:

CT [1]

.　.　.　.　.　.　.

:　　　　　　CT

CT　　　　　　　　　.

:　　　　　　　　　　　21　(　　　6　,　　　　　　3

,　　　12　)　　　　　　　　　.　CT　　　600-800 ml

CT (n= 12)　　　　　CT (n= 9)　　　.

60-70　　　　　　　　, 3　　　　　　　　　.　CT

,　　　　,　　　　　,　　　　　　　,

,　　　　　　　,　　　　　　,

.　CT　　　　　　　　　　　　.

: 6　　　　　　3　　　　　　,　　　　5.5cm

.　　　　　　　　　　　　　　　　,

.

.　　　12　　　,　　　4.5-15.5 cm (　　11.5 cm)

, 2　　　, 1　　　, 9　　　　　.

,

.　　　　　　　　　　　　　　　,

10　　　　　　　　　　,　　10cm　　　　5

.　　　　　7

(p<0.05).　　　12

,　　　　　　　　.

:　　　　　　　　　　CT

,　　　　　CT

.

(3,4).

,

(1,2).　　　　　　　　1-3%

,

(5).

,　　　,

,　　　　　　　　(6,7), CT

(8,9).

CT

(10),　　CT

(11).

CT   ,

              (12-14).   CT
              ,
                                   ,
        ,   ,
                          ,
                    .

        1994   5   1998   10   (n= 17)
          (n= 4 :   2   ,
                2   )
                    21   (: 6   ,   : 3   ,
        12   )   .   13   ,
        8   ,   17- 77   52   .
21   12   CT
        , 9   CT
CT   ,   .
              CT   Xpeed scanner (Toshiba medical system,
Tokyo, Japan)   Hispeed Advantage scanner (GE Electric
Medical System, Milwarkee, U.S.A.)   , CT
                              600- 800ml   ,
                                            CT
CT   .   3- 5ml
              120- 150ml   (Iodine
300mg/ml, Iopromide; Schering Berline, Germany)
        .   ,   ,   ,

                                          ,

Table 1. **Guidelines for the Diagnosis of Malignancy or Potential Aggressiveness in Stromal Tumors**

Unequivocal factors	Metastasis (histologically confirmed)
	Invasion of adjacent organs
High risk factors	Size (> 5.5 cm)
	Tumor necrosis
	Nuclear pleomorphism
	Dense cellularity
	Microscopic invasion of
	the laminar propria or blood vessels
	Pattern-alveolar or cell balls
	in the epithelioid variant
Criteria for malignancy	
Malignant	One unequivocal or
	two high-risk factors
STUMP	One high risk factor only
Benign	No high risk factors

                                                    :
              60- 70   3
              .   CT
              5- 7mm   , 1-1.5: 1 pitch, 5mm
                            .
                    10mm
        .   CT
        60   2.7   1.6   , 5-
10mm   . 25
              5   ,
                                .
              3
        10mm   .
        CT   ,   ,   ,
        ,   ,
        ,   ,   ,
                            .   Fisher ex-
act test   p<0.05   .   2   1
                              ,
                    .
                    Lewin
                    (Table 1) (15).

                    6   4   ,
                          1   .
        3   . 12
                                                    10
                    ,   8   ,
2
              .   2
              .
              , 6   (endogastric growth)
        (Fig. 1). 3   ,
                    1
(Fig. 2).   , 3   ,
1   (exogastric growth)   , 8
        (   )   (Table 2) (Figs. 3-5).
        6   2-5.5cm (3.5cm

