

Development of the Incorporating System of Automatic Contrast Injector and Radiology Information System (RIS) for Contrast-enhanced CT Examination

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Background

In contrast-enhanced CT examination, **patient basic information** (ID, name, weight, height, etc.), **contrast agent information** (volume, iodine amount, etc.), **injection information** (volume, flow rate, etc.) and **injection result** (actual volume, pressure, etc.) are important factor for performing the examination accurately and safety.

It is difficult to set up a contrast injection protocol in accordance with the imaging object area and body weight due to no incorporating automatic contrast injector and radiology information system (RIS).

Background

And, the parameter and the result of injection are more useful information in the examination, but are not used to refer to the imaging protocols of previous scan and reproduce it.

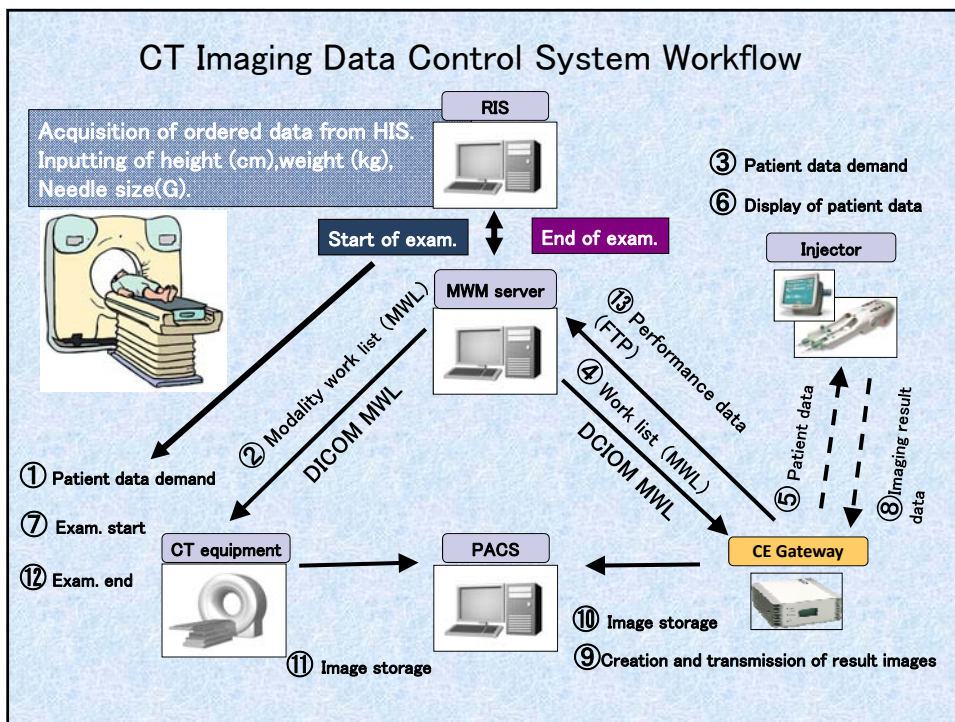
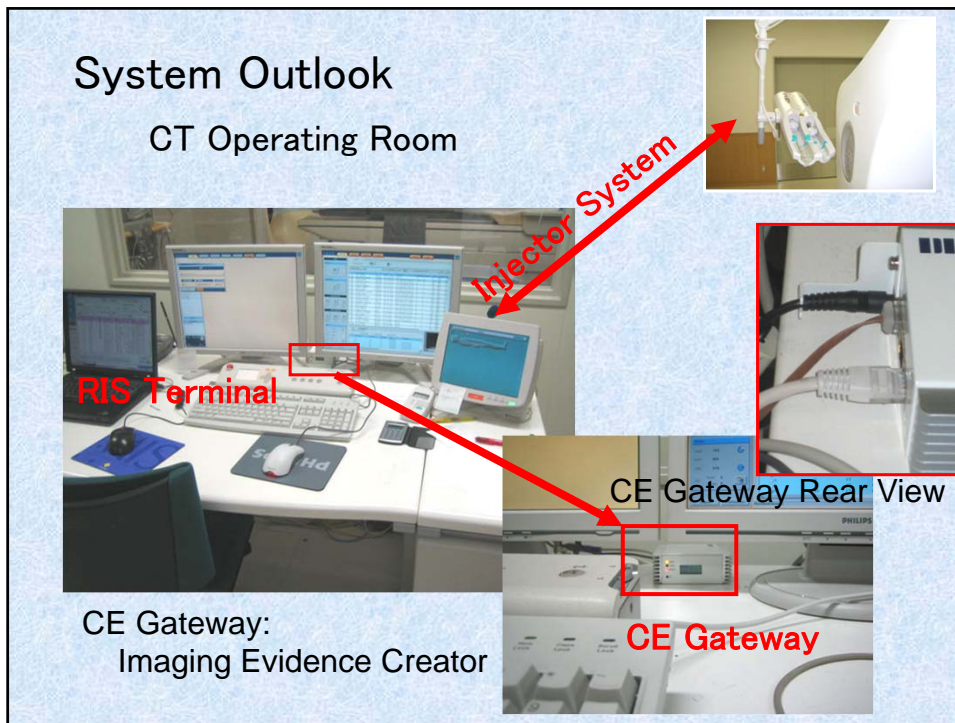
Purpose

The purpose of this study is to develop the incorporating system for sharing the information of patient, contrast and Injection between automatic contrast injector and RIS to increase the accuracy and safety of contrast-enhanced CT examination.

