

# VISIONS

SPECIAL

MAGAZINE FOR HEALTH PROFESSIONALS

Global Edition // Interventional X-Ray // No 07 // August 2023

Cardiology Edition



## Interventional X-ray

Optimizing  
Cardiovascular  
Disease Interventions  
with Alphenix

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Boundaries of  
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**Canon**



## // EDITORIAL

Dear Readers,

I would like to express my deepest gratitude to all medical professionals for their hard work and for always giving their best under pressure in tense clinical situations.

This is the 7th edition of VISIONS Special – Interventional X-ray, which features the voices of users of our angiography systems.

We at Canon Medical Systems believe it is our responsibility and our core mission to continuously deliver the best possible medical technologies and solutions as well as safe and reliable medical equipment.

In this edition, our customers discuss their personal experiences with the innovative technologies and functions provided by Alphenix and also describe how they use their systems in actual clinical practice.

In August of this year, we released Alphenix / Evolve Edition. The Evolve Edition has many advanced features based on our  $\alpha$  Evolve Technology to improve clinical workflow and minimize strain on both patients and healthcare professionals. Various aspects of  $\alpha$  Evolve Technology are also introduced in this edition.

I hope you enjoy reading this edition of VISIONS.

Made for patients. Made for partnerships. Made for you.  
Made for Life.

**Kunitoshi Matsumoto**  
General Manager, Vascular Systems Division,  
Canon Medical Systems Corporation



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## Providing Hospitality and Proposing the Ideal Cath Lab, Our New Showroom for VL Products “Angiography Experience Lab” Is Now Open



On April 25, an opening ceremony was held for our Angiography Experience Lab. The newly established showroom facility is on the first floor of building 21 and will serve as a place for global customers to experience our latest VL technologies and solutions. The grand ceremony aimed to widely spread the significance of the facility within the company. It is expected that the Angiography Experience Lab will provide great value and be used in many ways in the years to come.

At the beginning of the ceremony, President Takiguchi and Senior Vice President Tachizaki gave a formal address in which they strongly expressed their desire to make effective use of the new facility in our progress towards becoming No. 1 globally.

Next, Mr. Matsumoto, general manager of the Vascular Systems Division, explained the direction of VL business, the strategy to establish strong No.3 position with 11% market share in global market, and how the Angiography Experience Lab will be utilized in the coming years.

Finally, Mr. Morita, vice president of the National Sales Division, gave a greeting and expressed his gratitude to everybody involved in the realization of the facility. He also expressed his enthusiasm for effectively using the Angiography Experience Lab to improve sales.

With cooperation from the Canon Design Center, the Angiography Experience Lab was designed with two themes: “hospitality” and “proposing the ideal Cath Lab”. The lobby has a hotel-like atmosphere and provides space where customers can relax. In addition to the obvious — introducing the Alphenix angiography system and its options — by focusing on the operation console, the lighting, and the color



President Takiguchi



Senior Vice President Tachizaki



General Manager Matsumoto



Managing Director Morita

scheme of the walls and floors, we have realized a design that represents the ideal Cath Lab environment for both medical professionals and patients.

With the support of the Project Coordination Center, we have also introduced a new initiative that allows customers to experience the 3D layout of systems and peripherals in a virtual version of their own facility using a large monitor and a virtual reality system. In addition, for global customers who find it difficult to come directly to Nasu, we have built an online streaming system that utilizes the latest Canon webcams.

The Angiography Experience Lab. came to life about two years after the idea of setting up a showroom was proposed. We are sincerely thankful to everybody who supported us in its realization\*.

*\*Canon Design Center, General Affairs & Facility Management Dept., Facility Control Dept., Public Relations Dept., Project Coordination Center, Global Marketing Dept., Service Strategy & Planning Div., Vascular Systems Development Dept., Vascular Systems SCM Dept.*

*May 12, 2023  
X-Ray Sales Dept., VL Sales Engineer Grp.  
Vascular Systems Marketing and Promotion Dept., VL Global Marketing Grp.*





## EuroPCR 2023: Canon Medical Systems Hosts Successful Symposium at Prominent International Academic Course in Interventional Cardiology.