Table 2. **Growth Pattern of Gastric Stromal Tumors**

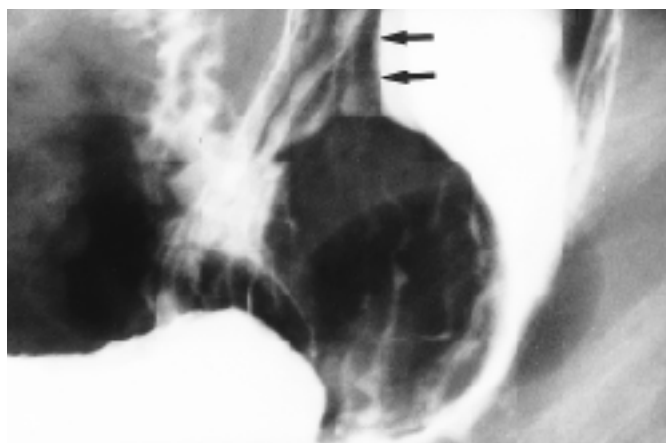|	Endogatric	Exogastric	Both	Total
Benign	6	0	0	6
STUMP	2	0	1	3
Malignant	3	1	8	12
Total	11	1	9	21

STUMP: stromal tumor uncertain malignant potential
Both: endogastric and exogastric

)   5.5cm   , 3   (S-   (Figs. 3-5). 5
TUMP)   3-4.5cm (3.5cm)   .   (Fig. 5B).
          4.5-15.5cm (11.5cm) , 5   10cm   ,   ,
     , 6   5-10cm   ,   1   5cm   ,
     (Table 3).
               , 6   .
                                                            10cm   5
     (Fig. 1).   3   2
                                        , 1   (Fig. 3A).
                                                                                        ,
     .   ,
          ,
                                                                           ,
                                                                                ,
                                                                 (Figs. 3B,5C).
                                                  7   (53.8%)
                         ,
                              ,
                    (Fig. 3A).
                                                                                ,
                                                       (P<0.05) (Table 4).
                                                                 ,

Fig. 1. A 58-year-old man with benign gastric stromal tumor. CT scan during the portal phase shows a round mass with endogastric growth in the gastric upper body. Note uniform contrast enhancement of intact overlying mucosal layer (arrows).

Table 3. Tumor Size of Gastric Stromal Tumors

	< 5 cm	5-10 cm	>10cm	Total
Benign	5	1	0	6
STUMP	3	0	0	3
Malignant	1	6	5	12
Total	9	7	5	21
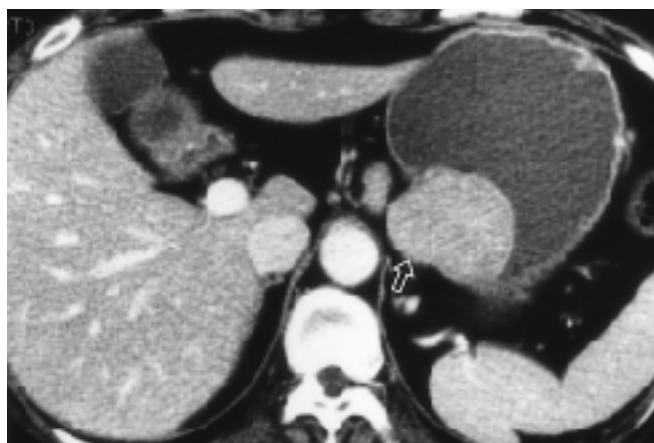
A   B

Fig. 2. A 50-year-old waman with stromal tumor of uncertain malignant potential.
A. Upper gastrointestinal series shows a well-circumscribed sbmucosal mass with bridging folds (arrows) in the posterior wall of the gastric upper body.
B. CT scan during the portal phase shows a round intraluminal protruding mass with exogastric component (arrow) in the posterior wall of the gastric upper body.

:

,

(Figs. 3-5).   , 12

,   10   .

