

: CT 1

2 . . . . . 3 . . . 2 . 2 .

: CT . 29 38

: CT 30 , 70 3

1 cm (n=12), 1 cm - 2 cm (n=15), 2 cm

- 4 cm (n=8) 4 cm (n=3) 4 , CT

: 가 1 cm

(8 , 67%), 1 - 2 cm ,

(10 , 67%), 2 - 4 cm

(6 , 75%) . 4 cm 3 2 (67%)

1 - 2 cm 87%(13/15), 2 - 4 cm 4 cm 100% (11/11)

: CT

. 1 cm 92% (24/26)

Edmonson Steiner (3-9). CT

가 Edmonson (cell den - CT

grade I / 가 가 , (trabecules)

가 (fibrous capsule) Edmonson grade I

(1, 2). CT

가 가 가 가

(3).

1996 11 2001 12 5

CT 57

(hepatocarcinogenesis)

(dysplastic nodule) 가 11) 가 (needle biopsy) (10, 13 6

(n=23 )

(n=6 ) 29

Edmonson grade I

---

<sup>1</sup>

<sup>2</sup>가

<sup>3</sup>

2002 5 2 2002 6 27

38

CT (segment) . 29 24 ,

5 1 cm 12 8

CT 32-73 ( 51 ) , (67%)가 , , 3 (25%)

4.8 1 . 가 CT(HiSpeed

GE Scanner; GE Medical System, Milwaukee, WI, U.S.A.)

300 mg I/mL (Ultravist (Table 1). 1-2 cm 15 10

300 ; Schering AG, Berlin, Germany) 120 mL 3 mL/sec (67%) 가

, 30 ( ), 70 ( ), 3 ( (Fig.

) CT 1), 3 (20%) , ,

7 mm (collimation) 7 mm/sec , 2 (13%)

(table speed) . CT 2K (75%) . 2-4 cm 8 6

×2K PACS (GE Medical System Integrated Imaging (Fig. 2), 2 (25%)

Solutions, Mt Prospect, IL, U.S.A.) window width 150 가 4 cm

, window level 90 . CT 3 (4, 6, 11 cm) , 4 cm

1 cm , 6 cm (Fig. 3)

1 cm -2 cm , 2 cm -4 cm 4 cm

4가 , ,

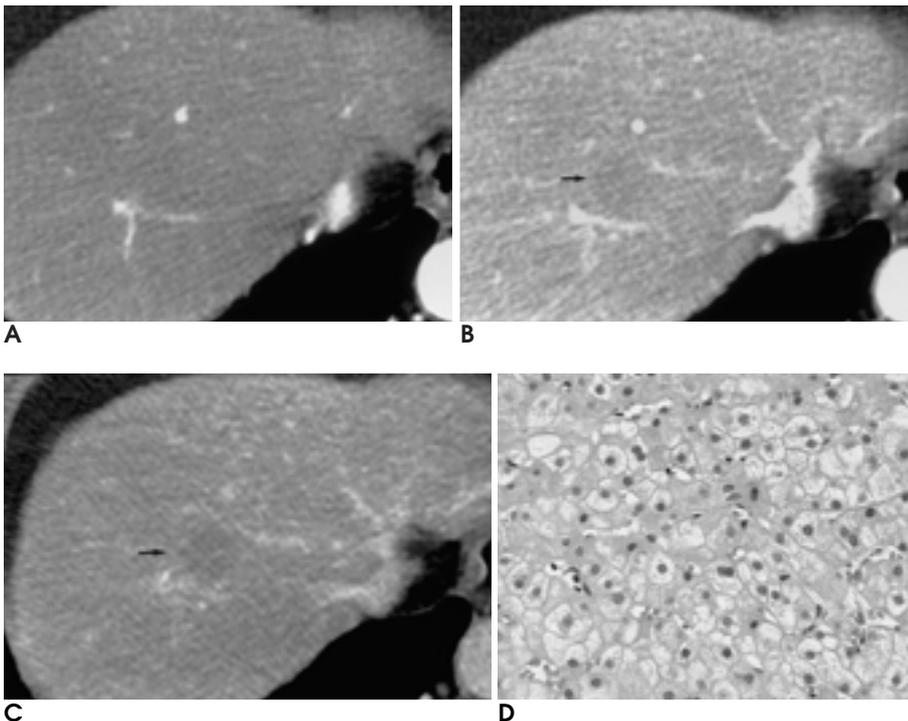
11 cm

chi-square test . 38 (Fig. 4).

