

## 頸部，乳房と肺野におけるCRリニアックグラフィの処理条件の検討 エラー画像とその改善方法について

佐藤 洋<sup>\*1,2</sup>，飯沼 一浩<sup>\*3</sup>

### STUDY OF THE PROCESSING CONDITIONS OF CR LINACGRAPHY IN A NECK, A BREAST, AND A LUNG FIELD —ABOUT AN ERROR PICTURE AND ITS CORRECTIVE STRATEGY—

Hiroshi SATO<sup>\*1,2</sup> and Kazuhiro INUMA<sup>\*3</sup>

(Received 28 November 2005, accepted 20 March 2006)

**Abstract:** It is important to obtain clear linacgraphy images (LG images) in order to confirm the positions of the exposure field and surrounding structures. At our institution, LG images are acquired using computed radiography (CR). Although clear images of the abdominal and pelvic regions can be obtained, error images are commonly observed in LG images of the neck, breast, and lung fields. Here, the term “error image” refers to an image that shows appropriate density only in the exposure field and cannot provide sufficient information in surrounding areas. In the present study, in order to identify the causes of this problem, we developed a new method for quantitatively evaluating image sharpness using a tough water step phantom and conducted investigations to determine the imaging conditions providing optimal image quality.

Using this method, we performed radiography for the tough water step phantom, which has X-ray absorption characteristics similar to those of the human body, under the same conditions used to acquire LG images, determined the line spread function (LSF) by analyzing the edge spread function (ESF) of the obtained edge image, and quantitatively evaluated image sharpness at full width at half maximum (FWHM).

Three key factors were found to affect the quality of LG images acquired using CR: the internal structure of the cassette, the type of metal intensifying screen, and the image processing method. It was also found that error images were generated due to inappropriate image processing. For the abdominal and pelvic regions, it was possible to obtain clear LG images with relatively narrow latitude (Ave.1.0 at an X-ray energy of 4 MV for the FCR system manufactured by Fujifilm Medical Co., Ltd.). On the other hand, for the neck, breast, and lung fields, it was necessary to set a large latitude (Ave.2.0) to obtain optimal image quality because the subjective contrast is significant in these regions. Thus, we were able to overcome the problem for LG images. It was also found that the flexible noise control (FNC) function, which has been developed for noise reduction, was related to the latitude setting. Although the FNC function operates properly for images with narrow latitude such as those of the abdominal and pelvic regions, image sharpness is increased when the FNC function is not used for images with large latitude such as those of the neck, breast, and lung fields.

Key words: Linacgraphy, Portal image, Computed radiography, Image processing, FNC

<sup>\*1</sup> 厚生中央病院放射線科 (〒153-8581 東京都目黒区三田1-11-7)

Department of Radiology, Kohsei Chuo General Hospital (1-11-7 Mita, Meguro-ku, Tokyo 153-8581, JAPAN)

<sup>\*2</sup> 国際医療福祉大学大学院医療福祉学研究科保健医療学専攻 (〒324-8501 栃木県大田原市北金丸2600-1)

Department of Radiological Science, Division of Health Sciences, International University of Health and Welfare Graduate School (2600-1 Kitakanamaru, Otawara, Tochigi 324-8501, JAPAN)

<sup>\*3</sup> 国際医療福祉大学保健学部放射線・情報科学科

Department of Radiological Science, School of Health Sciences, International University of Health and Welfare

## 能動的呼吸制御装置を用いた肺癌定位放射線治療

高井 憲司<sup>\*1</sup>, 高井 良尋<sup>\*2</sup>, 小藤 昌志<sup>\*1</sup>, 三津谷 正俊<sup>\*3</sup>, 武田 賢<sup>\*4</sup>,  
根本 建二<sup>\*1</sup>, 小川 芳弘<sup>\*1</sup>, 坂谷内 徹<sup>\*1</sup>, 菅原 俊幸<sup>\*1</sup>, 山田 章吾<sup>\*1</sup>

