

: CT 1

. . .

: CT 가

: 16

30 16 CT (Sensation 16, Siemens,
Erlangen, Germany) 5 가 10

. CT 3 mm

2,3,5 - triphenyltetrazolium chloride (TTC)

CT . CT CT (HU)

: TTC CT

. CT CT

, CT (0.48±0.12 vs. 0.64±0.13, $p < 0.05$,
163±46 HU vs. 216±56 HU, $p < 0.05$). 1

CT

: 가 CT

CT (Multidetector CT, MDCT)

가 가 가
(1 - 3).

가 (4, 5).
Hoffmann (6) 4 - MDCT
(reperfusion)

, Koyama (7) CT

MDCT

가, CT

가 .

(National
Institutes of Health, NIH)
("Guide for the Care and Use of Laboratory Animals";
NIH Publication No.86 - 23, revised 1996)

16 (Sprague - Daley rats,
200g , 12 , 220g)
(Lab Diet 5P00 water ad libium)

(; ,
,) 100 g 0.5 mg

MDCT 120kV, 160mAs, 400/40, CT (Sensation 16, Siemens, Erlangen, Germany) 24 (n=15). 22 (400 mgI/L, Iomeron 400; Bracco Imaging SpA, Milan, Italy) 가 30 (n=16), 5 (n=10) 1 1 mm, 0.75 mm, 1 mm 가 3 (RAPIDIA 3D; , ,) (multiplanar reformation) CT (short axis view) 3 mm 1.5% Triphenyltetrazolium chloride (TTC) 가 15 가 , , 10 9

TTC (Fig. 1). , CT (HU) (region of interest) (Contrast Ratio, CR = Infarction HU / Non-infarction HU) CT (Fig. 2). CT (anterior septal portion) CT CT TTC 가 CT (163 ± 46 HU vs 216 ± 56 HU, $p < 0.05$). (0.48 ± 0.12 vs 0.64 ± 0.13, $p < 0.05$) (Fig. 3). 가 TTC (3.5 ± 3%) (Fig. 4). 가 3 5 7

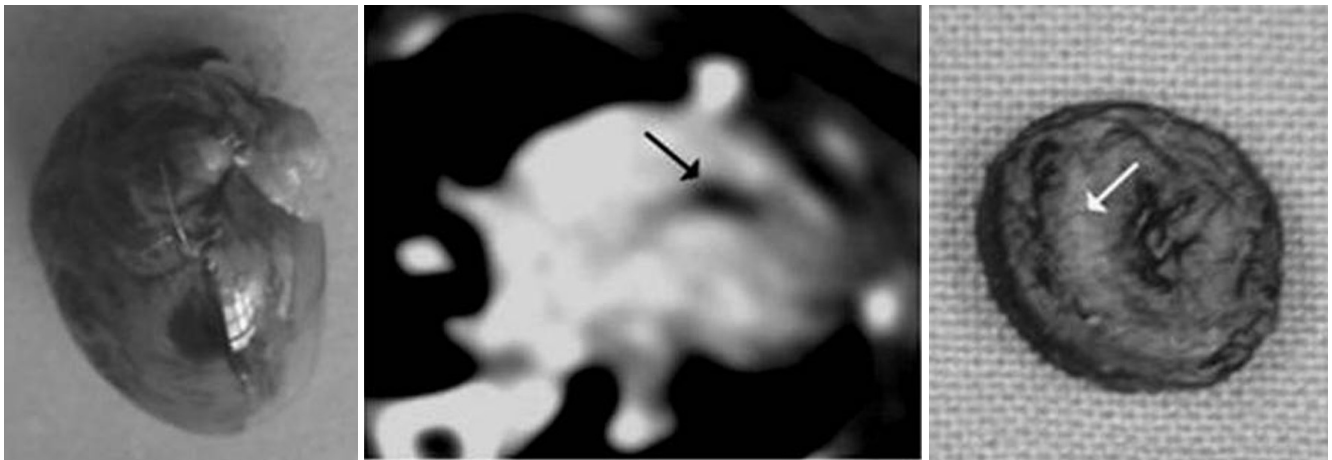


Fig. 1. A. Postmortem image of the anterior portion of excised heart. The ligated vessel is the left anterior descending coronary artery. B. Multiplanar reformatted image. Low attenuation area (arrow) represents infarct area. C. TTC specimen shows infarction area as a low attenuated area and unstained myocardium (arrow).

5
5 . TTC
, 3
가 TTC 6 3
가 TTC
(4 - 6).
CT
(6, 7),
(9, 14).
가
3.5%
0.05).
($p >$
RI)
가 ,
CT
CT
Braunwald (15)
-

