

# CT

:

1

: CT

: 1997 7 1999 6 CT  
 26 ( : =23:3) . CT (30 ), (70 ),  
 (220 ) 가  
 ( ) 가 ( ) , ,  
 , CT ( CT ), ( ),  
 : CT 7 (27%), 13 (50%) , 1  
 가 (12 , 13 , 25 ) , 96% .  
 가 : : = 2:2:2 (11 )  
 , 3:3:3 1 12 (46.2%) 14  
 (53.8%) 가 3 4  
 CT 가 (86%,14%) 2  
 (25%,75%) (43%,57%).  
 : CT 3 4 가  
 CT 가 1 2

(5).

CT

50 - 60%

0 - 2%

(1 - 3).

가

가

(conventional computed tomography, CT),

가

CT, (magnetic resonance imaging, MRI)가

CT 가

CT

6%

가

(4),

CT

CT

33%

CT

3

(radiologic - pathologic

correlation)가

CT

1997 7 1999 6 CT  
 32 ( : : = 26:4:2 )  
 가 (3 ), 1 cm  
 (2 ) (1 )  
 26 ( : = 23:3 )  
 . 1 cm 가 , CT  
 (18 ), (3 ),  
 (2 ) ,  
 (Indirect hemagglutination)가  
 19:7 ,  
 30-82 ( 54 )  
 CT Somatom Plus 24 Somatom Plus -4(Siemens  
 Medical Systems, Erlangen, Germany) 14  
 , 12 , (Ultravist 370: Schering AG,  
 Berlin, Germany) 2.5-3ml,  
 100-120 ml , 30 ( )  
 70 ( ) 220 ( ) 8 mm,  
 10 mm/sec 8 mm  
 CT , ,  
 가 , 50%  
 가  
 , CT ( -CT ),  
 , CT  
 (9 , 34.6%), (3 ,  
 11.5%), (1 , 3.8%), (13 , 50%)  
 , 10 (38.5%).  
 가 , CT  
 (CT ) 4-56 ( 15.4 )  
 , 1-7 , 8-14 , 15  
 가 14 , ( , 7 ;  
 , 3 ; , 2 ), 2 ( +  
 , + ) 9

CT  
 3 1:256  
 , metronidazole . CT  
 5 cm , 5-10 cm, 10 cm  
 가 ( )  
 가 ( ) , SPSS 7.5  
 (Chi - Square test).  
 CT  
 7 , 13 ,  
 1  
 가 (12 , 13 , 25 ) ,  
 96% (Fig. 1).  
 가 : : = 2:2:2  
 (11 ) (Fig. 2), 3:3:3 1  
 12 (46.2%) 14 (53.8%)  
 가 3 4  
 (Table 1)  
 (Fig. 3, 4).  
 CT 가 1-7 , 8-14 , 15 7 ,  
 12 , 7 , CT 1-11 cm( 6.5 cm)