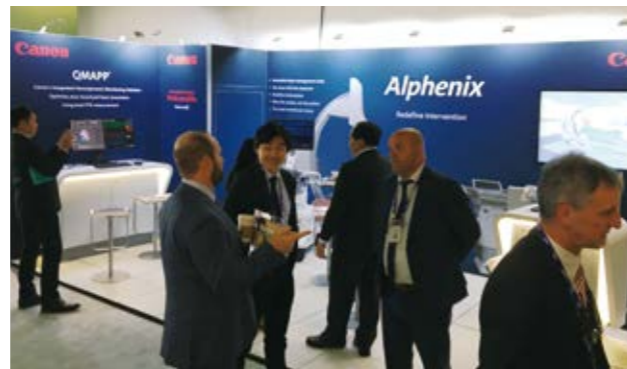
EuroPCR is an internationally prestigious academic society for interventional cardiology, and this year it was held from May 16th to 19th in Paris. Every year (with the exception of the COVID-19 pandemic period), the conference attracts about 12,000 medical professionals from all over the world.

Physicians specializing in cardiac catheterization gather at the conference in Paris and delegates learn about the world's most advanced cardiac catheterization and minimally invasive treatments.

This year, in addition to the exhibition at our booth, Canon hosted a successful industry sponsored symposium at EuroPCR, taking another meaning step toward AI-powered deep learning fluoroscopic image technology integration to our Angiography system, Alphenix, developed for the interventional cardiology market.

Canon invited a prominent moderator and three speakers (Advanced Alphenix users) who are active not only in Europe but also globally. The symposium presented on the theme of "Advanced deep learning real-time imaging technologies and efficient tools to conduct PCI\* and SHD\* procedures while minimizing dose for patients and healthcare professionals."

The seminar was chaired by Prof. Stephan Windecker (Chairman and Professor of the Department of Cardiology at Bern University Hospital and Vice-Dean of the Medical Faculty of the University of Bern, Switzerland), who is a world-leading authority on cardiology including also cardiac intervention. Prof. Windecker as a practiced moderator succinctly summarized to the audience the value of each presentation, demonstrating his deep knowledge of the daily



challenges in interventional cardiology procedures. The three presenters, all current users of Canon angiography systems were invited to deliver lectures: Dr. Masahiko Asami (Interventional Cardiologist of the Department of Cardiology at Mitsui Memorial Hospital); Dr. Sanjeevan Pasupati (Interventional Cardiologist of the Department of Cardiology and Director of Structural Heart Disease & Cardiovascular Research Unit at Waikato Hospital, New Zealand); and Dr. Nicolas Amabile (Interventional Cardiologist of the Department of Cardiology at Institut Mutualiste Montsouris (IMM), France).

Dr. Asami introduced the deep learning technology-based coronary fluoroscopic imaging produced by Canon's new product which will be commercially available as Alphenix Evolve Edition. Although other



**Dr. Masahiko Asami,**  
Interventional Cardiologist  
Mitsui Memorial Hospital,  
Tokyo, Japan.



modalities like CT and MR still require post-processing time for deep learning-powered image processing, the new Alphenix edition provides a "real-time" noise-reduced fluoroscopic coronary images for interventional cardiologists. He also presented on how he overcame one of most complicated TAVR (transcatheter aortic valve replacement) cases while utilizing the Alphenix system.

Dr. Pasupati demonstrated the clinical benefits of our new AI-booster technologies, DDS (Dynamic Device Stabilizer, a feature for stabilizing and enhancing stents for PCI\* treatments) and EchoFusion (a feature that overlays an echo ultrasound image on the live fluoroscopic image for structural heart disease procedures), expertly presenting to the audience actual clinical images from his facility.

Dr. Amabile explained how he overcame a challenging chronic total occlusion (CTO) case in the coronary artery, and introduced unique dose reduction tools on Alphenix systems called DTS (Dose Tracking System) and Spot ROI\*.

Due to the expertise of Prof. Windecker and the eminent speakers who delivered meaningful lectures, there was an enthusiastic reaction from the audience, with the symposium hall venue almost full. In addition a further positive reaction



to the symposium is that is now one of the most viewed sponsored sessions on the EuroPCR YouTube channel. After the symposium, Prof. Windecker, who is currently not a user of Canon technology, made the following inciteful comment following the symposium: "I was impressed with the technologies incorporated in these angiography systems. I would definitely consider Canon's systems as candidates for purchase."

