다중 검출 나선형 CT
–기기적 특성 및 임상응용–

Multidetector Row Computed Tomography
- `Principles and Clinical Applications`-

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Abstract

The computed tomography (CT) technology has recently leaped with the advent of the multi detector row technique since the introduction of spiral CT. The most important advantages of multi detector spiral CT (MD CT) are its rapid scan speed and the increased z axis spatial resolution. MD CT permits selection of high resolution for isometric imaging in any imaging planes, long coverage of study volume, or decreased scan time for clinical purposes and needs. The most widely applied clinical indication of MD CT is CT angiography. MD CT makes a dynamic study or multi phase study easier and more reliable. Combination of isometric imaging in any anatomic planes, CT angiography, multi phase dynamic study, 2 or 3 dimensional image reconstruction has made radiologic diagnoses more accurate and has provided more useful information for preoperative surgical design and educational purposes. The combined increase of temporal resolution (200 msec) opens the era of cardiac imaging. With its inherent contrast resolution, coronary CT angiogram can reveal atherosclerotic changes of the arterial wall as well as the degree of luminal narrowing. MD CT has provided new opportunities for medical imaging and will expand rapidly with further clinical applications.

Keywords : CT
:

CT

19$^{72}_{CT}$ Dr. Hounsfield Cormack
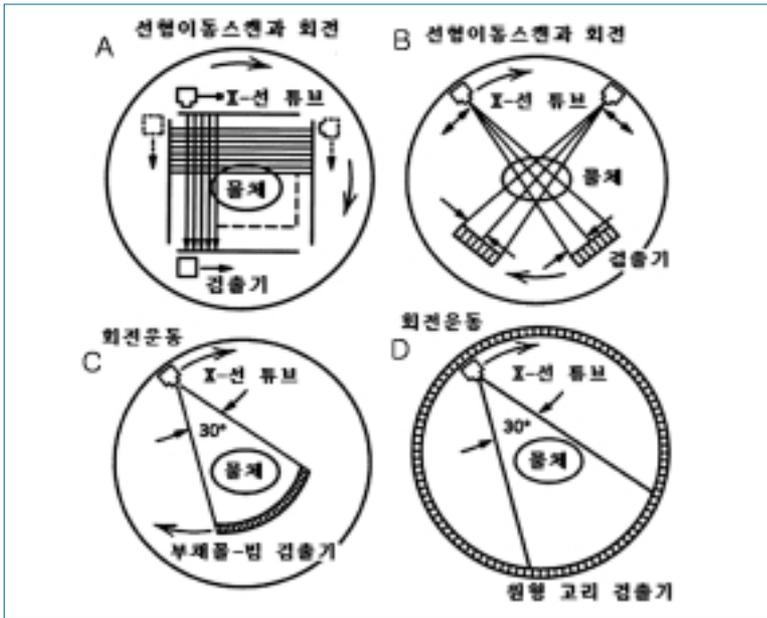
,

,

1979 Novel . CT

gantry

. CT

(1A), (1B),

(fan beam) (

1C), (1D)

. 1990

(spiral) CT , gantry

.

A)
B)
C)
D)

그림 1. CT

A)
B)
C)   z ,   x ,   y   , z
                     .