STEREOTACTIC RADIOTHERAPY FOR LUNG CANCER USING  
ACTIVE BREATHING CONTROL SYSTEM

Kenji TAKAI<sup>\*1</sup>, Yoshihiro TAKAI<sup>\*2</sup>, Masashi KOTO<sup>\*1</sup>, Masatoshi MITSUYA<sup>\*3</sup>, Ken TAKEDA<sup>\*4</sup>,  
Kenji NEMOTO<sup>\*1</sup>, Yoshihiro OGAWA<sup>\*1</sup>, Tohru SAKAYAUCHI<sup>\*1</sup>, Toshiyuki SUGAWARA<sup>\*1</sup>, and Shogo YAMADA<sup>\*1</sup>

(Received 27 December 2005, accepted 20 March 2006)

**Abstract:** In Tohoku University Hospital, primary or metastatic lung cancers with the respiratory motion of more than 1 cm were treated with SRT (stereotactic radiotherapy) under ABC (active breathing control: ABC-SRT). The local control rate and lung toxicity treated with ABC-SRT were analyzed. The indication of ABC-SRT is as follows: tumor size in largest diameter ≤ 5 cm, motion distance ≤ 1 cm, and patient's consent to treatment.

Nineteen patients (average age: 58.2 years, male 12: female 7) with 25 lesions were enrolled to ABC-SRT during March 2000 and July 2004. Patients with primary lung cancer were four, the others with metastatic cancer. Prescribed doses were 45 Gy/3 fr or 60 Gy/8 fr at the isocenter. ABC-SRT was successfully done for all patients except one patient who failed to be given the prescribed dose (only 45 Gy/6 fr were administered). In 24 lesions with complete treatment, the control rate in 1/2/4 years was 94.1%/74.0%/74.0%, respectively. In tumors <2.5 cm size in largest diameter, the control rate was 90.0%, 2.5 cm, 42.9%, tendency of significance ( $p=0.0579$ ) was observed. One patient developed grade 2 pneumonitis (RTOG: Radiation Therapy Oncologic Group/EORTC: European Organization for Research and Treatment of Cancer), who was then orally medicated with steroid to cure. The others developed grade 0-1 pneumonitis. Although 10 of 19 patients were treated with chemotherapy, the lung toxicity was relatively light. Reduction of PTV by ABC seem to reduce the lung toxicity. In tumors <2.5 cm size in largest diameter, good control rate was acquired compared to the tumors 2.5 cm in size. We're going to analyze the lung toxicity treated without ABC-SRT to compare the present results.

Key words: Lung cancer, Stereotactic radiotherapy, Active breathing control, Lung toxicity

\*1 東北大学病院放射線治療科 (〒980-8574 宮城県仙台市青葉区星陵町1-1)

Department of Therapeutic Radiology, Tohoku University Hospital (1-1 Seiryomachi, Aoba-ku, Sendai, Miyagi 980-8574, JAPAN)

\*2 東北大学医学部保健学科 Course of Health Sciences, Tohoku University School of Medicine

\*3 東北大学病院放射線部 Department of Clinical Radiology, Tohoku University Hospital

\*4 独立行政法人国立病院機構 仙台医療センター放射線科 (〒985-8520 宮城県仙台市宮城野区宮城野2-8-8)  
Department of Radiology, Sendai Medical Center (2-8-8 Miyagino, Miyagino-ku, Sendai, Miyagi 985-8520, JAPAN)

限局性前立腺癌に対する高線量率組織内照射後の  
Health-Related Quality of Life 変化の短期的調査  
根治的前立腺全摘除術との比較を交え

吉田 賢史<sup>\*1</sup>, 平塚 純一<sup>\*1</sup>, 常 義政<sup>\*2</sup>, 今城 吉成<sup>\*1</sup>

**EVALUATION OF SHORT-TERM CHANGES IN THE HEALTH-RELATED QUALITY OF LIFE OF PATIENTS WITH LOCALIZED PROSTATE CANCER RECEIVING HIGH-DOSE-RATE BRACHYTHERAPY WITH OR WITHOUT EXTERNAL BEAM RADIOTHERAPY: COMPARISON WITH PATIENTS RECEIVING RADICAL RETROPUBIC PROSTATECTOMY**

Kenji YOSHIDA<sup>\*1</sup>, Junichi HIRATSUKA<sup>\*1</sup>, Yoshimasa JO<sup>\*2</sup>, and Yoshinari IMAJO<sup>\*1</sup>