2

,

,

(Figs. 5A,5B).
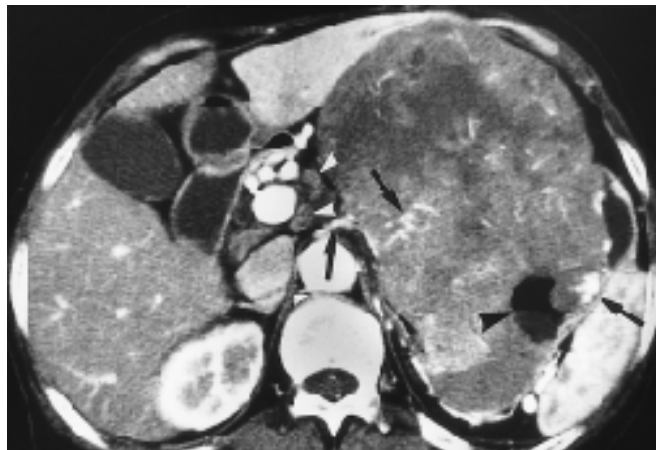
A   B

Fig. 3. A 61-year-old woman with malignant gastric stromal tumor.
A. CT scan during the portal phase shows a huge spherical mass obliterating the lumen of the gastric fundus and body with endo-
and exogastric growth. The mass is not significantly enhanced but highly enhancing feeding vessels (arrows) in the perigastric
space and peripheral portion of the tumor are seen. Note multiple enlarged lymph nodes (white arrowheads) in the left gastric
space, which were pathologically confirmed as reactive hyperplasia.
B. CT scan in the equilibrium phase shows delayed heterogeneous enhancement of the tumor due to necrosis and the overlying
mucosal layer is poorly identified. Note an air-fluid level within necrotic portion (black arrowhead) of the tumor.
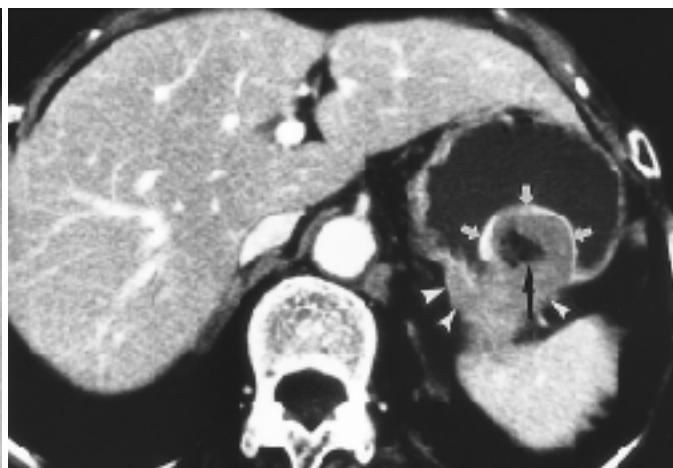
B

Fig. 4. A 77-year-old woman with malignant gastric stromal tumor.
A. Upper gastrointestinal series shows a well-defined, round submucosal mass
with central ulceration (arrow) in the posterior wall of gastric fundus.
B. CT scan during the portal venous phase shows a intraluminal protruding mass
with exogastric growth (arrowheads) arising from the posterior wall of gastric fun-
dus. Note a highly enhanced, intact mucosal layer (white arrows) overlying the tu-
mor and central necrosis with small air bubbles (black arrow).

A

Lewin 　(15)

, STUMP ,

(Fig. 5C). 2 .

