

**The advantage of SCARA robotic arm technology  
in a Maxillofacial imaging, particularly in CBCT application**

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The typical mechanical construction of the conventional panoramic x-ray machines has been based on one rotational movement combined with simple fixed guide to change the position of rotating centre of the x-ray beam. This has led to the many dedicated x-ray machines for different imaging modalities and diagnostic purposes. For example panoramic, bitewing, tomography and CBCT images have not been able to take with the one x-ray machine. In Planmeca ProMax multimodal imaging x-ray machine these problems are solved by using the Selectively Compliant Articulated Robotic Arm, SCARA. The robotic SCARA technology is similar to fully robotized assembling lines e.g. in electronic industry. The SCARA technology provides utterly precise arm movement that are needed for rotational maxillofacial radiography. With this unique technology, the software-calculated imaging geometry is performed with a three-joint SCARA arm. The arm can freely produce any movement pattern required by any existing or future exposure program; hence the unit mechanic design will never restrict its imaging capabilities. This SCARA technology has made possible finally to combine the different imaging modalities into one machine and even upgrade the new imaging modalities and programs in existing ProMax x-ray machine later on. In the ProMax there are combination of different imaging modalities available including panoramic images with a different shapes of the focal layers corresponding to the patients anatomies, bitewing programs, digital tomographic programs, for any area of maxillofacial region, digital 2D cephalometric programs and CBCT 3D imaging modalities. One of the most remarkable advantages can be achieved in CBCT imaging due to the possibilities to adjust the size and location of the FOV in order to minimize the radiation dose to the patient. It has a capability to stitch individual FOV's together if the large volumes are needed.

**Film-less imaging system in Hokkaido University hospital  
- Present practice about intra-oral images –**

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**Background:**

Medical hospital of Hokkaido University has already started fully film-less radiographic system since 2004. But Dental sector of the hospital did only 5% due to following reasons.

1. Digitalization of intra-oral images is still yet to full-fledged established.
2. Lack of information about tooth position and insufficient measuring software for Cephalogram.
3. Not enough number of image viewer and its space.

**Image taking and supply:**

From 2008, digitalized Intra-oral images have been sent to PACS system through HIS and RIS.

1. Patient data such as ID No. and Name etc. was taken at terminal through DICOM Gateway by connection with RIS-MWM server (standardized as DICOM Ver.3.0 MWM).
2. Information about tooth position was set on DICOM image by mapping of DICOM-Gateway.
3. Image sending to PACS was done by DICOM Ver.3 standardized Storage Service Class.

**At present:**

We are facing problem with not so large scale except some small mistakes. Now we are sticking out for safety of patients and more valuable perfect images for treatment.

PACS: Picture Archiving and Communication System

HIS: Hospital Information System

RIS: Radiology Information System

RIS-MWM: Radiology Information System-Modality Work list Management

DICOM: Digital Imaging Communications Medicine

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1967-1970: Army training at Japanese Defense Academy

1978: D.D.S., Hokkaido University Dental School

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## **Essentials of CT and MR imaging for oral and maxillofacial lesions**

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A variety of disease process may involve oral and maxillofacial area including developmental, inflammatory, obstructive, traumatic, or neoplastic lesions. Therefore, advanced imaging modalities, such as CT, MRI, US, and PET, play an important role for the diagnosis in oral and maxillofacial area. In particular, cross-sectional imaging or three dimensional imaging by CT and MRI have been widely applied as one of oral and maxillofacial imaging. The topic of this seminar will focus on basic image diagnosis of CT and MRI in oral and maxillofacial area. Therefore, the following talk will be developed.

1. Review the normal anatomy of the oral and maxillofacial area on CT and MR images.
2. Describe the role of CT and MR imaging for oral and maxillofacial lesions.
3. Discuss the complementary use of both CT and MR imaging for oral and maxillofacial lesions.

The knowledge of muscle and space anatomies in oral and maxillofacial area is very important for the diagnosis on CT and MRI. Some anatomical landmarks and important image findings will lead to the exact diagnosis and help the treatment. In this seminar, the representative anatomy on CT and MRI will be presented. Intraoral or panoramic radiographs have commonly been using for dentoalveolar imaging. Multidetector CT also provides the high resolution images for dentoalveolar imaging. When the dentoalveolar lesion is larger or cannot be diagnosed precisely, advanced imaging modalities are needed for diagnosis. CT imaging plays the very important role to diagnose hard tissue lesions in oral and maxillofacial area, such as trauma or almost all jaw cysts, and for the planning of dental implant. On the other hand, MR imaging plays the very important role to diagnose internal derangement of TMJ. The complementary use of both contrast enhanced CT and MR imaging is necessary to diagnose oral and maxillofacial lesions, such as benign and malignant tumors and inflammatory disease. There will be no time to talk basic principles of multidetector CT and MRI in this seminar. So I would like to talk the current clinical role of both CT and MRI for oral and maxillofacial lesions using case-based approach. CT and MR imaging is not always expected to provide a specific diagnosis but should help narrow the differential diagnosis and provide the appropriate lesion's area three-dimensionally, thereby helping to guide patient treatment. I hope that this seminar will serve your clinical work.

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