Canon aims to build on the success of this important symposium to further expand our suite of solutions for Alphenix system in the cardiovascular market. //

- \*KOL=Key Opinion Leader
- \*PCI=Percutaneous Coronary Intervention
- \*ROI=Region of Interest
- \*SHD=Structural Heart Disease

July 14, 2023,  
Vascular Systems Marketing and Promotion Department /  
VL Global Marketing Group





 **aEvolve Technology**

Alphenix / Evolve Edition: Intelligent Solutions  
Powered by aEvolve Technology



Introducing Alitivity, our bold new approach to AI innovation that uses smart technologies to make a whole new level of quality, insight and value across the entire care pathway possible.

Designed specifically to address the growing complexities of interventional cardiology we developed aEvolve Technology. Leveraging Artificial Intelligence, aEvolve provides innovative solutions to support high quality, safe and efficient diagnosis and treatment while improving the experience for patients and healthcare workers.

 **Alitivity**





Dr. Masahiko Asami  
Interventional Cardiologist at the Mitsui Memorial Hospital,  
Tokyo, Japan.



## Optimizing Cardiovascular Disease Interventions with Alphenix

Dr. Masahiko Asami is an Interventional Cardiologist at the Mitsui Memorial Hospital in Tokyo, Japan. He specializes in diagnosing and treating structural heart disease (SHD). The number of patients requiring SHD treatments, including mitral valve repair and left atrial appendage closure, is rapidly growing in his daily practice, as well as globally. Dr. Asami explains how Canon's Alphenix Intervention System supports his complex SHD procedures.

For transcatheter treatment approach, imaging plays a crucial role in SHD interventions, from pre-procedural evaluation and device size selection to treatment and follow-up.

### An essential partner

"The Angio system is an essential partner for the Interventional Cardiologist in delivering precision in various kinds of cardiac procedures and treatments for SHD. Therefore, we are very discerning about the quality of the equipment that we use for our daily practices," remarked Dr. Asami. "We've been using Canon's Alphenix Angiography system for years, and really love it. It provides great image quality, low dose exposure, low contrast media volume, great workflow, and useful panel detector size."

The Mitsui Memorial Hospital has two Cath Labs running Alphenix. Cath Lab 1 is mainly used for electrophysiology

(EP) and percutaneous coronary intervention (PCI) and is equipped with an eight-inch flat panel detector. In Cath Lab 2, Alphenix is mainly used for SHD, endovascular, and cerebrovascular treatments. They are performed using a 12-inch flat panel detector.

"Generally, the eight-inch flat panel detector is preferred for coronary cases because it is easier to avoid FPD interference with the patient, especially with steep C-arm angulation," he explained. "However, we were uncomfortable with using a smaller field of





### Choice of FPD sizes

Alphenix interventional angiography systems are available with a choice of flat panel detectors sizes to suit your coverage needs.

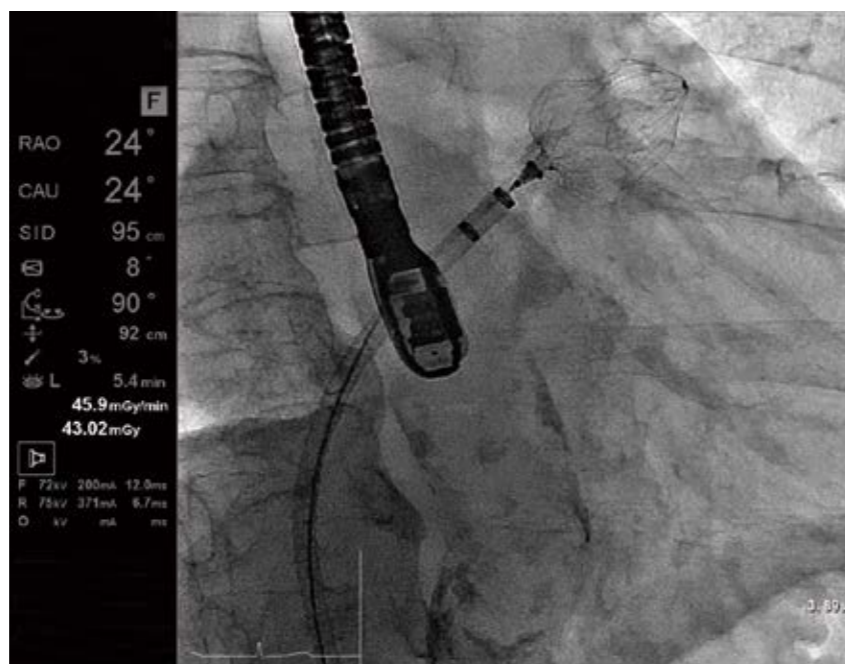


view for SHD, cerebrovascular, and peripheral interventions. Our Canon 12-inch flat panel detector solved this.”

