(n=11)
 가 (p .01). 1
 50% 50%
 60% 82.7%(24/29),
 100%(11/11), 87.5%(35/40) 50%
 96.5%(28/29), 100%(11/11), 97.5%(39/40)
 : CT 5 cm
 60% 50%
 가

가 가 (6-8).

,
 (CT) 10
 CT [Hounsfield Unit(HU)]
 (1, 2). , CT
 (MRI) 가 (3-5). (9). ,
 , CT
 가 10 HU CT
 CT (percentage
 of enhancement washout)
 가 (10-12).
 가
 CT

¹가
²가

2003 1 2

2003 4 4

CT (three-phase CT)
가 5 cm
41
(- 30 HU)
1
40 가
40.7 (29 - 73)
가 27 , 가 13
CT
CT
6
가
CT
60
10
5 mm, 1:1 pitch
120 ml (Ultravist, Schering, Berlin, Germany)
2.5 ml
60 5 mm, pitch 1:1 1:1.6
10
CT
Somatom plus 4 (Siemens, Erlangen, Germany)
120 kVp, 200 mA . CT
가
가
(absolute percentage of enhancement washout)
. { (CT

CT
- CT CT)/(CT -
CT) $\times 100$ l
60% , 60%
, 60%
, (11).
50%
60%
CT
29 () 11
()
14 (8 , 6) , 26
(n=2), (n=2), (n=1), (n=1),
(n=1) , 1
66.7%
21.8%(n=11)
가 (t - test, $p < .01$).
50% 가
50%
가 (Fig. 1).
60% 60%
, 60%
82.7% (24/29),

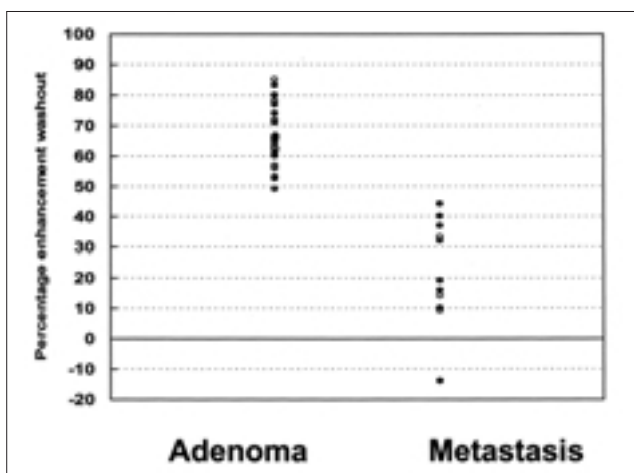


Fig. 1. Graph shows that the percentage enhancement washout value is more than 50% in all adenomas except one and less than 50% in all metastatic tumors.

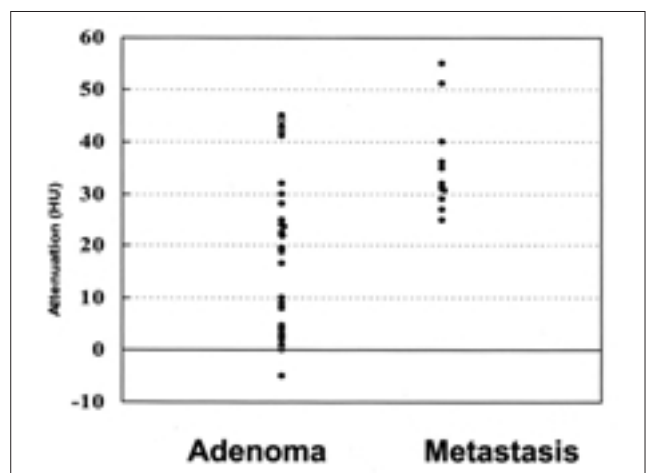


Fig. 2. Graph shows that the attenuation value of all metastatic tumors is more than 20 HU.

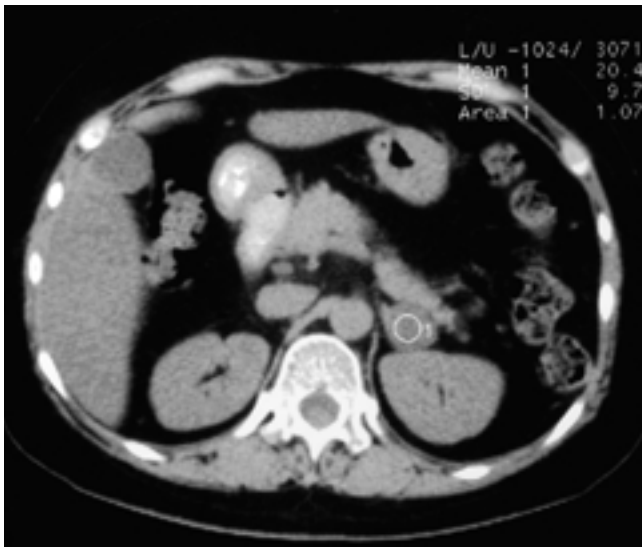
100% (11/11), 87.5% (35/40)
50% 50%
, 50%

(28/29), 100% (10/10), 96.5%
97.5% (39/40)

CT 17.6
HU (n=29) 35.6
HU (n=11) CT
가 10 HU
55.2% (16/29) CT
가 10 HU
44.8% (13/29)

(67.2% vs. 64%, $p > .05$).
CT 20 HU
(Fig. 2).