System Composition

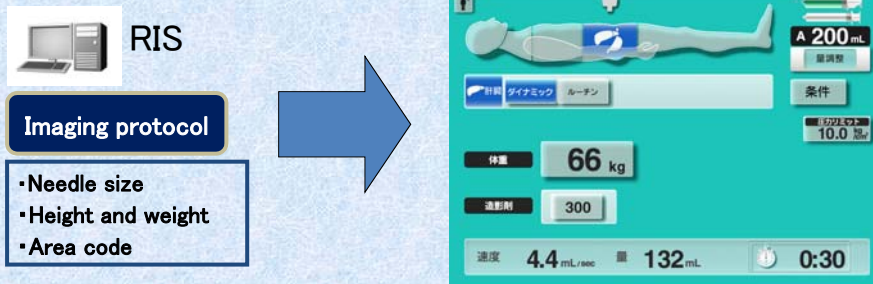
- **Injector system** (for CT use) 3 units
Nemoto Kyorindo, Dual Shot GX,
- **CT scanner**
Philips, Brilliance 64, 2 units
GE, Light Speed VCT, 1 unit
- **RIS, PACS**
Yokogawa Medical Solutions
- **CE Evidence** 3 units
Resource One Co., Ltd. CE Gateway,
CE Gateway is the gateway for exchanging the data of an injector, RIS, and PACS.
- **IC-tagged contrast agent syringes**
Daiichi sankyo





Main Workflow (1)

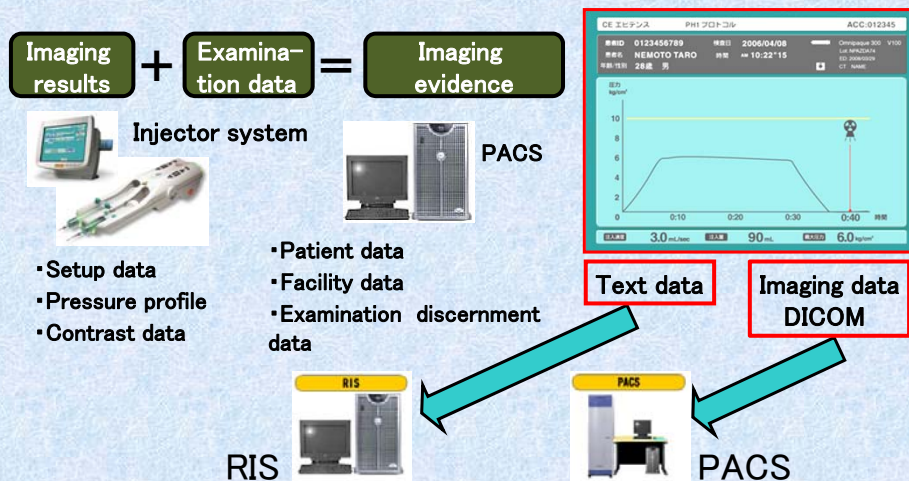
- ◎ RIS sends data on needle size, patient height, body weight, and an area code to the injector just before an examination.
- ◎ The injector determines flow rate and volume in accordance with the setup conditions in the corresponding protocol.



Injection parameters are automatically calculated in accordance with area code and body weight.

Main Workflow (2)

- After an injection, the imaging results and examination data are matched, and text data is sent to RIS and imaging data to PACS.



Setup of Injection Protocol (1)

- Examination region, height, weight, and sex of patient data are transmitted to an injector from the RIS.
- The injector, based on the acquired data, selects an optimal injection protocol out of the stored memory.
- When a syringe equipped with an IC tag is used, contrast name, volume, and iodine amount are automatically selected.

Setup of Injection Protocol (2)

- The following data are automatically sent to the injector from the IC tag syringe.



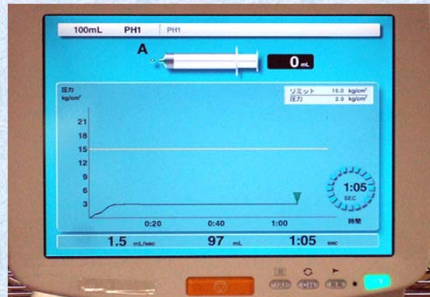
Data on IC Tag

Contrast name
Contrast volume
Iodine amount
Ingredients
Lot number
Expiration date for use
Resisting pressure

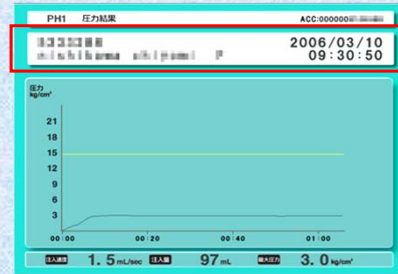


IC tag syringe

Injection Result Screen



Injector control terminal screen



Screen transmitted from CE Gateway

- Image created by CE Gateway
Flow rate, actual injection volume, maximum injection pressure, and profile data of actual injection pressure are output from the injector.

