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X-Ray Mass Survey of the Stomach

by

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胃のレントゲン集団検診に就て

九州大学医学部放射線科教室 入江英雄他

1953年以来入江等は胃のレントゲン間接撮影による胃癌の集団検診に着手した。日本に於ける胃癌の死亡率は高く殊に40才以上の高年者に実施すると胃癌の発見率は集団によつては1%に近い。此の方法は多くの追隨者を出し日本では全国的に実施され、ますます旺になりつつある。

しかも早期癌の発見率が病院受診者に於けるよりも非常に高率である。又胃潰瘍、十二指腸潰

瘍、胃ポリープも多く検出される。

その方法、手技に就てはまだ改良すべき点が多い。

レントゲン診断の感度を上げ、且つ実施を楽にする方法としてはレントゲンテレビジョンの間接撮影が有望であり、入江等は既にその実施に着手した。

The incidence of carcinoma of the stomach in Japan is the highest in the world, the statistics showing 40 patients per 100,000 population. The incidence is much higher for the age group above 40 years.

Since carcinoma of the stomach infrequently gives symptoms at the early stage, Irie started mass x-ray survey of stomach in 1953. At present this method is used all over the country and has contributed not only to detection of early stomach carcinoma, but to diagnosis of gastric and duodenal ulcers and polyps of the stomach. There is little danger in regard to genetic effects (gonad dose) since this mass survey is done for the age group over 40 years.

The results are shown in the following tables. (Tab. 1—Tab. 7)

Tab. 1 Nationwide Statistics

| | 1964 | 1963 |
|------------------------------------|-------------------|-------------------|
| Total number of examinees | 210,017 (100.0%) | 142,153 (100.0%) |
| Carcinoma vent. | 429 (0.2%) | 390 (0.3%) |
| Polyp vent. | 382 (0.2%) | 285 (0.2%) |
| Ulcus vent. | 3,474 (1.7%) | |
| Ulcus duod. | 2,107 (1.0%) | 6,049 (4.2%) |
| Ulcus vent. et duod. | 311 (0.2%) | |
| Total number of the found diseases | 6,703 (3.2%) | 6,724 (4.7%) |

Note. This statistics were made by Prof. Ariga, Nihondaigaku, Tokyo

Tab. 2 Early Stomach Cancer in Mass Examination in Comparison with Usual Outpatients (1960—1964)

| | Operated cases in total | Operated early cancer |
|---------------------------------|-------------------------|-----------------------|
| Usual outpatients | 517 | 42 (8.1%) |
| Cases found in mass examination | 16 | 4 (25%) |

(From 2nd Surgical clinic of Kyusyu Univ.)

Note: We can see that early cancer patients are found more among the mass examinee than among the usual hospital patients.

Tab. 3 Technique of the Photofluorography of the Stomach

| | |
|-----------------------------|--|
| Apparatus | KXO-15 Toshiba full wave rectification |
| Tube | DRX-80 Toshiba |
| Focus size | 2×2mm |
| Kilovoltage | 120KV |
| Filter | 2 mmAl |
| Tube current | 70mA |
| Exposure time | 0.2—0.3 sec |
| Focus-screen distance | 70cm |
| Grid ratio | 10: 1 |
| Screen | DPS |
| Camera | Canon CX-35MII |
| Lens | Canon 65mm f 1:1.4 |
| Film | Sakura New Y type |
| Dose at the examinee's back | 320—380 mR/exp. |

Tab. 4 Errors in the Interpretation of the Photofluorograms

| Cause of errors | False positive | False negative |
|-----------------|----------------|----------------|
| No manipulation | 16.7% | 2.4% |
| Miniature size | 2.6% | 0.6% |
| Total | 19.3% | 3.0% |

Tab. 5 Findings by Different Position, Direction and Filling

| | | Upright | | | | Lying | | | |
|--|----------|----------------------|----------------------|----------------------|---------------------------|------------|------------|-------------|-------------|
| | | | | | | Prone | | Supine | |
| | | Sagittal Filling (+) | 1st obl. Filling (-) | Sagittal Filling (+) | G.I. Position Filling (-) | Relief (+) | Relief (-) | Filling (+) | Filling (-) |
| Kyushu Univ. 940 cases | Ulcer 14 | 13 | 1 | 12 | 2 | 10 | 2 (2) | 10 | 2 (2) |
| Stomach Group Fukuoka 10090 cases | Ulcer 39 | 36 | 3 | 24 | 15 | 24 | 15 | 31 | 8 |
| | Cancer 7 | 5 | 2 | 4 | 3 | 4 | 3 | 4 | 3 |
| Hospital of Communication Ministry Osaka 616 cases | Ulcer 14 | 8 | 6 | 5 | 9 | 7 | 7 | 5 | 9 |
| | Cancer 4 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |

Next are shown the diagrams of the structure of the Roentgen car in Fig. 3 and 4.

