



ITE's Innovation to Change How Kidney Stones are Removed

Partnership between ITE, NUH, NUS and Invivo Medical to bring innovation to the market

A team of staff from ITE have successfully created a solution to simplify percutaneous-nephrolithotomy (PCNL), which is the complicated process of removing large or complex kidney stones. The **Percutaneous-Access-to-Kidney-Assist Device (PAKAD)** is made possible through ITE's collaboration with the National University Hospital (NUH), the National University of Singapore (NUS) and Invivo Medical Pte Ltd.

Innovation to Make Complex Procedure Simpler, Shorter and Safer

PCNL is a complicated surgery technique that is usually carried out by senior surgeons. Traditionally, PCNL surgeons refer to x-ray imaging of the patient's kidney to locate the stone(s), before inserting a long and hollow needle through the skin to reach the stone(s). An endoscope surgical instrument is then inserted through the aid of the needle passage to fragment and remove the stone(s). This is complex, as the surgeon has to use free-hand techniques to locate the stone(s) in a three-dimensional environment, while referring to a two-dimensional image. At times, several attempts may be required, which lengthens the patient's exposure to x-ray radiation and recovery period.

The PAKAD incorporates precision engineering mechanisms to systematically adjust, guide and stabilise the needle into alignment with the targeted stone(s). Through successful trials on animals at NUH, the PAKAD has proven that it can **simplify and shorten the PCNL process, hence reducing x-ray exposure, risks of complication, and recovery periods**. With the PAKAD, the junior surgeons can also perform the needle insertion PCNL procedure.

Multiple Parties Make Innovation Possible

ITE's team's research efforts were strengthened through the domain expertise of NUH and NUS. Through Invivo Medical, the device will be commercialised and a licensing agreement was signed among ITE, NUH, NUS and Invivo Medical. The team received financial support



for the Applied Research through the MOE Innovation Fund, the NRF Proof-of-Concept grant, and the MOE Translational R&D and Innovation Fund.

Work on the PAKAD started in 2011. After the PAKAD was developed and a patent application was filed, the PAKAD was first showcased at a major event at TechInnovation 2013, as part of the Singapore start-up ecosystem. At the event, PAKAD was matched with an investor, who is now bringing the device to market through Invivo Medical. Over the next five years, the sales of the device is projected to hit S\$25 million.

The contributions by various parties have made it possible for the innovation to benefit patients. The research team will complete clinical trials before obtaining regulatory approvals. PAKAD is expected to reach the market by the end of 2018.

“This is an excellent example of industry-institution partnership to develop innovative and integrated solutions to improve productivity and processes. We are grateful to NUH, NUS and Invivo Medical, to enable ITE to create and patent the Percutaneous Access to Kidney Assist Device (PAKAD) for safe kidney surgery,” said Ms Low Khah Gek, CEO, ITE.

“The new technology allows for better precision during surgery and enhances patient safety and outcome. It expands on NUH’s track record of partnerships for clinical innovation and development that help raise the standard of clinical care. We look forward to more of these collaborations to bring about greater tangible benefits for our patients,” Prof Kesavan Esuvaranathan, Head and Senior Consultant, Department of Urology, National University Hospital.

“NUS is delighted to have been part of this multi-party collaboration. Researchers from the NUS Yong Loo Lin School of Medicine provided medical expertise, which ITE used to enhance the PAKAD. Realising the strong potential for this technology to improve clinical procedures and healthcare for kidney stone patients, the NUS Industry Liaison Office took the lead in the commercialisation process, including managing negotiations for this multi-party licensing agreement. Our endeavour to bring innovative technologies closer to market is made possible with great partners who have similar goals,” said Mr Sean Flanigan, Director of NUS Industry Liaison Office.



“The new medical-device is the world’s first operational Percutaneous Access to Kidney Assist Device (PAKAD). It is the result of a successful collaboration by three institutions and the industry, and made possible by a match-up at TechInnovation 2013. Beyond this, we plan to do continual product development to apply the invention to more minimally-invasive surgical and biopsy procedures,” said Dr Joseph Chai, Managing Director / Director, Invivo Medical Pte Ltd.

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About ITE

The Institute of Technical Education (ITE) is a post-secondary education institution established in **1992** under the Ministry of Education. As a principal provider of career and technical education, and a key developer of national occupational skills certification and standards, ITE's **Mission** is to create **opportunities** for students and adult learners to acquire skills, knowledge and values for employability and lifelong learning. ITE's **Vision** is to be A **Trailblazer** in Career and Technical Education. Our **Values** are **Integrity, Teamwork, Excellence** and **Care**. ITE comprises the ITE Headquarters and three ITE Colleges - College Central, College East and College West.

About NUH

About the National University Hospital The NUH is a tertiary hospital and major referral centre for a comprehensive range of medical, surgical and dental specialties. The Hospital also provides organ transplant programmes for adults (in kidney, liver and pancreas) and is the only public hospital in Singapore to offer a paediatric kidney and liver transplant programme.

Staffed by a team of healthcare professionals who rank among the best in the field, the NUH offers quality patient care by embracing innovations and advances in medical treatment.

In 2004, the NUH became the first Singapore hospital to receive the Joint Commission International (JCI) accreditation, an international stamp for excellent clinical practices in patient care and safety. Today, patient safety and good clinical outcomes remain the focus of the hospital as it continues to play a key role in the training of doctors, nurses and allied health professionals, and in translational research which paves the way for new cures and treatment, offering patients hope and a new lease of life.

A member of the National University Health System, it is the principal teaching hospital of the NUS Yong Loo Lin School of Medicine and the NUS Faculty of Dentistry.

For more information, please visit www.nuh.com.sg

About National University of Singapore (NUS)

A leading global university centred in Asia, the National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education and research, with a focus on Asian perspectives and expertise.

NUS has 17 faculties and schools across three campuses. Its transformative education includes a broad-based curriculum underscored by multidisciplinary courses and cross-faculty enrichment. Over 38,000 students from 100 countries enrich the community with their diverse social and cultural perspectives. NUS also strives to create a supportive and



innovative environment to promote creative enterprise within its community.

NUS takes an integrated and multidisciplinary approach to research, working with partners from industry, government and academia, to address crucial and complex issues relevant to Asia and the world. Researchers in NUS' Schools and Faculties, 30 university-level research institutes and centres, and Research Centres of Excellence cover a wide range of themes including: energy, environmental and urban sustainability; treatment and prevention of diseases common among Asians; active ageing; advanced materials; risk management and resilience of financial systems. The University's latest research focus is to use data science, operations research and cybersecurity to support Singapore's Smart Nation initiative.

For more information on NUS, please visit www.nus.edu.sg.

About Invivo Medical

Invivo Medical Pte. Ltd. is a Singapore-groomed medical technology and device start-up specialised in the research and development of novel precision percutaneous access surgical devices.

Invivo Medical aims to be a world class R&D and manufacturing platform to commercialise medical inventions and patents licensed and strategized to establish a uniquely synergised medical innovation platform, connected with an industry ecosystem to research and develop innovative technology and effective devices for medical applications cater to the global market.

Our vision and mission is to be a leading provider of innovative and quality medical solutions, technologies and devices to the mankind, providing quality medical care to patients around the world.