1cm 12 , 1-2 cm가 15 , 2-4 cm (Table 2) 38 13 (34%),

가 8 4 cm 3 2.9 cm . 22 (58%), 27 (71%),

28 (74%) 가 .



**Fig. 1.** CT Images of 1.8 cm sized well-differentiated HCC in segment VIII with iso-subtle low-low pattern. Arterial phase scan (A) shows no detectable hepatic mass, portal phase scan (B) shows subtle low attenuation mass (arrow). On equilibrium phase scan (C), the mass is seen as more discrete and low attenuation lesion (arrow). Photomicrograph (Hematoxylin-eosin stain, ×200) (D) shows well-differentiated hepatocyte-like tumor cells arranged in trabecules, as normal liver.

( $p > 0.05$ ),

( $p < 0.05$ ).

1 cm 12  
 4 (33%), 1-2 cm 15 13 (87%)  
 , 2-4 cm 4 cm 가 (4, 12-13)  
 가 . 1 cm . 가 (dysplastic nodule) ,  
 가 ( $p < 0.05$ ) 1 cm (4, 5, 7, 8, 14).  
 (de novo carcino-

**Table 1.** Triple-Phase Helical CT Findings of Well-Differentiated Hepatocellular Carcinomas

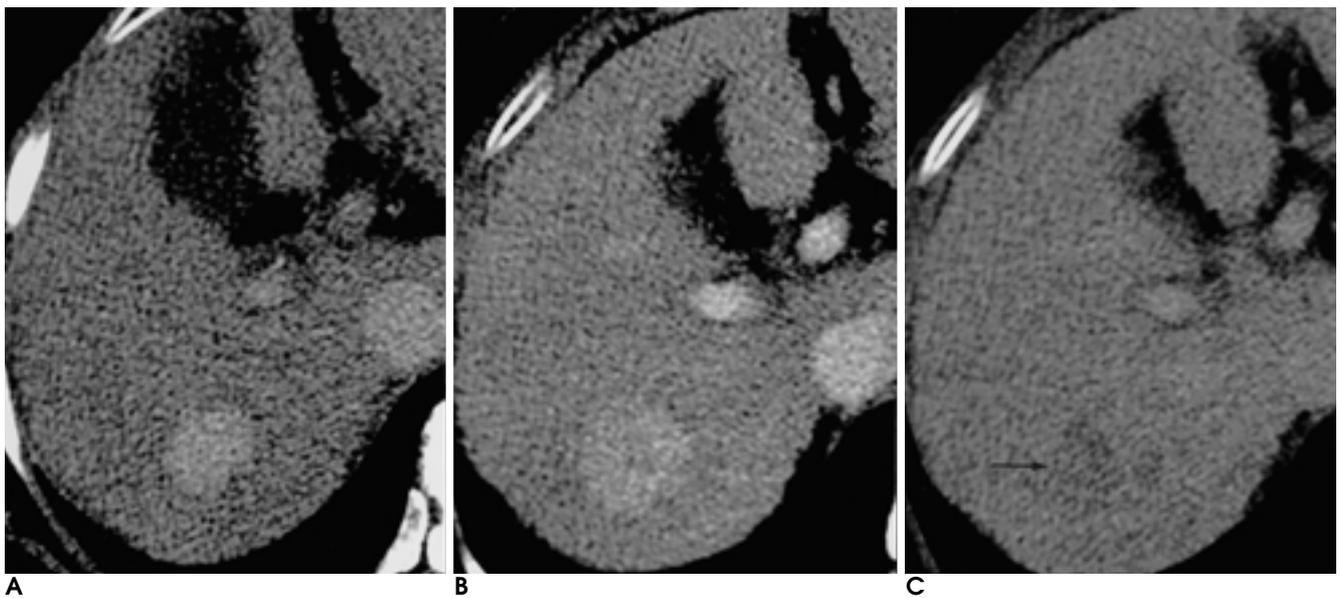
Hepatic Arterial Phase	Portal Venous Phase	Equilibrium Phase	Number				
			< 1 cm (n=12)	1-2 cm (n=15)	2-4 cm (n=8)	4 cm (n=3)	Total (n=38)
ND	ND	ND	8 (67%)	2 (13%)			10 (26%)
ND	Low	Low		10 (67%)			10 (26%)
High	High	Low		3 (20%)	6 (75%)		9 (24%)
ND	ND	Low	3 (25%)		2 (25%)		5 (13%)
Low(FA)	Low	Low				2 (67%)	2 ( 5%)
High	ND	ND	1 ( 8%)				1 ( 3%)
Mixed	Mixed	Mixed				1 (33%)	1 ( 3%)