Now Irie and his associates have begun to perform this mass survey examination with TV indirect Roentgenography in place of photofluorography.

There are two ways of TV indirect Roentgenography: the one is to take photographs from I.I. picture, the other is to take it from picture of TV monitor.

Both can be taken by shot camera viewing the Roentgen picture of the stomach of another TV

Tab. 6 Findings of Stomach Cancer in Each Case in Relation to Position, Direction, Filling of Ba Mea

| Case number | Upright | | Lying | | | |
|-------------|-------------------|--------|---------|--------|---------|--------|
| | Sagittal 1st obl. | | Prone | | Supine | |
| | Filling | Relief | Filling | Relief | Filling | Relief |
| I | — | — | — | — | + | — |
| II | — | — | — | + | — | + |
| III | + | — | — | — | + | + |
| IV | + | + | + | + | + | + |
| V | + | + | + | + | + | + |
| VI | + | + | + | — | + | — |
| VII | + | + | + | + | + | + |
| | (+) 5 | (+) 4 | (+) 4 | (+) 4 | (+) 6 | (+) 5 |
| | (-) 2 | (-) 3 | (-) 3 | (-) 3 | (-) 1 | (-) 2 |

Note: Cancer of Case II was found only by relief method.

Tab. 7. Observation of Detection Accuracy with Model Experiment of Ulcer and Tumor(Murakami)

| Method | Direct | Miniatute of direct roentgenogramm | | | | Photo fluorogramm | | | |
|----------------|-----------|------------------------------------|----|---------|----|-------------------|----|---------|----|
| | | 55×55 | | 30×30 | | 55×55 | | 30×30 | |
| Film size (mm) | Naked eye | Lens | | Project | | Lens | | Project | |
| | | 20 | 16 | 16 | 16 | 16 | 11 | 11 | 10 |
| Niche model | | | | | | | | | |
| 3mmφ | + | + | + | + | + | + | + | + | + |
| 2mmφ | + | + | + | + | + | + | + | + | + |
| 1.5mmφ | + | + | + | + | + | — | — | — | — |
| Tumor model | | | | | | | | | |
| 6mmφ | + | + | + | + | + | + | + | + | + |
| 4mmφ | + | + | + | + | + | + | + | + | + |
| 3mmφ | + | + | + | + | + | + | + | + | + |

I would like to show illustrative photofluorograms in Fig. 1 and Fig. 2.

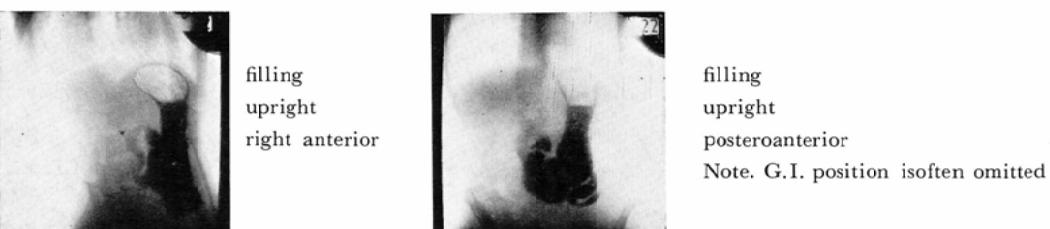
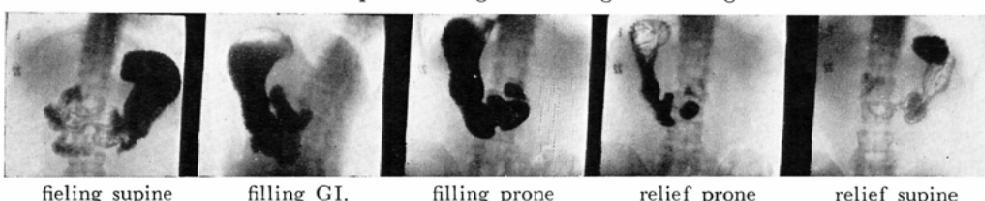