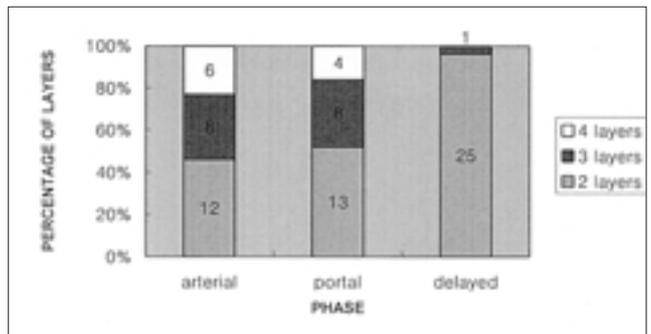
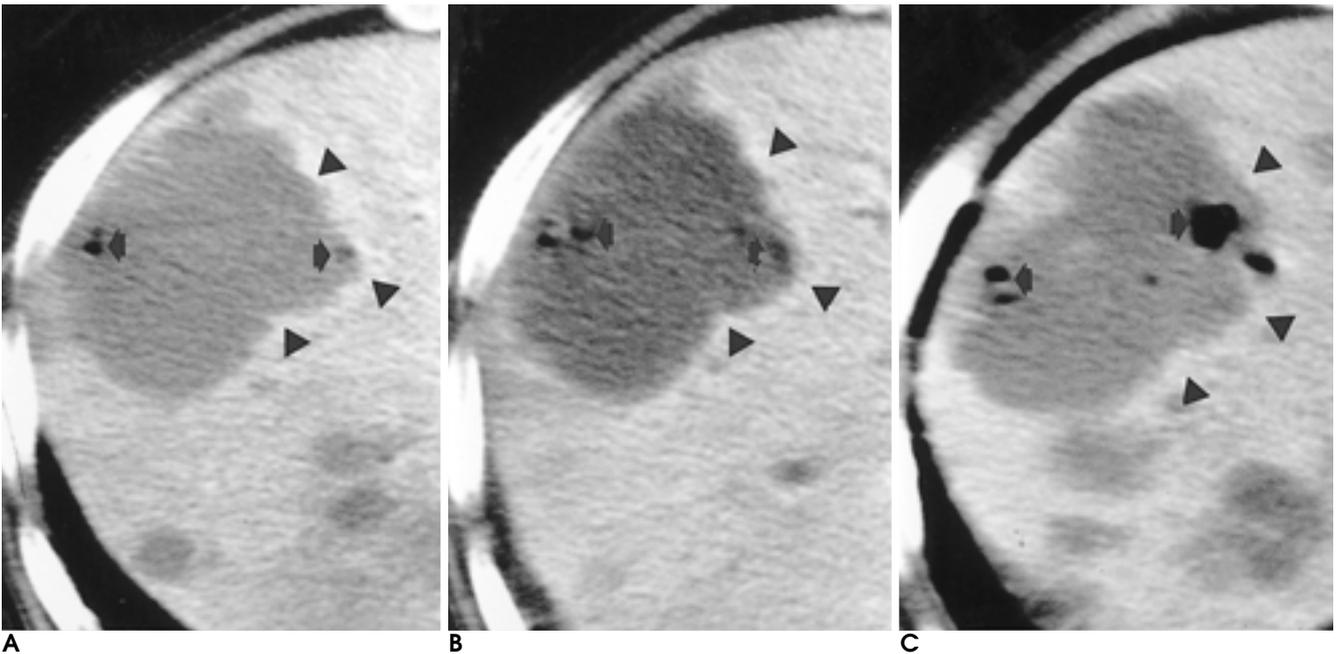


Fig. 1. Distribution of alternating layers of liver abscess in each three phase

Table 1. Multiple Layering Pattern of Liver Abscess in Three Phases

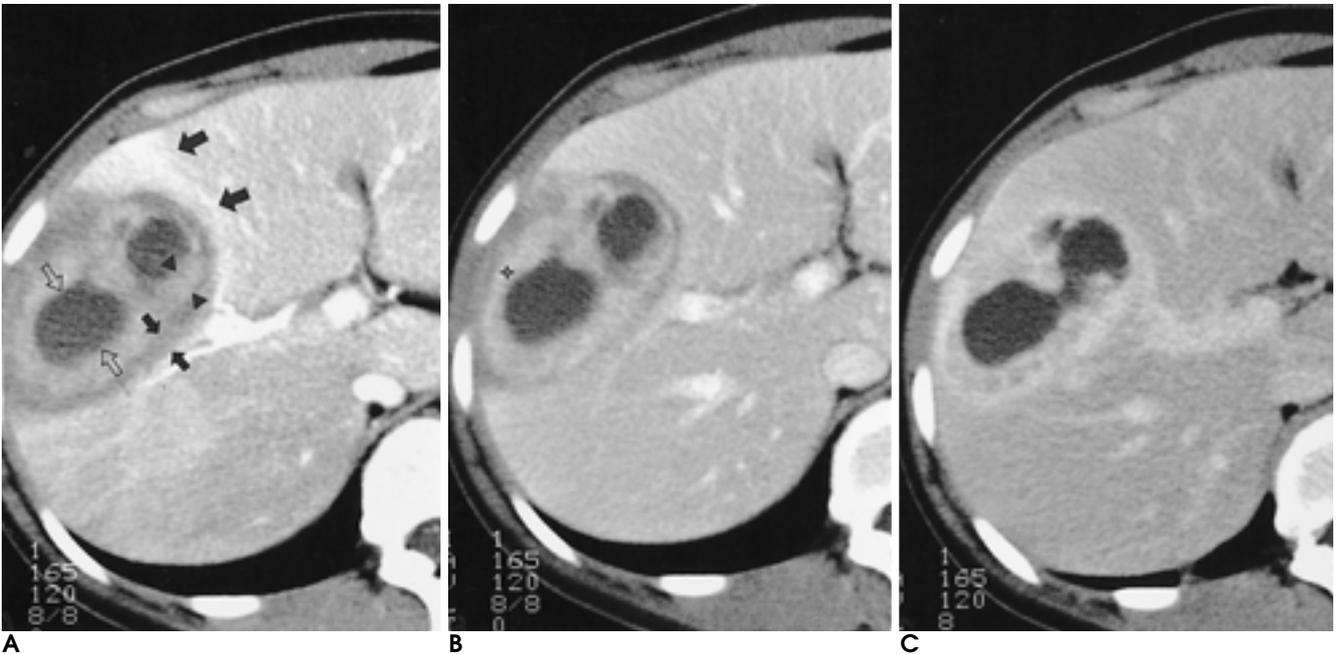
Changing Group		Unchanging Group	
A:P:D	No. of subjects	A:P:D	No. of subjects
4:4:2	2		
4:3:2	3		
3:4:2	2		
3:3:2	4	3:3:3	1
3:2:2	2		
2:3:2	1	2:2:2	11
Total (%)	14 (53.8)		12 (46.2)