ND: not detected, FA: fatty attenuation

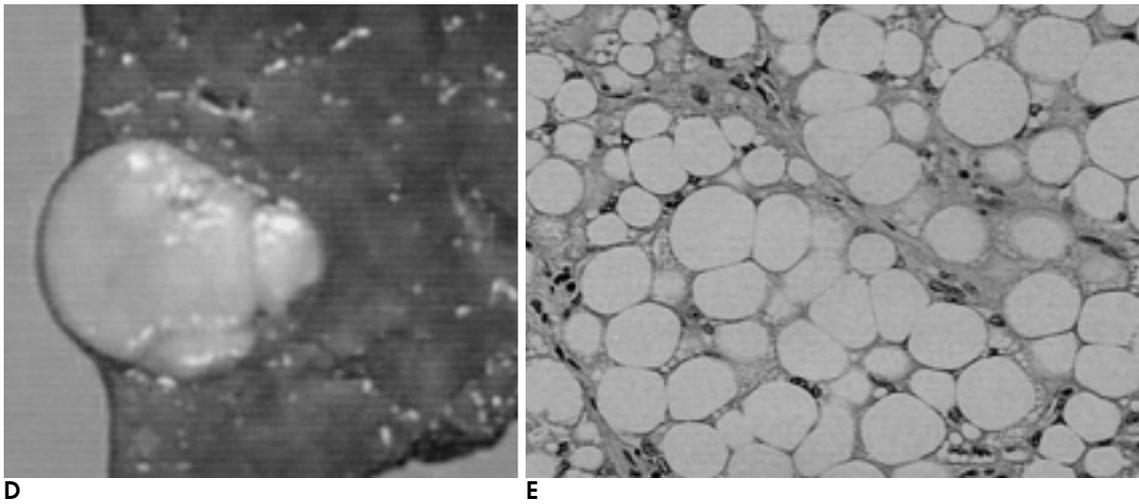
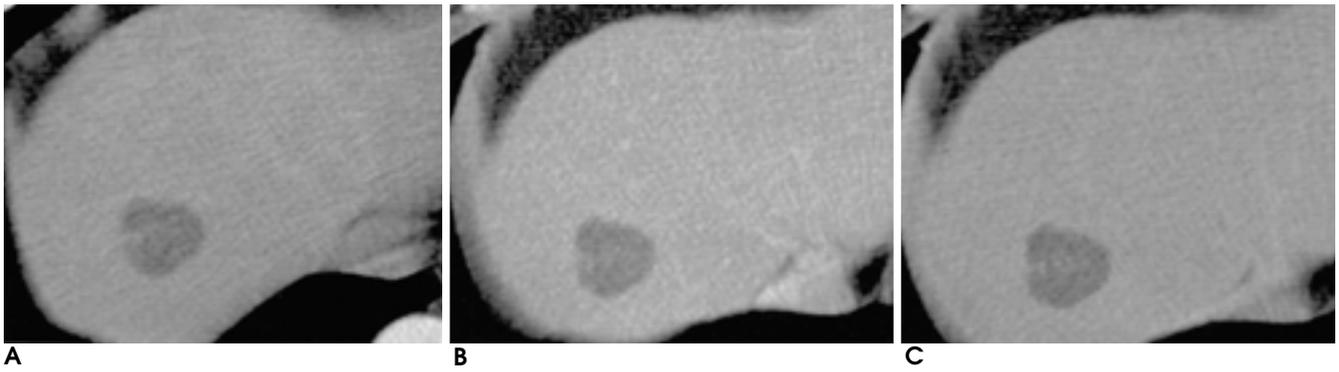
**Table 2.** Detection of Well-Differentiated Hepatocellular Carcinomas on Triple-Phase Helical CT