CT

(reactive hyperplasia) (Fig. 3). CT

, , ,

,

, , , , CT

(15). (7,16), Gastrografin

CT

(16), , CT

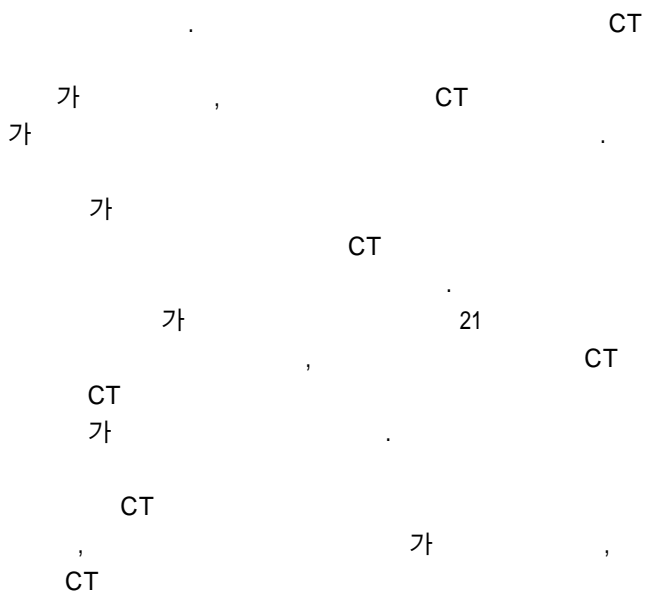. CT

50% 5 (6,10). , CT CT

.

(3,4). , , ,

, , CT
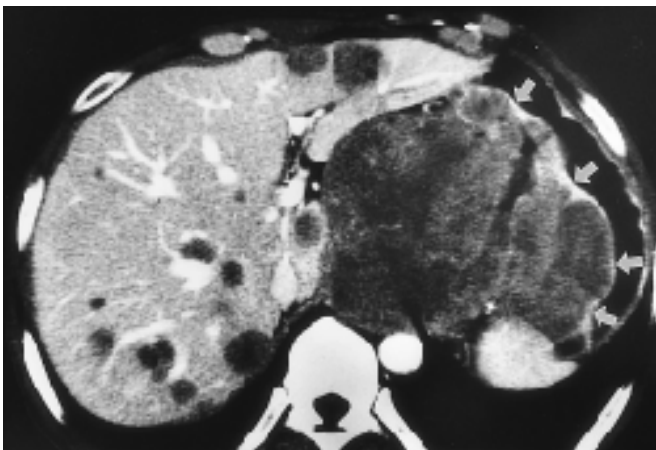
A
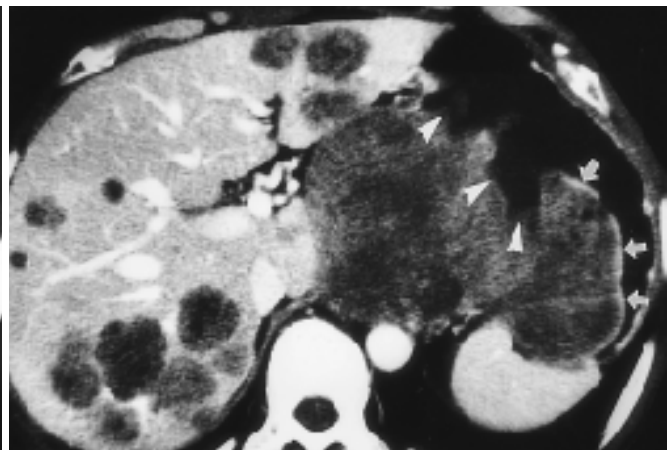
B
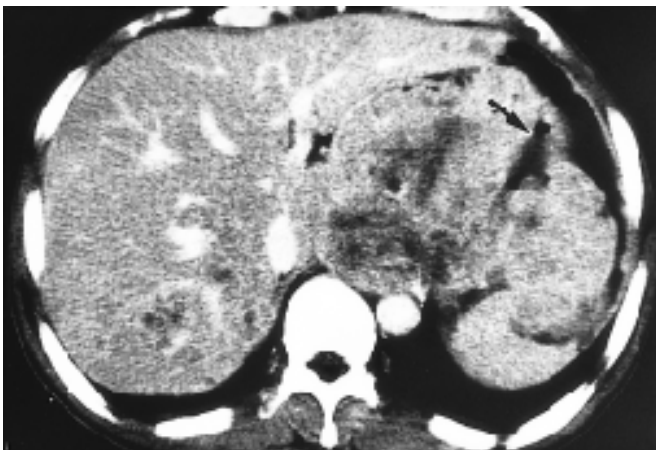
C

