

## Higher Precision, Lower Costs

### How 3D Printing Brings Hope to the Aging Society

As of 2019, one out of eleven people in the world is over the age of 65, and the ratio will increase to one in six by 2050\*. Aging is one of the most important demographic changes in the twenty-first century, and its implications for the medical industry are significant and profound. “Major OECD member states are experiencing an explosive increase in medical expenses, as they enter the phase of aging. Applying 3D printing technologies to various medical fields not only enables customized medical instruments, but also reduces medical costs,” states Prof. Kim Nam-guk from the Department of Convergence Medicine at Asan Medical Center.

\* World Population Prospects 2019



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Prof. Kim Nam-guk, Department of Convergence Medicine  
**Asan Medical Center**





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**Asan Medical Center**

Founded in 1986, Asan Medical Center is the largest medical institution in Korea with a total of 2,705 beds occupying about 85,000 square meters. It has been leading Korea’s medical development by offering world-class medical professionals and optimal treatment systems — based on advanced medical systems — as well as cutting-edge medical equipment. As the Korean society ages, Asan Medical Center also needs to treat more patients with serious diseases.

### Improving Surgical Outcomes

Surgeons often find it necessary to establish surgical plans, perform simulation operations and explain the surgical procedures to patients. However, mere CT and MRI data were not tangible enough. They want a detailed surgical site, which could show the locations of blood vessels with clarity.

As the cradle for medical innovation, Asan Medical Center introduced 3D printers from Stratasys® in 2013 to address these issues. The Department of Convergence Medicine, the Department of Radiology and the Department of Surgery have worked on a project to increase the accuracy of tumor surgery for kidney cancer and breast cancer. Recently, Asan Medical Center’s 3D printing technology has been selected as a “new medical technology” by the Ministry of Health and Welfare for the first time in Korea.



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## What Is Being Done

Surgeries for kidney cancer often involve the excision of the patient's kidney, either complete or partial. It makes more sense to only remove the part of kidney that has been affected by the cancer cells, but the operation requires great precision. Important blood vessels must not be touched.

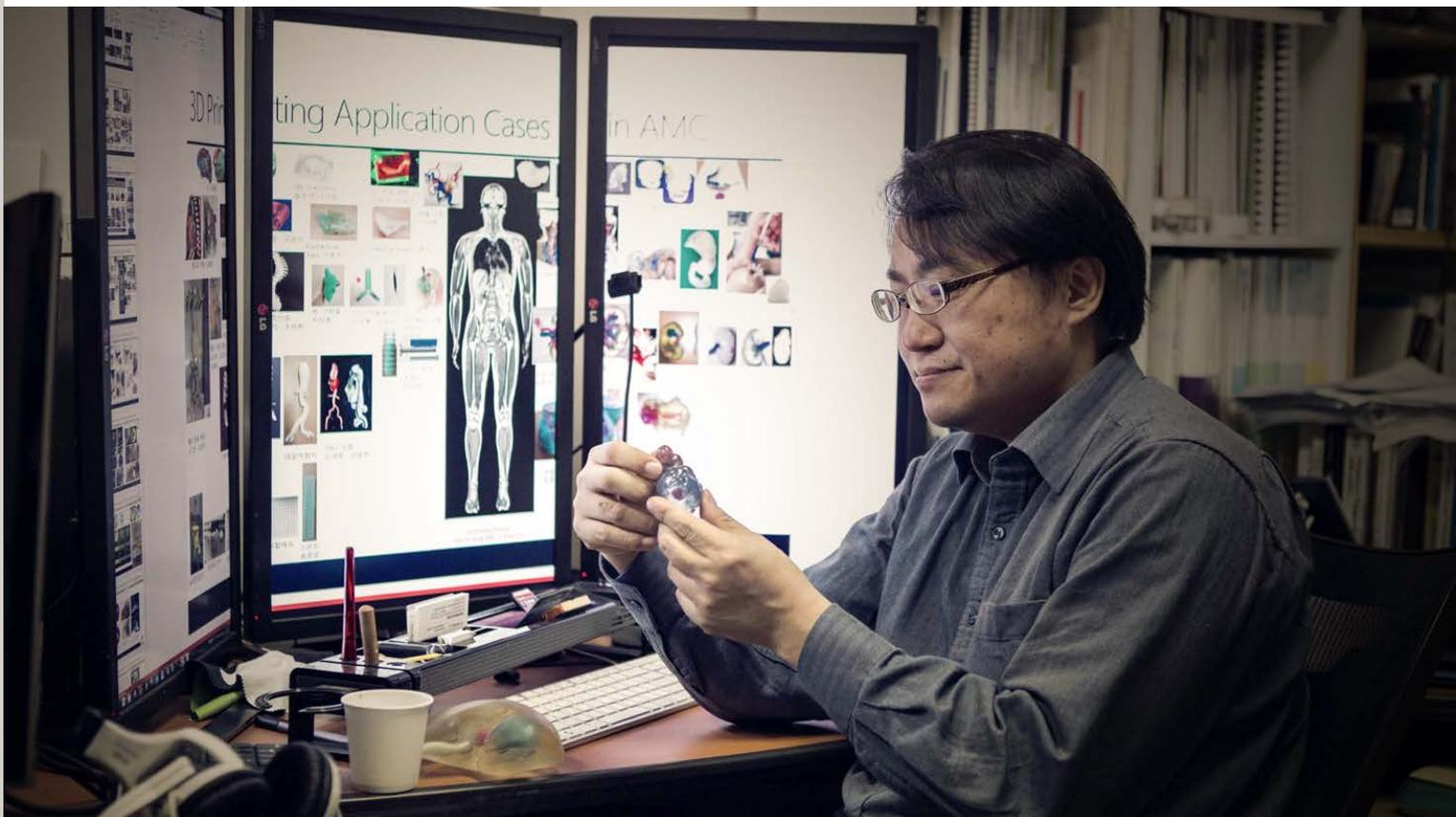
3D printing provides a great solution to this conundrum. With Connex3™, doctors at Asan Medical Center can print organ models that are both soft and transparent. Because the materials are soft, the doctors can perform mock surgeries on the models. And because they are transparent, the insides, such as renal arteries and veins, the renal pelvis, tumor issues, etc., are easily visible to the naked eye. The 3D printed models have greatly contributed to the precision and speed of operations.

Breast cancer surgeries can also benefit a lot from 3D printing technologies. Before the surgery, a micro-needle typically needs to be inserted into the breast under ultrasonography in order to mark the surgical site. This difficult procedure requires an expert surgeon and often brings pain to the patient. At Asan Medical Center, surgeons 3D print customized

surgical guides based on the patient's MRI data before each operation. Made with Stratasys' FDM technology, these guides are sturdy and can mark the surgical sites accurately without bringing unnecessary pain to the patient. At the same time, surgeons can preserve the normal breast tissues to the largest extent and reduce the revision and relapse rates.

## Plenty More Applications

Asan Medical Center has already benefited a lot from introducing Stratasys 3D printers, and these new technologies are bringing new hope to the aging society, which Korea is entering. Prof. Kim Nam-guk believes that the current medical system could not adequately solve the new problems that keep appearing. "A sustainable medical service system is necessary to keep medical expenses from becoming a social and economic burden in the aging society. As a result, everything must be shifted towards precision medicine, and 3D printing is one of the most important ways to do this," remarked Prof. Kim. Currently, the surgical team at Asan Medical Center is using 3D printing technologies to create surgical plans and make customized prosthetics.



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