	< 1 cm (n=12)	1-2 cm (n=15)	2-4 cm (n=8)	4 cm (n=3)	Total (n=38)
Arterial Phase	1 ( 8%)	3 (20%)	6 ( 75%)	3 (100%)	13 (34%)
Portal Phase	0 ( 0%)	13(87%)	6 ( 75%)	3 (100%)	22 (58%)
Equilibrium Phase	3 (25%)	13 (87%)	8 (100%)	3 (100%)	27 (71%) <sup>†</sup>
All Phase	4 (33%)	13 (87%)*	8 (100%)*	3 (100%)*	28 (74%)* <sup>†</sup>

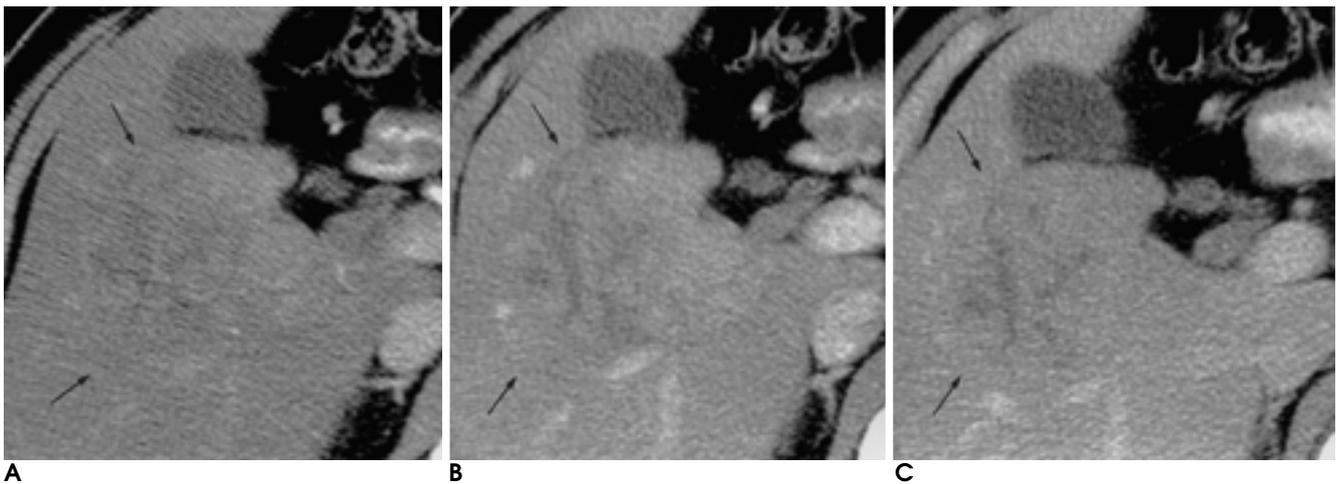
\* Detection rate was higher ( $p < .05$ ) than < 1 cm group, <sup>†</sup>Detection rate was higher ( $p < .05$ ) than arterial phase



**Fig. 2.** CT Images of 3.8 cm sized well-differentiated HCC in segment VI with high - high - subtle low pattern. Mass is homogeneously enhanced on arterial (A) and portal phase (B). And mass (arrow) is changed to low attenuation on equilibrium phase (C).