A:P:D = arterial:portal:delayed



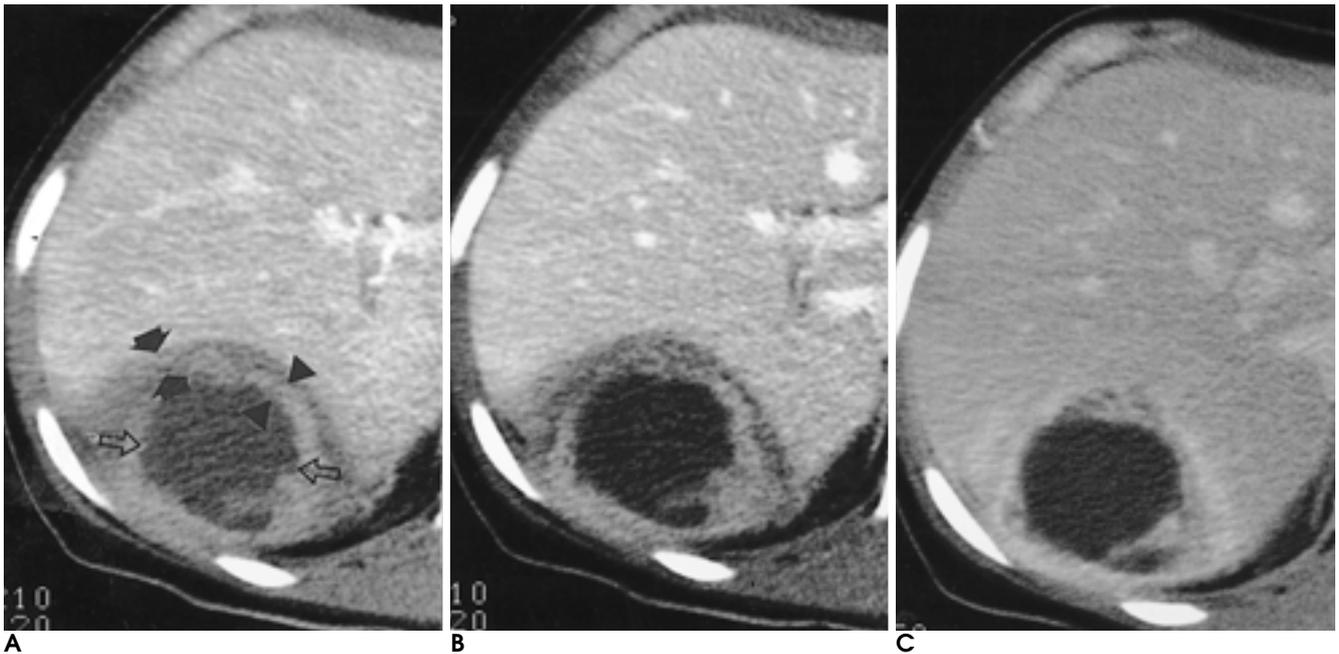
**Fig. 2.** Multiple pyogenic liver abscesses in a 64-year-old man who received Whipple's operation due to pancreatic cancer: 2:2:2 enhancement pattern.

The CT interval is 3 days in this patient, who has been treated for diabetes mellitus. Three consecutive CT scans during arterial, portal, and delayed phase (**A, B, C**) show multiple hypodense lesions in the liver. The largest one have persistent marginal enhancement (arrowheads) and intralesional air bubbles (arrows). This central hypodense and marginally enhanced layering is the most common of all enhancement pattern in three phases.