(Received 5 January 2006, accepted 21 April 2006)

**Abstract:** Purpose: To evaluate short-term changes in the health-related quality of life (HRQoL) of patients with localized prostate cancer receiving high-dose-rate brachytherapy (HDR-BT) with or without external beam radiotherapy (EBRT) and compare them with those in patients receiving radical retropubic prostatectomy (RRP). Materials and Methods: We have examined the HRQoL of a total of 92 men with localized prostate cancer receiving radical treatment at Kawasaki Medical School since May 1, 2004. Forty patients received HDR-BT+EBRT, 33 patients received HDR-BT alone, and 19 patients received RRP. We asked them to complete the 36-item Short-Form Health Survey (SF-36) and the University of California Los Angeles Prostate Cancer Index (UCLA-PCI) before and at one, and six months after treatment. Forty patients in the HDR-BT+EBRT group, 32 patients in the HDR-BT group, and 15 patients in the RRP group completed these HRQoL questionnaires. We examined short-term changes in the HRQoL scores in each group using Wilcoxon's signed rank test and compared the RT (HDR-BT+EBRT or HDR-BT) group with the RRP group using Mann-Whitney's U test. Results: In each group, the scores of most aspects of these HRQoL questionnaires declined at one month after treatment and rose again at six months after treatment. This change was most notable in the HDR-BT+EBRT Group. In the post-treatment scores of both RT groups, urinary function (UF) and sexual function (SF) scores for the UCLA-PCI were better than those of the RRP group. Conclusion: The declination of these HRQoL scores seems to bear some relation to the acute effects of each treatment modality, especially in the HDR-BT+EBRT group. Urinary function and SF were more favorable for the RT groups, but the evaluation of SF was most difficult in this study. Since we believe it is necessary to carry out a long-term and minute examination to evaluate the HRQoL of patients with localized prostate cancer more accurately, this study will continue.

Key words: Localized prostate cancer, Health-related quality of life, High-dose-rate brachytherapy, Radical retropubic prostatectomy

<sup>\*1</sup> 川崎医科大学放射線科 (治療) (〒701-0192 岡山県倉敷市松島577)

Department of Radiation Oncology, Kawasaki Medical School (577 Matsushima, Kurashiki, Okayama 701-0192, JAPAN)

<sup>\*2</sup> 川崎医科大学泌尿器科

Department of Urology, Kawasaki Medical School

JASTRO平成15・16年度研究課題報告  
医療実態調査研究による放射線治療施設構造基準化（案）の改訂  
（日本版ブルーブック）

日本PCS作業部会

手島 昭樹<sup>\*1</sup>, 立崎 英夫<sup>\*2</sup>, 光森 通英<sup>\*3</sup>, 三橋 紀夫<sup>\*4</sup>, 宇野 隆<sup>\*5</sup>,  
中村 和正<sup>\*6</sup>, 角 美奈子<sup>\*7</sup>, 鹿間 直人<sup>\*8</sup>, 戸板 孝文<sup>\*9</sup>, 小口 正彦<sup>\*10</sup>,  
権丈 雅浩<sup>\*11</sup>, 小泉 雅彦<sup>\*12</sup>, 大西 洋<sup>\*13</sup>, 高橋 豊<sup>\*14</sup>, 古平 毅<sup>\*15</sup>,  
山内 智香子<sup>\*3</sup>, 芦野 靖夫<sup>\*16</sup>, 小川 和彦<sup>\*9</sup>, 井上 俊彦<sup>\*17</sup>