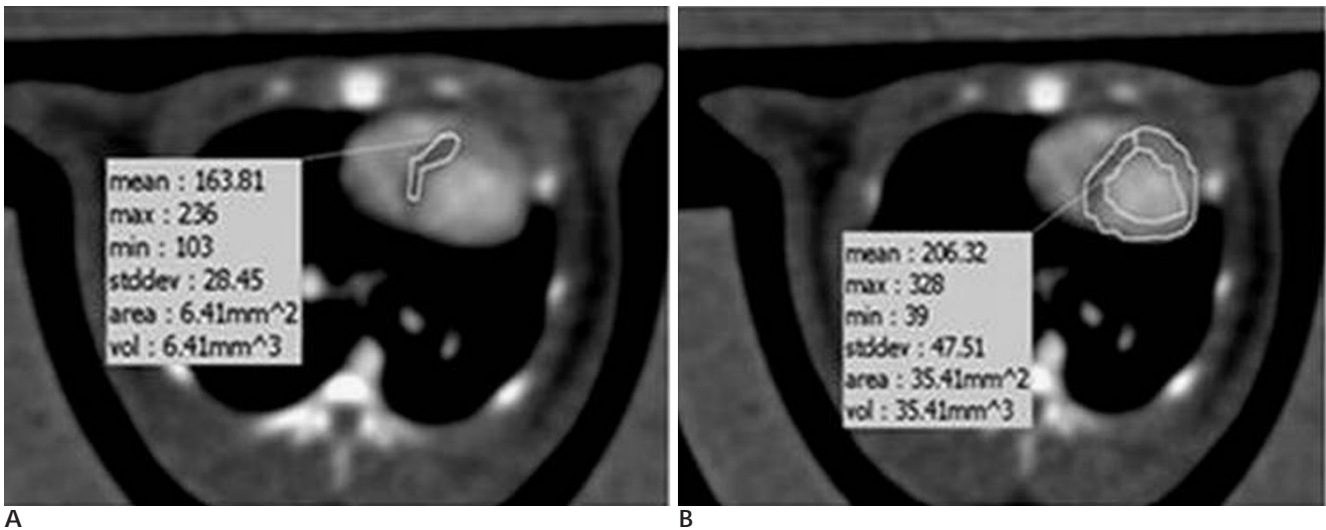


Fig. 2. Method of measuring volume ratio of infarct (A) and total myocardium (B) at mid ventricle level.

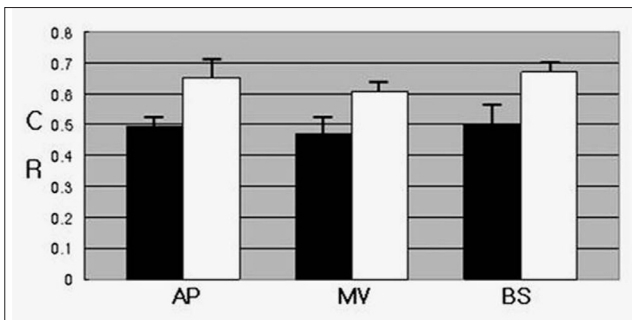


Fig. 3. Contrast ratio difference in the area of infarct region compared with normal region in myocardial walls at 3 different levels in 16 rats (AP: apical level, MV: mid-ventricular level, BS: basal level). It shows significantly lower attenuation of infarct area than that in normally perfused myocardium. Note. CR = contrast ratio, Black bar = infarct myocardium, White bar = normally perfused myocardium.

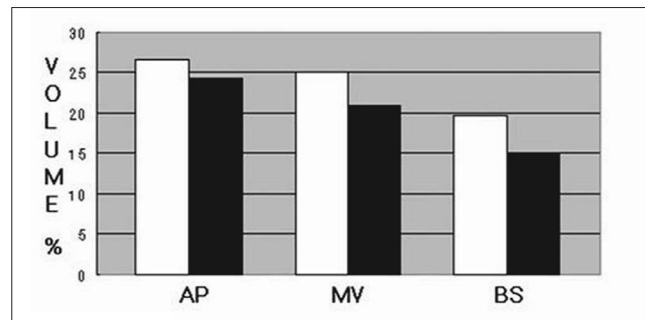


Fig. 4. Comparing percentage of infarct volume calculated from MDCT images and TTC-stained specimens at 3 different levels (AP: apical level, MV: mid-ventricular level, BS: basal level). CT measurements led to slight overestimation of infarct size ($n=3$). However, there was no statistical significance. Note. White bar = CT volume, Black bar = volume of stained area.

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Occlusive Myocardial Infarction: Cardiac CT Perfusion in a Rat Model¹

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Purpose: To test whether cardiac multidetector CT (MDCT) perfusion imaging can accurately delineate an irreversibly damaged myocardium in animals with an occlusive myocardial infarction.

Materials and Methods: In 16 rats, the left anterior descending coronary arteries were ligated distal to its first diagonal artery after a thoracotomy. Thirty minutes after the procedure, 16-slice MDCT (Sensation 16, Siemens, Erlangen, Germany) was performed and delayed images were obtained up to 5 minutes after injecting the contrast agent (0.2 mL/100g, 0.5 mL/sec). Ten rats were re-examined one week later. After CT scanning, the rats were sacrificed and their hearts were extirpated for 2,3,5-triphenyltetrazolium chloride (TTC) histochemical staining. The stained slices were compared with the CT images. The CT number (HU) of the infarct and non-infarct areas were estimated from the contrast ratio (CR).

Results: The CT attenuation in the infarct area was significantly lower than that in the normal myocardium. Quantitative analysis of the CT attenuation revealed a significant difference in the CR and CT attenuation of the infarct and reference areas (0.48 ± 0.12 vs 0.64 ± 0.13 , $p < 0.05$, 163 ± 46 HU vs 216 ± 56 HU, $p < 0.05$). However, there were no significant differences in the CT numbers between the infarct and non-infarct areas on the one-week follow-up.

Conclusion: A perfusion defect on MDCT indicates the myocardial damage in an animal model with occlusive myocardial infarction.

Index words : Heart, CT
Myocardium, infarction

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