**Fig. 3.** CT Images of 4.2 cm well-differentiated HCC in segment VII with unusual enhancement pattern. Arterial (A), portal (B), and equilibrium phase scans (C) show fat attenuation mass without enhancement. Photograph of a resected specimen (D) shows white colored mass. Photomicrograph (Hematoxylin-eosin stain,  $\times 200$ ) (E) reveals the presence of abundant fat deposition in cytoplasm of malignant hepatocytes.



**Fig. 4.** CT Images of 11 cm sized well-differentiated HCC in segment V with unusual enhancement pattern. Arterial (A), portal (B), and equilibrium phase scans (C) show large exophytic heterogeneous iso-attenuation mass (arrows) containing amorphous shaped necrotic portion.

genesis)

Itai (22)

가

(5, 15, 16).

가

가

CT

4 cm

2

Takayasu (17)

CT

CT

56%

CT , 46%

가

(atypia)

(2, 23),

, Fujita (18) Monzawa (3)

4 cm

CT

가

CT

70%

67%

CT 74%

CT 가

. 11 cm

1

CT

CT

가

가

CT

(24)

CT

38

가 5 가

38%

38

10 (26%)

11%(5/47)

CT

, 8 1 cm

, 2 1-2 cm

CT (3,

CT

17)

. 1-2 cm

가 가

, 1-2 cm

가, 2-4 cm

가 가

, 4 cm

가

가 1-2 cm

15

가

가 가

10 (67%)가

가

. 1 cm

92%(24/26)

71%

(27/38) 가

Matsui (19)

CT

가 가

가

(20, 21)

(unpaired artery)

가

2-4

cm

가 8 6 (75%) 가

, 6

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2 cm

3

. 1-

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## Well-Differentiated Hepatocellular Carcinoma: Triple-Phase Helical CT Findings<sup>1</sup>

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**Purpose:** To determine the imaging characteristics of well-differentiated hepatocellular carcinomas (HCCs), as seen at triple-phase helical CT.

**Materials and Methods:** Thirty-eight well-differentiated HCCs in 29 patients who underwent surgical resection comprised our study population. Triple-phase helical CT images were obtained at 30 seconds, 70 seconds, and 3 minutes after contrast injection, and HCCs were divided into four groups according to their size: smaller than 1 cm ( $n=12$ ), 1 - 2 cm ( $n=15$ ), 2 - 4 cm ( $n=8$ ), and larger than 4 cm ( $n=3$ ). The enhancement patterns of HCCs at triple-phase helical CT were retrospectively analysed.

**Results:** In the smaller than 1 cm group, the most common enhancement pattern at all three phases was iso-attenuation ( $n=8$ ; 67%). In the 1 - 2 cm group, iso-attenuation ( $n=10$ ; 67%) was most common during the arterial phase and slightly low attenuation during the portal and equilibrium phases while in the 2 - 4 cm group, high attenuation ( $n=6$ ; 75%) was most common during the arterial and portal phases, and low attenuation during the equilibrium phase ( $n=6$ ; 75%). Two (67%) of three cases in the larger than 4 cm group demonstrated low, including fatty, attenuation. The detection rate was 33% (4/12) in the smaller than 1 cm group, 87% (13/15) in the 1 - 2 cm group and 100% (11/11) in the 2 - 4 cm and larger than 4 cm groups.

**Conclusion:** At triple-phase helical CT, the enhancement patterns of well-differentiated HCCs were diverse, and the detection rate of those larger than 1 cm was 92% (24/26).

**Index words :** Liver, CT

Liver neoplasms, diagnosis

Computed tomography (CT), helical

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