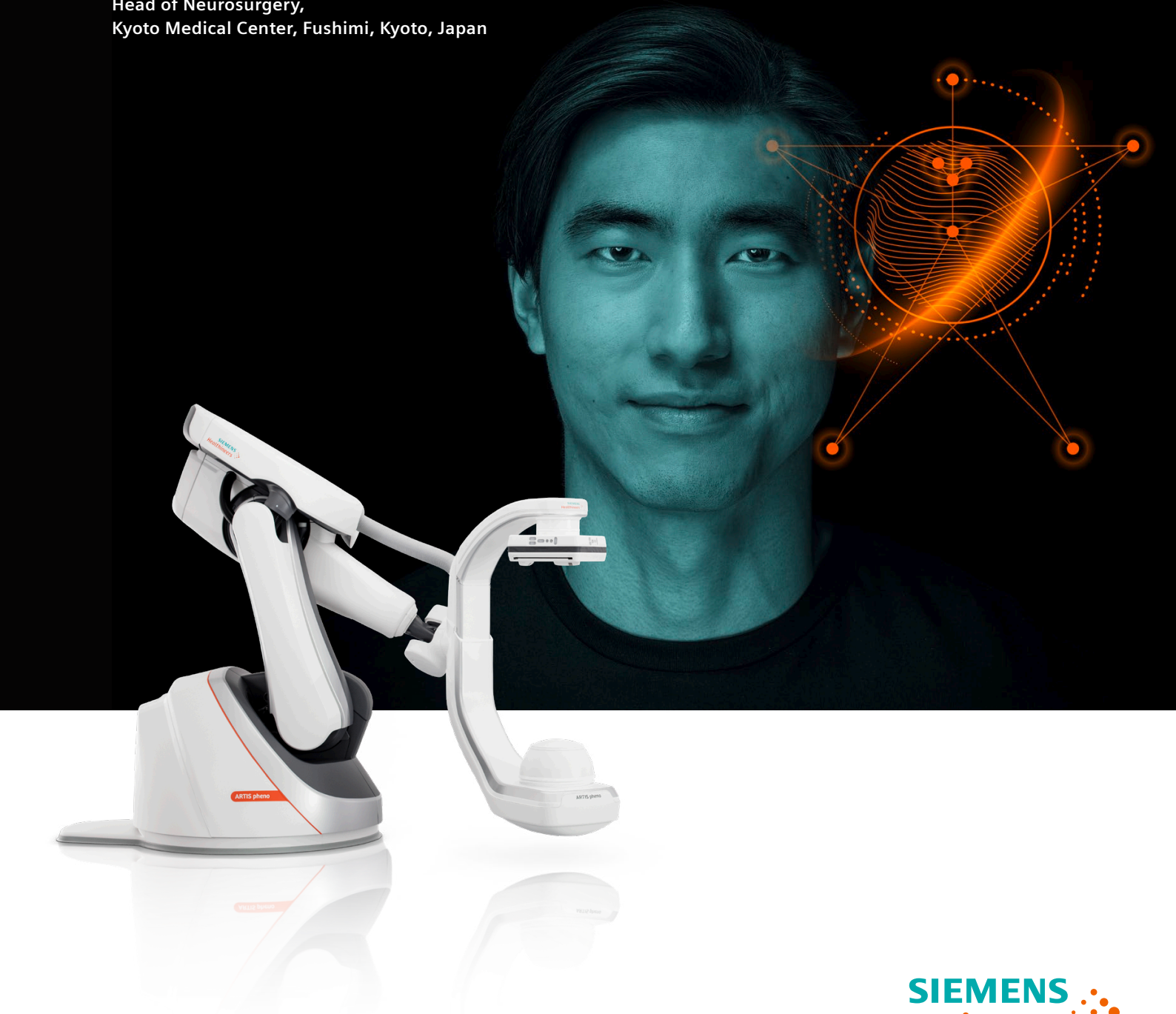
Interview

Collaboration across departments maximizes operational efficiency in the hybrid operating room

Dr. Fukuda Shunichi, MD,
Head of Neurosurgery,
Kyoto Medical Center, Fushimi, Kyoto, Japan



