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A STUDY OF THE DECORDING OF MULTIPLE PINHO-
LE CODED APERTURE RI TOMOGRAPHIC IMAGES.
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The authors constructed a Multiple Pin-
hole Coded Aperture(MPCA) and developed lel-
ated decoding software. When simple coordi-
nate transformation was performed, missing
coordinate points and shfting of counts occ-
urred. While observing the tomographic plane
and collecting counts at various depth on
the Shadowgram, a solution to this problem
was found. The counts from the central por-
tion of the tomographic image from the MPCA
were incorrectly high, this was rectified by
a correction function to improve the unifor-
mity correction program of the γ-camera.
Depth resolution of the tomographic image
improved in proportion to the area encompas-
sed by the pinhole configuration.   An MPCA
with a uniform arrangement of pinholes (e,g,
pinholes in an arrangement parallel to the
X-axis or the Y-axis) yielded decoded tomo-
graphic images of inferior quality. Optimum
result were obtained with a ring-shaped arr-
angement yielding clinically applicable tom-
ographic images even for large objects(Lung,
Liver and Brain).

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EVALUATION OF SCINTILLATION CAMERA BY
SPHERICAL LESION DETECTABILITY.
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The lesion detectability with a scintil-
lation camera as a function of count den-
sity was determined for the four spherical
cold lesions with diameter 0.9-2.5 cm with-
in a uniform background activity. It can
be seen from the curves that the lesion
detectability increases with an increase in
count density untill 2 kcounts/cm^2, however
it does not appreciably improve for count
densities above 2 kcounts/cm^2. The curves
also show that a giving count density, the
lesion detectability decreases as the
lesion size or object contrast decreases.
The photon-deficient images were evaluated
visually by three observers having two or
more years experience in nuclear medicine
whether or not he could see the lesions.
The observer was required to select one of
four levels of confidence ((4)-(1)) to
represent his judgment: (4) confidence that
a lesion is present approaches 100 %, (3)
confidence approaches 75 %, (2) confidence
approaches 50 %, (1) he has minimum confi-
dence (approximately 0 %).
Signal to noise ratio (S/N) defined by
Eq. 1 was calculated to examine the rela-
tion between the physical (S/N) and visual
performances on the photon-deficient images:

$$\frac{S}{N} = \frac{B \times Co \times Ec}{\sqrt{B}} = Co \times \sqrt{B} \times Ec \quad (Eq.1)$$

Co: contrast, Ec: contrast efficiency (background count density)

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EVALUATION OF LESION DETECTABILITY FOR ^{67}Ga
MULTI-WINDOW IMAGING.   T.Matumoto, T.A.
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The purpose of this study is to gain the
optimum parameter for designing collimator
for 67Ga. The flow of study is as follows:
(1) The geometrical resolution(FWHM) and
plane sensitivity(cpm/uCi) of 200KeV- and
400 KeV-collimator for 67Ga, is calculated.
(2) Several physical parameters which
express the lesion detectability, are cal-
culated for 11 camera-collimator-system
having various system resolution and sensi-
tivity.
(3) Using a digital computer, 200 simulated
images containing from only one from four
defects of various sizes and depths are
made and displayed on a micro-dot imager
unit. Twenty persons are asked to see X-
ray film of the 200 images and to jude
whether or not ther are defects in the
images using five confidence level.
(4) From the results of their answer, the
performance of 67Ga multi-window imaging
is evaluated as a measure of human detecta-
bility of the defect.
Result:
(1) We conclude that the correllation of
signal-to-noise ratio of images and confi-
dence level of answer is liner, but the
deviation is large.
(2) 67Ga-multi-window imaging is superior
to single window imaging in lesion detecta-
bility.

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PRELIMINARY STUDY OF γ-CBF MEASUREMENT BY
Xe-133 INHALATION METHOD USING SCINTILLATION
CAMERA EQUIPPED WITH A HOMEMADE COLLIMATOR.
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Kanazawa.

The ultra high sensitive collimator for a
scintillation camera was designed to evalu-
ate the γ-CBF with the method of Xe-133
inhalation. This collimator has 121 square
holes (11 x 11 holes), 18 mm in inside dia-
meter and 70 mm in length, which are formal
by combined septums of 1 mm (Al) + 1 mm (Pb).
FWHMs of the collimator were 20 mm, 26 mm,
32 mm, 36 mm and 44 mm at each distance of
1 cm, 3 cm, 5 cm, 7 cm and 10 cm from colli-
mator, respectively. The sensitivity of
this collimator was 18 times higher than
that of high sensitive conventional one. We
can record good time-activity curves from a
head after the inhalation of 4 mCi of Xe-133.
These results promised us to enable the
measurement of γ-CBF by Xe-133 inhalation
using the scintillation camera equipped with
this collimator.