“Due to the fact that the housing size is very compact on 12-inch detector size of Canon FPD, the risk of collision with the patient is much less, even for coronary cases,” he continued. “The 12-inch flat panel is easy to use, and it can perform all procedures including PCI, so we can also utilize the larger FPD for other various cardiovascular cases, as we’re now able to secure a larger field of view. This ubiquity makes the 12-inch detector a good value investment for us.”

### Outstanding image quality

The Alphenix system consistently provides a great image quality, which interventional cardiologists can concentrate on their procedures with fluoroscopic images that is noise-re-



Left Atrial Appendage(LAA) Closure

duced, sharper, and more defined images during manipulating PCI devices and confirmation of coronary blood circulation, while minimizing dose.

“What I love about this system is image quality. With Canon’s technology, you can obtain deeper perception or better anatomy and gain better image comprehension in challenging situations, like steep angulation and examinations for obese patients,” said Dr. Asami.

“You can minimize the use of contrast media” he added. Even using really

low volumes of contrast media like three times diluted, the Alphenix’s DA diluted mode enables us to see great clear clinical images.”

The ability to perform SHD or PCI procedures using a very small amount of contrast medium means that SHD/PCI can be offered to more patients and enables a broader access to PCI and SHD for patients at risk of, for example, patients with chronic kidney failure or contrast-induced nephropathy (CIN).

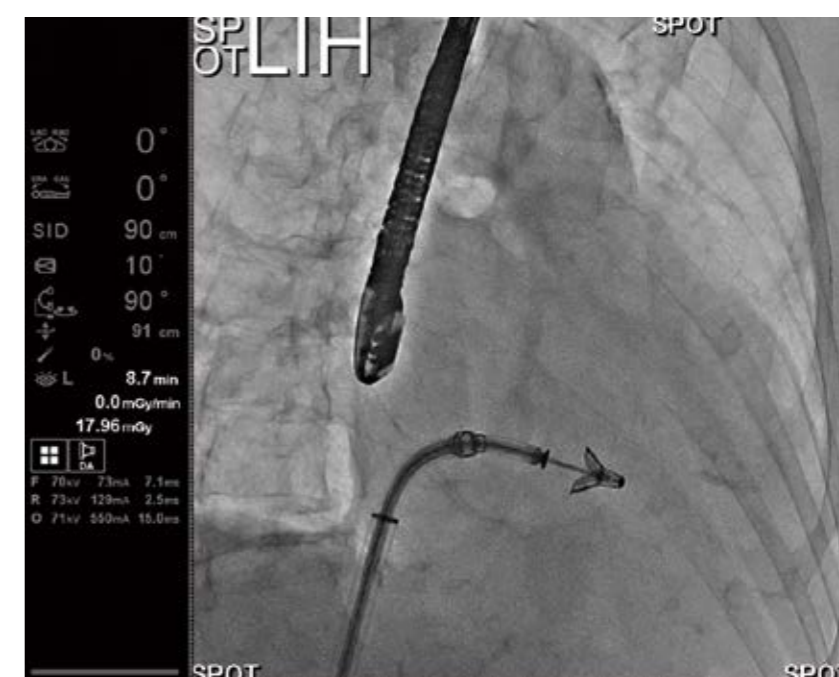
From a global perspective, shortages of contrast medium over the past few years have affected many hospitals and

patients. The shortage has impacted millions of examinations, some of which are essential or improve diagnostic accuracy.

### Exceptional agility

The range of C-arm positions of the Alphenix provide coverage from head-to-toe and fingertip-to-fingertip.

“The C-arm of Alphenix is incredibly flexible. It can be moved to pretty much anywhere I want without having to move the catheter table,” noted Dr. Asami. “Very wide coverage when puncturing can be achieved both longitudinally and laterally, so we don’t have to move the patient table anymore, which also contributes to avoiding interference with ECG cable, blood pressure monitoring cable, and several lines from the anesthesia side.”