그림 2. MD CT
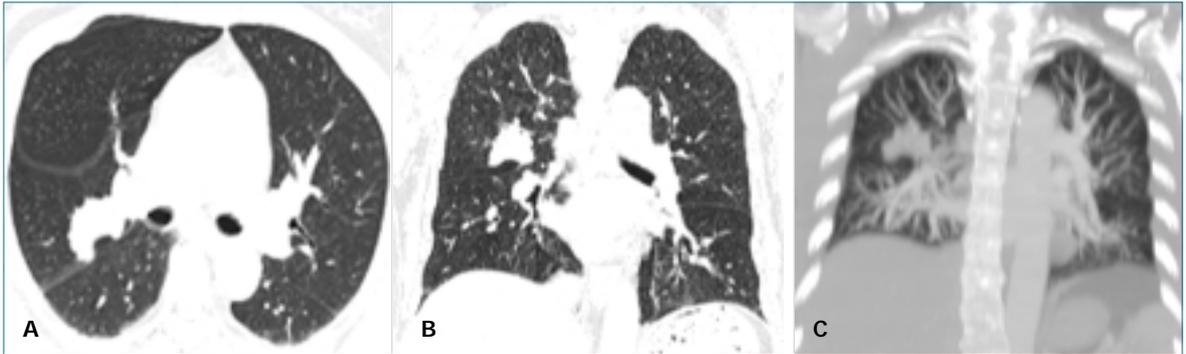
x, y

z

CT

z

.   CT
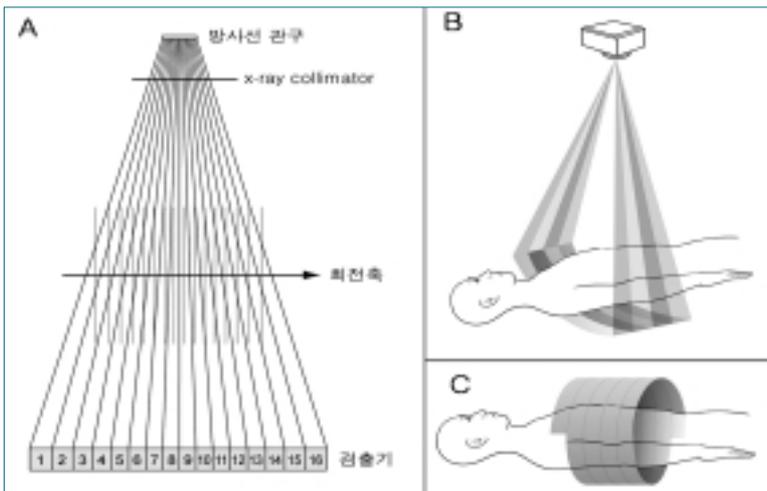
CT(Multi Detector row
Spiral CT,   MD CT
)(2A)   ,

(cone beam,   2B)
.   16

.

CT

10

200 msec

,

10   .

z

(2C)   scan

,

,   z

(isometric)   , 2

, 3   (reconstruction)

,

CT

.

3. MD CT   .   . CT
                                                                                    (A). 3 mm
                                                (B).   2 cm
                              (C).

MD　CT

2. Scan

                    CT   table
gantry 1   table   pitch
              . MD　CT

1.　　　　　(Multiple Detectors)

 MD　CT　1992　2　　　　　　　　　　,
1998　4 , 2001　8 , 2002　16   linear interpola-
          CT   tion   2
                  ,   .   . 180° Linear interpolation algorithms
16　MD　CT   ,   26 mm   X   180°
          360°   52 mm   table
feed   , gantry   (1, 2).
     400　msec   . 4   MD　CT   z
                                                          , 2   , 3
     .   . Pitch   z   x, y
     matrix (Isotropic) array ;   array   3
      matrix   ,   adaptive(non-   .   CT
isotropic) array ;   array   MD　CT
                          .
16   MD　CT   matrix   ,   pitch
array   adaptive array
(1, 2).   0.5 mm(CT)   mm   cm(thin

,

.

CT

CT scan   ,
   20   , pitch

                                    .

MD CT
,   ,
   ,   .
                                              , 3   ,

                                    . MD CT
                                        z
                              CT
             .   .   ,

4.   (aortic aneurysm). 16   MD CT
      3

                  .

or thick slab   )
   (3C).   ,

3.   .
                    gantry
                  ,   1.   , 2   3
flat panel detector   ,
   ,   (cone beam)
                  .   . z
                                          ,
      ,   ,

,

(3). 2 [2D multiplanar
reformat(MPR), 2D maximum intensity projec-
tion(MIP)], 3 [3D surface rendering(SSD),
3D volume rendering(VRT)]

, (3,

,
.

2.

25~ 30
MD CT pitch
.

,
(4) ,

.

3.
gantry 400 msec ,
CT
CT (4) (5)
. CT (5) MD CT

,
.

CT

1. CT
MD CT CT

5. .
70 ,
MD CT .

.

(6, 7). CT 3

,

,

.

(bolus injection)

(8).
MD CT

(multiphase)
(
6) CT, ,
.

(4), (,
,) , ,

A)   CT   3   2   .
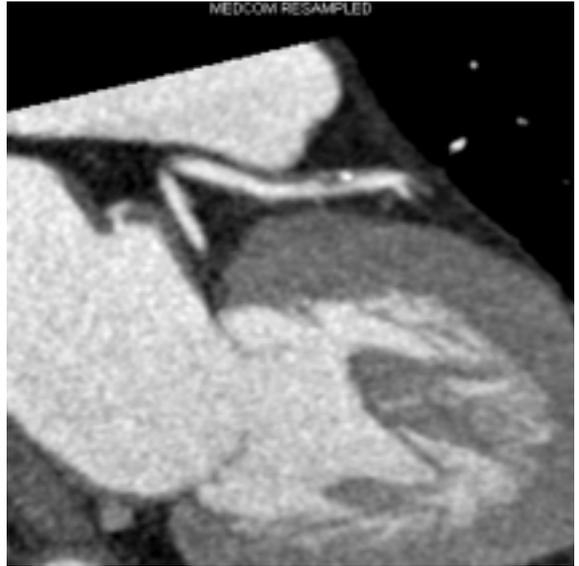B)   3   2   ,   1   .
C)   3   CT   .