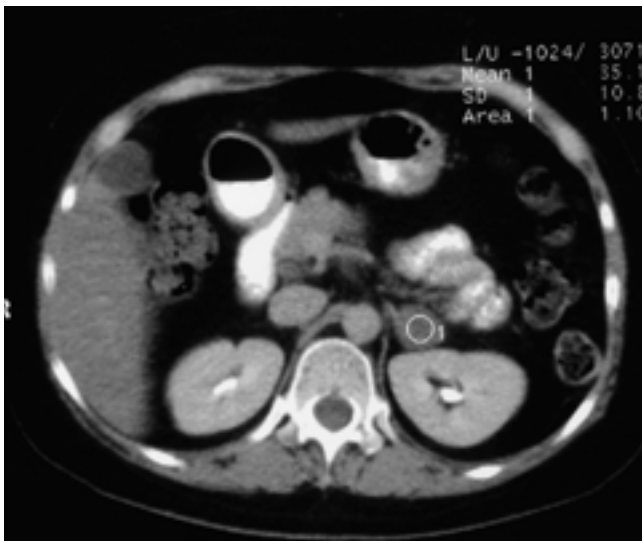
가 3 cm
가
CT MRI
CT
10 HU CT MRI
가
CT 10 HU
(pheochromocytoma) 가
5 cm 가



A



B



C

Fig. 3. 42-year-old female with adrenal adenoma.

A. The attenuation coefficient of left adrenal mass is 20.4 HU on unenhanced CT scan.

B. On portal venous phase CT scan, the mass has attenuation value of 77.8 HU.

C. On 10-min delayed CT scan, its attenuation value is 35.1 HU. The enhancement washout value is 74%. It was proved as cortical adenoma by surgery.

가	CT	CT	60%	50%	CT	CT	10
			82.7%	HU		CT	
	60%	87.5%				CT	
	100%					5 cm	
	(11)						
50%			96.5%		60%가	50%	
100%		97.5%			가		
	가	50%		50%			
		1		50%			
			가				
			가				
50%				가			
			CT				
17.6 HU (n=29)		10 HU	CT				
가 10 HU							
(n=16 vs. n=13).	10 HU						
55.2%(n=16)			40%(10)				
	CT		가 10 HU				
10 HU		가					
			가				
		(10)					
가			가				
cm							
	가	가					
가							
			가				
			가				
		27%	가				
		(14),					
가		(6-8).					

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Usefulness of Percentage Enhancement Washout Value Calculated on Unenhanced, Contrast-Enhanced, and Delayed Enhanced CT in Adrenal Masses: Adenoma versus Metastasis¹

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Purpose: To determine the usefulness of percentage enhancement washout value calculated on unenhanced, enhanced and delayed enhanced CT scans for the characterization of adrenal masses.

Materials and Methods: Forty adrenal masses less than 5 cm in size were assessed using a protocol consisting of unenhanced CT, enhanced CT 60 seconds after intravenous administration of contrast material, and delayed enhanced CT at 10 minutes. The CT attenuation value of adrenal tumors was estimated on each scan, and percentage enhancement washout value was calculated as follows: $\{ (\text{attenuation value at enhanced CT} - \text{attenuation value at delayed CT}) / (\text{attenuation value at enhanced CT} - \text{attenuation value at unenhanced CT}) \times 100 \}$. An adrenal mass was considered benign if its percentage enhancement washout value was at the threshold value, set to 60% and 50%, or higher. The accuracy of the procedure was determined by comparing its findings with the final clinical diagnosis.

Results: Twenty-nine masses were benign and 11 were malignant. The mean percentage enhancement washout value of the former was significantly higher than that of the latter (66.7% vs. 21.8%; $p < 0.01$). All adenomas except one had a washout value of more than 50%. With a percentage washout threshold of 60%, 35 of 40 lesions were correctly characterized as benign or malignant [sensitivity 82.7% (24/29), specificity 100% (11/11), accuracy 87.5% (35/40)]; with a threshold of 50%, 39 of 40 lesions were correctly characterized [(sensitivity 96.5% (28/29), specificity 100% (11/11), accuracy 97.5% (39/40)].

Conclusion: Percentage enhancement washout values are useful for characterizing an adrenal mass as benign or malignant. For characterization, a threshold value of 50% was more accurate than one of 60%.

Index words : Adrenal gland
Adrenal gland, tumor
Adrenal gland, CT

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