**REVISION OF GUIDELINE FOR STRUCTURE OF RADIATION ONCOLOGY BY THE  
PATTERNS OF CARE STUDY**

Japanese PCS Working Group

Teruki TESHIMA<sup>\*1</sup>, Hideo TATSUZAKI<sup>\*2</sup>, Michihide MITSUMORI<sup>\*3</sup>, Norio MITSUHASHI<sup>\*4</sup>, Takashi UNO<sup>\*5</sup>,  
Katsumasa NAKAMURA<sup>\*6</sup>, Minako SUMI<sup>\*7</sup>, Naoto SHIKAMA<sup>\*8</sup>, Takafumi TOITA<sup>\*9</sup>,  
Masahiko OGUCHI<sup>\*10</sup>, Masahiro KENJO<sup>\*11</sup>, Masahiko KOIZUMI<sup>\*12</sup>, Hiroshi ONISHI<sup>\*13</sup>,  
Yutaka TAKAHASHI<sup>\*14</sup>, Takeshi KODAIRA<sup>\*15</sup>, Chikako YAMAUCHI<sup>\*3</sup>, Yasuo ASHINO<sup>\*16</sup>,  
Kazuhiko OGAWA<sup>\*9</sup>, and Toshihiko INOUE<sup>\*17</sup>

(Received 20 February 2006, accepted 11 April 2006)

**Abstract:** “Guidelines for Structure of Radiation Oncology in Japan” was revised by referring to annual change of structure and process in Japan and to other international guidelines. These results were published as so called “Japanese Blue Book Guidelines”. Number of cancer patients who require radiation is increasing by more than 7% annually. The standard guidelines for annual patient load per FTE radiation oncologist were set at 200 (warning level 300), those per FTE radiation technologist 120 (warning level 200), and those per one external beam equipment 250-350 (warning level 400). As the standards of process, establishment of verifiable information system like radiotherapy database and hospital cancer registration was proposed. Economic analysis showed that enough profit to meet with these guidelines became available recently in most radiotherapy institutions except for the smallest group.

Key words: Patterns of Care Study, Radiation Oncology, Structural Guideline, Japanese Blue Book Guideline

- <sup>\*1</sup> 大阪大学大学院医学系研究科医用物理学講座（〒565-0871 大阪府吹田市山田丘 1-7）  
Department of Medical Physics & Engineering, Osaka University Graduate School of Medicine (1-7 Yamadaoka, Suita, Osaka 565-0871, JAPAN)
- <sup>\*2</sup> 放射線医学総合研究所国際室 International Cooperation Section, National Institute of Radiological Sciences
- <sup>\*3</sup> 京都大学大学院医学研究科放射線医学講座放射線腫瘍学・画像応用治療学  
Department of Radiation Oncology and Image-applied Therapy, Graduate School of Medicine Kyoto University
- <sup>\*4</sup> 東京女子医科大学放射線科 Department of Radiology, Tokyo Women's Medical University
- <sup>\*5</sup> 千葉大学大学院医学研究院放射線医学 Department of Radiology, Graduate School of Medicine, Chiba University
- <sup>\*6</sup> 九州大学大学院医学研究院臨床放射線科学 Department of Clinical Radiology, Graduate School of Medical Sciences, Kyushu University
- <sup>\*7</sup> 国立がんセンター中央病院放射線治療部 Radiation Oncology Division, National Cancer Center Hospital
- <sup>\*8</sup> 信州大学医学部画像医学講座 Department of Radiology, Shinshu University School of Medicine
- <sup>\*9</sup> 琉球大学医学部放射線医学教室 Department of Radiology, University of the Ryukyus School of Medicine
- <sup>\*10</sup> 癌研究会附属病院放射線治療科 Department of Radiation Oncology, Cancer Institute Hospital, Japanese Foundation for Cancer Research
- <sup>\*11</sup> 広島大学大学院医歯薬総合研究科病態情報医科学講座  
Division of Medical Intelligence and Informatics, Hiroshima University Graduate School of Biomedical Sciences
- <sup>\*12</sup> 京都府立医科大学大学院放射線医学教室 Department of Radiology, Kyoto Prefectural University of Medicine
- <sup>\*13</sup> 山梨大学医学部放射線医学教室 Department of Radiology, University of Yamanashi, School of Medicine
- <sup>\*14</sup> 癌研究会癌研究所物理部 Department of Physics, Cancer Institute, Japanese Foundation for Cancer Research
- <sup>\*15</sup> 愛知がんセンター中央病院放射線治療部 Department of Radiology, Aichi Cancer Center Hospital
- <sup>\*16</sup> シー・エム・エス・ジャパン株式会社 CMS Japan, Co., Ltd.
- <sup>\*17</sup> 大阪大学名誉教授 Professor Emeritus, Osaka University