Fig. 1 Photofluorograms of standard position, direction and filling

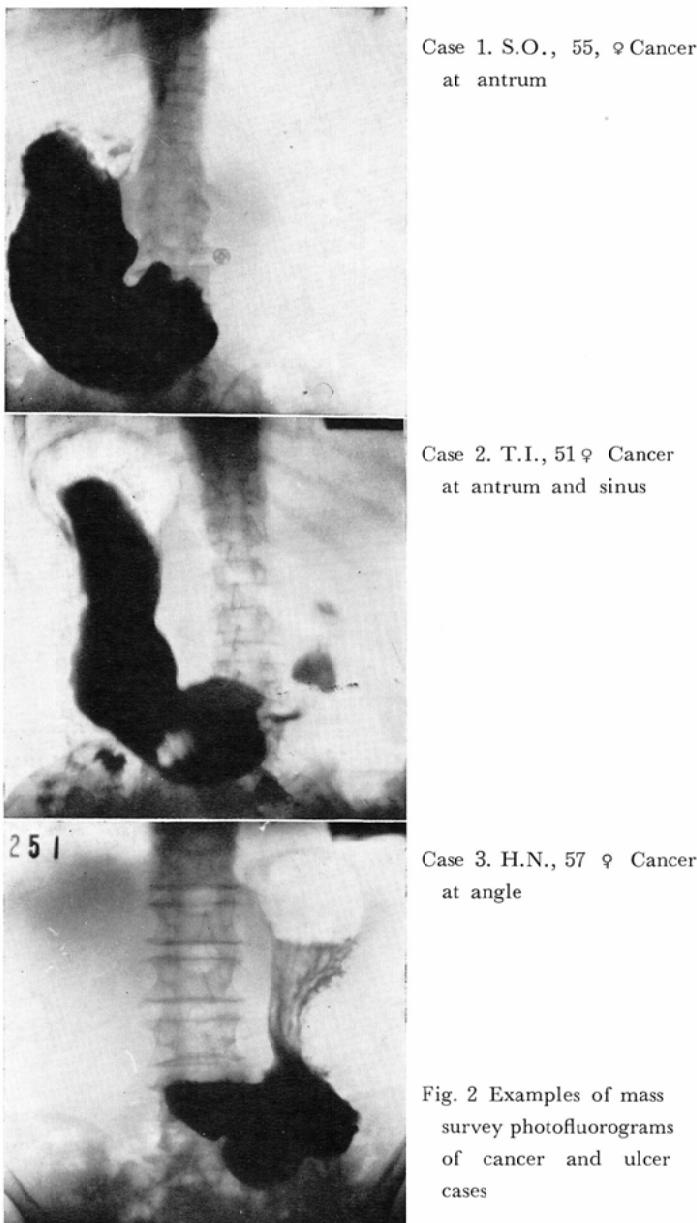


Fig. 2 Examples of mass survey photofluorograms of cancer and ulcer cases

monitor. (Fig. 5, 6 and 7)

DISCUSSION

The fact, that we could find more early cancer patients by mass survey examination than by individual hospital examination, does not mean that the indirect miniature roentgenography is more excellent than the fluoroscopy and direct Roentgenography with various manovors. The only cause lies in the fact that most of early cancer patients do not visit doctors because they have no distinct complaint.

The mass survey examination has its practical value to find early cancers other stomach disease. However we should endeavour to develop it more.

We believe that we can perform mass examination by x-ray TV more efficiently and excellently.

This paper was read on Sept. 24th. 1965 at XI ICR in Rome.