SIEMENS Healthineers

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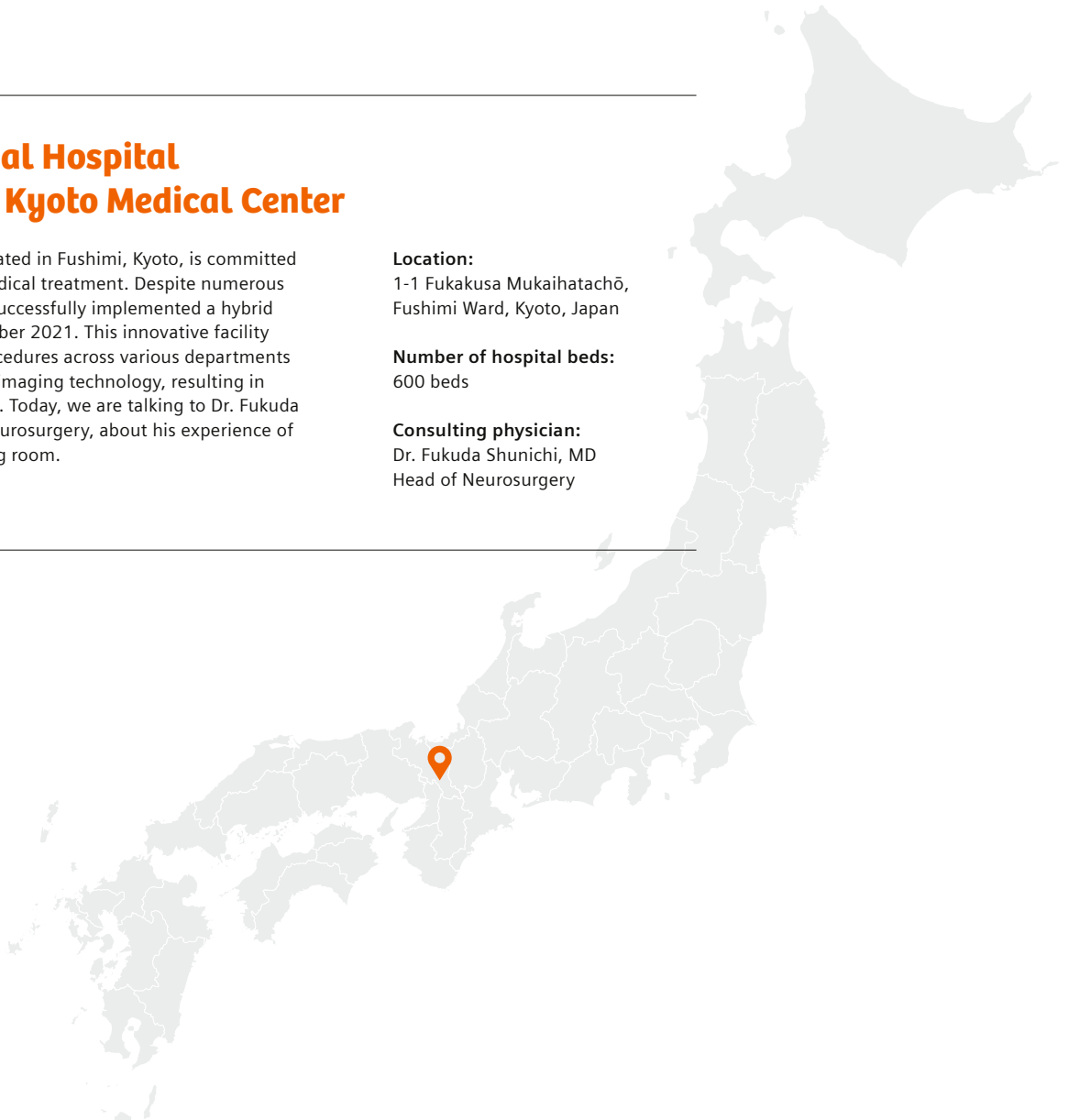
About National Hospital Organization Kyoto Medical Center

Kyoto Medical Center, located in Fushimi, Kyoto, is committed to advancing regional medical treatment. Despite numerous challenges, the hospital successfully implemented a hybrid operating room in December 2021. This innovative facility enables collaborative procedures across various departments with the aid of advanced imaging technology, resulting in increased utilization rates. Today, we are talking to Dr. Fukuda Shunichi, MD, Head of Neurosurgery, about his experience of using the hybrid operating room.

Location:
1-1 Fukakusa Mukaihatachō,
Fushimi Ward, Kyoto, Japan

Number of hospital beds:
600 beds

Consulting physician:
Dr. Fukuda Shunichi, MD
Head of Neurosurgery



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Could you tell us about the neurosurgery department?

We are collaborating with the neurological department here to establish a neuro center that offers specialist diagnosis and treatment 365 days a year, 24 hours a day. Neurosurgical diagnosis and treatment encompass a wide range of conditions, including stroke, brain tumors, head trauma, spinal cord diseases etc.

Kyoto Medical Center, situated at the heart of emergency medical care facilities in southern Kyoto, particularly in Fushimi, houses an emergency center. Urgent medical care is a key aspect of our department. Common conditions requiring emergency medical treatment include acute stroke, severe craniocerebral trauma, acute paralysis, and consciousness disorders resulting from benign brain tumors. Additionally, routine diagnosis and treatment involve selective procedures for conditions such as unruptured cerebral aneurysms and carotid artery stenosis, craniotomies for comprehensive brain tumor treatment, chemotherapy, or palliative care.