Fig. 5. A 50-year-old man with gastric leiomyosarcoma and hepatic metastases A and B. CT scans during the the portal phase show a large mass arising from the gastric fundus and body with endo- and exogastric growth. The tumor is not significantly enhanced but intact overlying mucosal layer (arrow) is highly enhanced. CT scan (B) at the lower level of A shows a disruption of highly enhanced mucosal layer at the area with irregular ulceration and necrosis (arrowheads). Note variable sized, hypodense nodules scattered throughout both hepatic lobes, representing metastases.
C. CT scan in the equilibrium phase shows delayed heterogeneous enhancement of the tumor due to necrosis and the mucosal layer overlying the tumor is poorly identified. Multiple metastatic nodules are poorly identified due to delayed enhancement. Note a small air density within necrotic portion of the tumor (arrow).

:

.

10   3 ,   1 ,   8

, 2   .   .

Nauert (17)   5cm   ,

50%,   46%   4%   .

.   12   10 (83%)

,   3   (18).

.   2 (17%)

,   .   , Megibow (16)

29

,   ,

5.5cm   (18).   .   Buy (20)   CT

,   (6)   18

5cm   .   12

,   10cm   ,

.   Nauert (17)   2cm   .

3   Scatarige (7)   CT

.   6   5.5cm

, 12   11   5cm   -   ,

,   .   1   5cm

.

,   12   7 (53.8%)

.   -

,

CT   CT   ,

.

,

(P<0.05).

,

, 12   .

.   ,

, ,   ,

(21).   2

.   ,

, 3   ,

.   .

,

,

,   (18).   . 2

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.   .

,   ,

(bridging)   (19).   (22).

CT

.   CT   , 10cm   5

(16).   6

CT

, CT

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CT

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21

, CT

CT

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CT

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CT

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Gastric Stromal Tumor: Two-Phase Dynamic CT Findings with Water as Oral Contrast Agents[1]

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Purpose: To evaluate two-phase dynamic CT with water as oral contrast agents in the CT diagnosis of gastric stromal tumors.

Materials and Methods: We retrospectively reviewed the CT findings in 21 patients with pathologically proven gastric stromal tumors. Six were found to be benign, twelve were malignant, and there were three cases of STUMP (stromal tumor uncertain malignant potential). Two-phase dynamic CT scans with water as oral contrast agents were obtained 60-70secs (portal phase) and 3 mins (equilibrium phase) after the start of IV contrast administration. We determined the size, growth pattern, and enhancement pattern of the tumors and overlying mucosa, the presence or absence of ulceration and necrosis, tumor extent, and lymph node and distant metastasis. The CT and pathologic findings were correlated.

Results: All six benign tumors and three STUMP were less than 5.5 cm in size, and during the portal phase showed round endogastric masses with highly enhanced, intact overlying mucosa. Twelve malignant tumors were 4.5-15.5 cm in size (mean, 11.5cm); an endogastric mass was seen in three cases, an exogastric mass in one, and a mixed pattern in eight. On portal phase images the tumors were not significantly enhanced, but highly enhanced feeding vessels were noted in five larger tumors (> 10 cm). All 12 malignant tumors showed ulceration and necrosis, and interruption of overlying mucosa was clearly seen during the portal phase. We were readily able to evaluate tumor extent during this phase, and in ten malignant tumors there was no invasion of adjacent organs. Seven malignant tumors showed air density within their necrotic portion (p< 0.05). On equilibrium phase images, all malignant tumors showed heterogeneous enhancement due to necrosis, and poorly enhanced overlying mucosa.

Conclusion: Dynamic CT during the portal phase with water as oral contrast agents was useful for depicting the submucosal origin of gastric stromal tumors and for evaluating the extent of malignant stromal tumors. Our results suggest that these CT findings may be helpful for differentiating between benign and malignant stromal tumors, and in distinguishing them from other gastric tumors.

Index words : Stomach, neoplasms
Stomach, CT

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