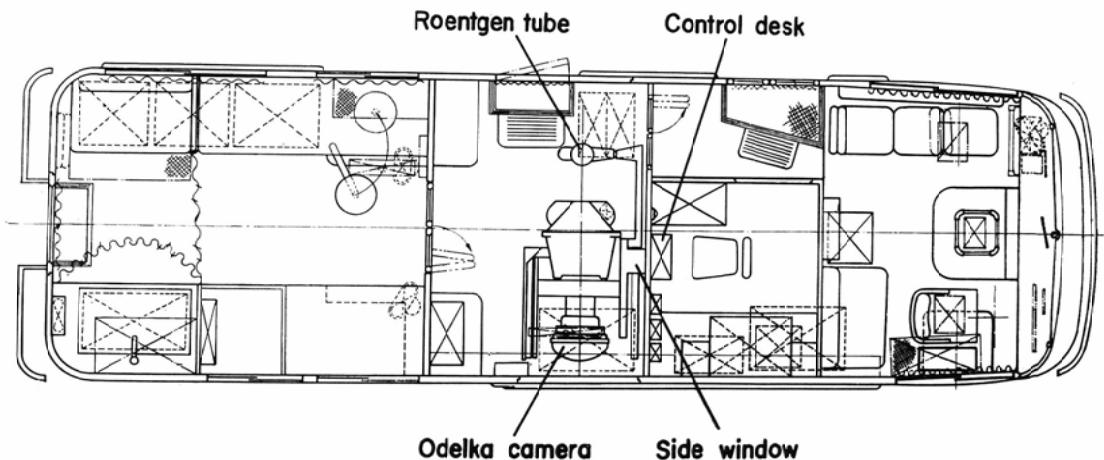


Fig. 3 Diagram of Roentgen car for Stomach Fluorography Made by Hitachi Roentgen Co.

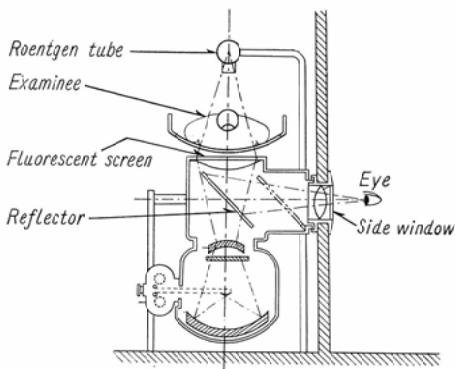


Fig. 4 Diagram of Side Window
Reflector: during the photography moves to the right side

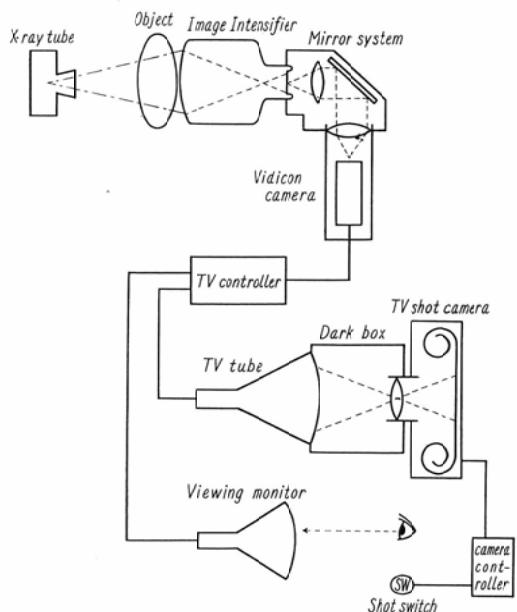


Fig. 5 TV shot camera

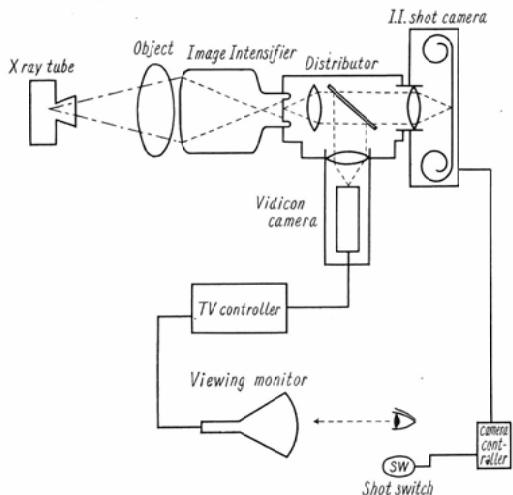


Fig. 6 I.I. shot camera

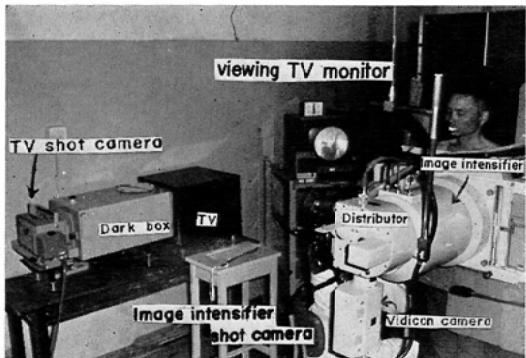


Fig. 7 Picture of TV and I.I. shot camera
Note: We can take shot films either from TV monitor or from I.I.