Although the number of surgeries at our center is not large, we are one of the top-ranked neurosurgery centers in the Kansai region when it comes to major surgeries. Notably, our department excels in clinical research, collaborating with national hospitals and institutions, and leading numerous research endeavors. Moreover, our clinical research center is equipped for animal experiments, facilitating studies on drug therapy for cerebral aneurysms, a current focus in my professional field.

Please tell us about treatment options provided in your department.

Neurosurgery encompasses diseases requiring urgent treatment (such as acute cerebral infarction, subarachnoid hemorrhage, severe craniocerebral trauma etc.).

There are also asymptomatic diseases where the surgical option needs to be considered with caution (such as unruptured cerebral aneurysm, asymptomatic carotid artery stenosis, benign brain tumor, etc.). In our

Hybrid operating room with ARTIS pheno

department, the appropriate treatment for each condition is determined through direct endovascular procedures, craniotomies, or a combination of diagnostics and the patient's condition. For instance, in the case of subarachnoid hemorrhage due to a ruptured cerebral aneurysm, we prefer endovascular coil embolization, which has statistical evidence showing better results than craniotomy clipping.

For unruptured cerebral aneurysms, safety is prioritized as coil embolization and clipping show no significant difference in therapeutic efficacy. Therefore, we carefully evaluate the effectiveness and safety of each approach, thoroughly discuss the advantages and disadvantages with patients and their families, and collectively decide on a treatment plan through open communication. Throughout this process, we believe in prioritizing patient well-being over relying solely on our expertise in a particular treatment method.

Could you discuss the use of the hybrid operating room?

In our department, we often require the support of an image-guided system for treating brain tumors and performing complex operations, particularly those focusing on deep-seated areas, such as tumors located at the base of the skull. When dealing with such cases, it's essential to select the appropriate excision scope based on the relationship with surrounding tissues, a task facilitated by real-time 3D images. This need has led us to conduct these operations in the hybrid operating room. Recently, we treated a patient with stenosis of the cervical transverse foramen of the vertebral artery, resulting in cerebral infarction due to pressure from the cervical vertebra on the artery caused by neck torsion. In such cases, precise excision of the cervical vertebra around the vertebral artery is critical.

However, even a minor equipment error could potentially injure the vertebral artery and lead to severe hemorrhaging. The hybrid operating room played a crucial role in this case. By using 3D imaging, we accurately determined the positional relationship between the blood vessel and the vertebra. Subsequently, with

the imaging guidance provided by the system, we successfully excised the peripheral ossified tissues without damaging the vertebral artery. Postoperative, digital subtraction angiography (DSA) confirmed complete resolution of the stenosis. Such intricate procedures highlight the indispensability of a hybrid operating room. This case shows the practical significance of this advanced facility in our practice.

What are your thoughts on ARTIS pheno?

My first impression was the substantial size of the device. Therefore, we consider lines of movements during operations very carefully. The imaging quality of the cervical vertebra is impressive, free from metal artifacts caused by head fixation and guide pins. It matches the clarity of preoperative CT scans. These are my main observations so far.

What are the effective methods and indications for image-guided surgery in the hybrid operating room?

Diseases suitable for treatment in the hybrid operating room include acute cerebral infarction, cerebral aneurysms, skull base tumors, and disorders of cerebral vessels accompanied by arteriovenous malformations, among others. For instance, thrombus retrieval therapy for acute cerebral infarction requires 24-hour preparation as per Japan Stroke Society guidelines. However, if it's accompanied by carotid artery stenosis, surgical thrombectomy may be combined. Combined therapy proves effective in certain cases. In situations where a large aneurysm in the neck extends beyond the scope of endovascular surgery, solely relying on this method may not completely cure the aneurysm. In such cases, it is effective to perform a craniotomy in a hybrid operating room and perform clipping to narrow the aneurysm neck before coil placement within the aneurysm.

In addition, when dealing with ruptured arterial aneurysms in deep locations, it is useful to temporarily block the parent artery with an intravascular balloon during clipping. In cases of skull base tumors, a collaborative approach involves excision from both the upward side in neurosurgery and the downward side in ENT and head and neck surgery. Muscle transplanted from the abdomen can supplement defects in plastic surgery. Previously, these operations typically lasted over 30 hours. However, the hybrid operating room's precise delineation of tumors and peripheral tissues has reduced the operating time by about five hours. The introduction of the hybrid operating room has reduced surgical risks for patients and eased fatigue among medical staff.

(Interview conducted on June 10, 2022)

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