Control of Imaging Examination Data

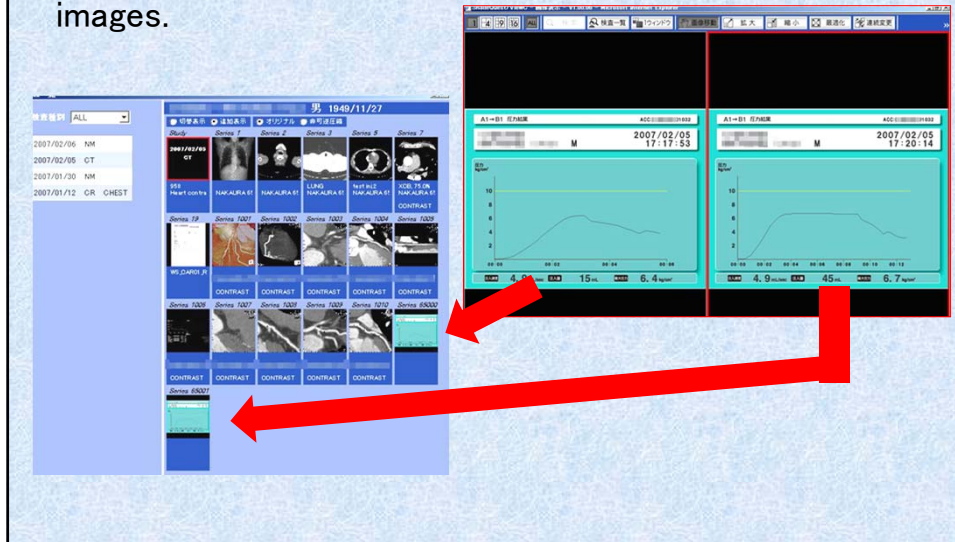
- Digital data of flow rate, volume, maximum pressure, average pressure, and pressure curve other than patient data are stored in the DICOM header of the output image.
- In addition, the text data with the same contents as the above are output and stored in RIS.

A part of the DICOM header

0000	(7A01,3080)	Not found TAG	4
000.0	(7A01,3090)	Not found TAG	6
2007.02.06	(7A01,30A0)	Not found TAG	8
100838	(7A01,30A1)	Not found TAG	6
060	(7A01,30B0)	Not found TAG	4
0/0/3/3/12/19/27/27/45/54/61/6...	(7A01,30F0)	Not found TAG	188
画素データ	(7FE0,0010)	Pixel Data	OW 0

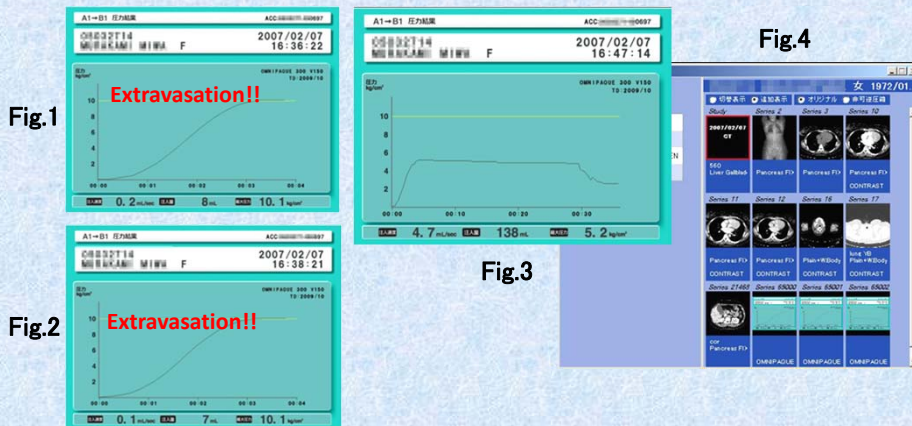
Image Storing into PACS

CT imaging examination data are stored in the last part of the CT examination image series as DICOM images.



Case of Twice Contrast Leakages

This is the case that contrast leakages happened twice. The graph of Fig.1 & 2 showed extravasation happened respectively. 3rd injection trial was successfully done. All of these 3 trials were archived into the PACS. These are reviewed retrospectively if it is necessary.



Conclusion(1)

- Setting up of a **contrast injection protocol** in accordance with the imaging object area and body weight became easy. In addition, contrast type, volume, and iodine amount can be automatically set up using **IC tag** syringes.
- Data for reviewing the **optimal injection protocol** was available by using the data stored in RIS.

Conclusion(2)

- It was easy to refer to **previous imaging protocols**, which made it possible to materialize a imaging method with reproducibility.
- It was possible to **view imaging data** in the form of images when reading.
- **Evidence** created for medical performance was easy by storing contrast media examination data.

Thank You for Your Attention !!

ご静聴、ありがとうございました。



Cherry blossom



Kumamoto castle