6.

7.

(8).   ,

3

(intimal flap),   (intimal
tear)   ,

.   120 cm

,

(9).

2.   ,   CT
MD CT

, EKG   (gating)   .
(prospective ECG triggering)
R wave   msec

(retrospective EKG gating)

(5).

(LAD)　　　R　R　　　60~ 70%,
(LCX)　　　50%,　　　(RCA)　　　40%
(10),

. MD　CT　　　　　　　200 msec
65

(11).
70
,　　90°　　45° gantry
(segmentation)

.

(12) (
7).　　　　　　　　　　16 MD　CT
1.5mm
93% (14)

.　　　　CT
(contrast resolution)

(　8) (13)
.

3.

scan
(14),　　　　　　　　　　　　　　,

8.　　　　　　　　. CT

, CT
,　　　,　　　　　　　　　.

.　　　　　　　　　　,
,　　　　　　　　　　.

10
(dose efficiency)　MD　CT

.

4.

, 3　　　　,　　　CT
,　　　　　　CT
(15).　　　　　　CT
(　6). CT

(　6).
CT　　　　(　9)
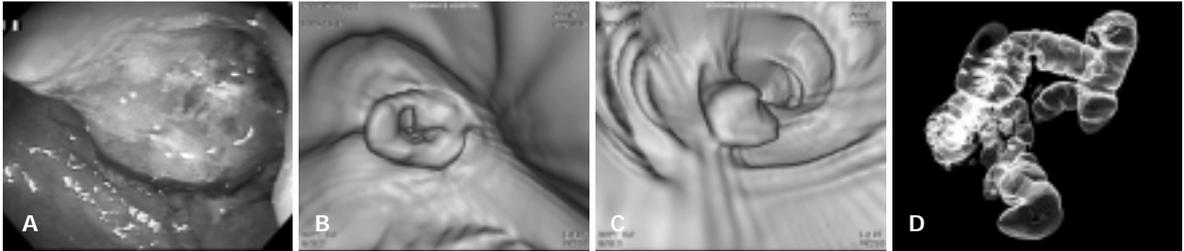
A)   .
B) CT   (endoluminal view)   .
C) CT
D) CT   (perspective view)   .

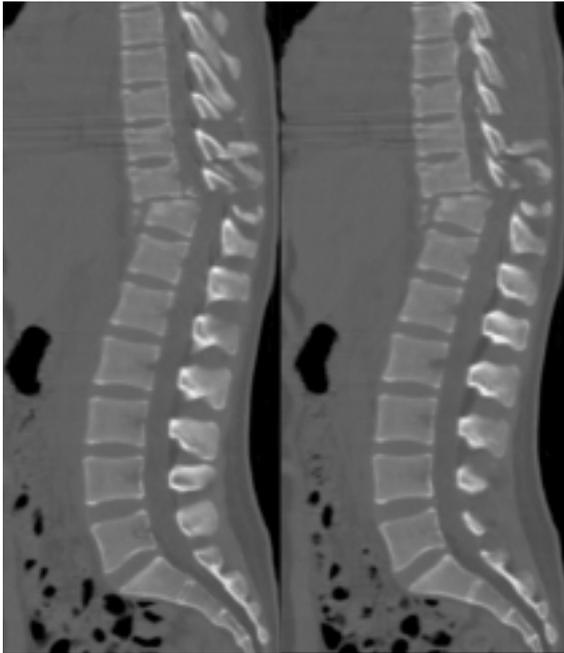(extended left hemicolectomy)
                     .

9. 45   :

10.   (A), CT   (B), CT   (C)   . CT
              3   .

(10).   CT
   (16),

                                                  (18).   MD CT
                                    .   3
                                             .

5.

                        MD CT   6.
CT   3
              (17)   ,

1114   CT ;

. 11   , 9, 10
                                    10
                       .

         1 1. 22   :

                (　 11)   .

        ,   ,
           (19). ⊕

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11   (   )

1.   6.

2.   7.

3.   8.

4.   9.

5.   10.