**Fig. 3.** A pyogenic liver abscess in a 30-year-old female: 4:3:2 enhancement pattern.

The CT interval is 20 days. No predisposing factors to the liver abscess was identified. A CT scan in arterial phase (**A**) shows the liver abscess as four alternating enhanced layers that are composed of central hypodense area (open arrows), inner slightly-enhanced ring (arrowheads), outer hypodense ring (black arrows), and peripheral wedge-shaped layer (large arrows). The fourth layer is isodense and disappeared in portal phase (**B**), and 3th layer is imperceptible and only two layers are remained in delayed phase (**C**).



**Fig. 4.** A pyogenic liver abscess in a 39 year-old female: 3:3:2 enhancement pattern. The CT interval is 13 days. No predisposing factors to liver abscess was identified. CT scans in arterial and portal phase (**A, B**) show central hypodense (open arrows), inner slightly-enhanced ring (arrowheads), and outer hypodense ring (black arrows). The outer ring is imperceptible and only two layers are remained in delayed phase (**C**).

5 cm, 5-10 cm, 10 cm  
 6, 18, 2 가 .

CT (p=.037),  
 1 가 (14%) 2  
 가 (75%)  
 (57%). 10  
 16 3, 11  
 (p=.054).

(Table 2).

, CT 가  
 (4, 6).

(7-9). CT  
 "(cluster sign)가  
 Jeffrey (10) 2 cm  
 (14%),

**Table 2.** Relationship of Changing-layer Pattern with Various Factors

Factors	Changing-layer Pattern		P value
	Yes	No	
Underlying disease			
Biliary disease	2 (25)	6 (75)	.123
GB perforation	1 (33)	2 (67)	
Pylephlebitis	1 (100)	-	
Unknown	10(71)	4 (29)	
DM			
Yes	3 (30)	7 (70)	.054
No	11(69)	5 (31)	
CT interval (days)			
1 - 7	1 (14)	6 (86)	.037
8 - 14	9 (75)	3 (25)	
15	4 (57)	3 (43)	
Microbial agent			
Pyogenic	11 (48)	12 (52)	.088
Amebic	3 (100)	-	
Abscess size (cm)			
1 - 5	1 (17)	5 (83)	.091
5 - 10	11 (69)	5 (31)	
10 <	2 (50)	2 (50)	

Note. - Data are the number of cases. The numbers in parentheses are percentages.

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 ble - target sign)가 (5).  
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## Three-phase Dynamic CT Findings of Liver Abscess: Related Factors with Multiple Layering Enhancement Pattern<sup>1</sup>

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**Purpose:** To determine the number of multiple alternating layers of liver abscess, and changes in this number, as revealed by spiral CT, and to ascertain which factors are related to changes occurring during the three phases of this modality.

**Materials and Methods:** Using three-phase spiral CT imaging we studied 26 cases of liver abscess (pyogenic:amebic=23:3). The number of layers comprising the abscess, as seen on postcontrast CT scans, was determined during the arterial (30sec), portal (70sec), and delayed (220sec) phase, and all cases were assigned to one of two groups according to changes in the number of layers observed during the three phases. With regard to underlying disease, the two groups were compared in terms of the presence of abscess and of diabetes mellitus, CT interval (time from onset of symptoms to CT scanning), microbial agent (pyogenic vs. amebic), and the largest diameter of abscess as revealed by CT.

**Results:** Except in one case, three or four alternating layers [in 13(50%) and 7(27%) cases, respectively] were seen only during the arterial and portal phase. During each of the three phases-and especially the delayed phase, where it was present in 25 of cases (96%)-two alternating layers (2:2:2) was the most common pattern, with a 3:3:3 pattern occurring in one case. All 12 cases (46%) in the unchanging-layer group showed one of these two patterns. All changing-layer group cases (14;54%) demonstrated three or four layers during the arterial and portal phase but only two during the delayed phase. The CT interval was the only significantly different factor between the two groups. During the first week, the number of cases in the unchanging-layer group was much higher than in the changing-layer group (86%,14%), but during the second week this situation reversed (25%, 75%).

**Conclusion:** Our study reveals that on three-phase dynamic CT images, a characteristic enhancement feature of liver abscesses is three or four layers during the arterial and portal phases, with reduction to two layers during the delayed phase. This change, as revealed by spiral CT, is rare during the week following the onset of symptoms, but common during the second week.

**Index words :** Liver, abscess  
Liver, CT

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