Trans-aortic Mitral Valve Repair procedure

**“I have no doubt that this technology will become one of the global standards in Interventional Cardiology market for the near future.”**

*Dr. Masahiko Asami, Interventional Cardiologist Mitsui Memorial Hospital, Tokyo, Japan.*





### Unique workflow opportunities

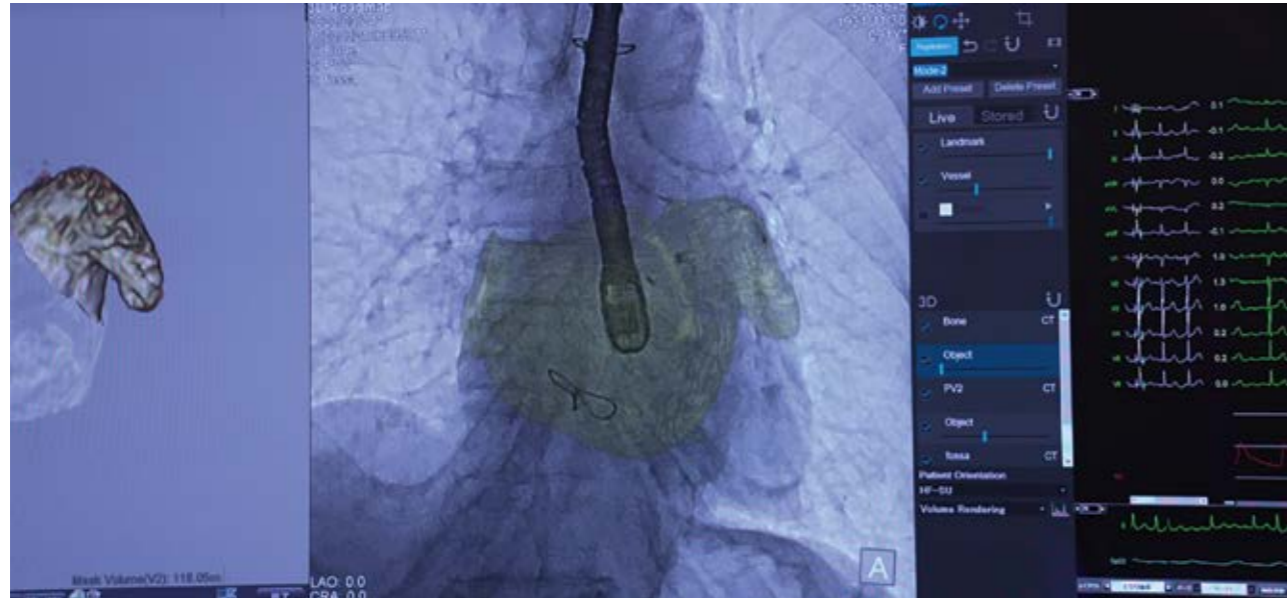
The Alphenix offers integrated cardiac-optimized technologies to help deliver the best possible outcomes to patients. These include tools to simplify procedure planning, technology to help users see and navigate in confidence, and better protect patients with a comprehensive suite of opti-

mized technologies.

“I really love the workflow of Alphenix. That is the absolutely unique point of Alphenix,” remarked Dr. Asami. “The CT fusion function would be a good example and that’s useful for us and accurate. It enables us to plan and deploy LAA closure device precisely.”

### Impact in Interventional Cardiology

“I have no doubt that this technology will become one of the global standards in Interventional Cardiology market for the near future,” concluded Dr. Asami. Interventional treatment is expected to become much less invasive in the near future, particularly through



CT fusion during LAA closure



Mitsui Memorial Hospital, Tokyo, Japan

the use of AI technology. However, so far, it has only been used for post processing of obtained images such as CT and MRI. With the advances in technology, the time has finally come to utilize it for treatment in realtime enabling less radiation dose, less contrast media, and better device/vessel visibility. //

### Find out more about Dr. Asami's work in SHD:

Meaningful Innovations in Interventional Cardiology - EuroPCR 2023 - YouTube

<https://www.youtube.com/watch?v=rXGwTkdEChY>



Cardiology Days / Structural Heart Disease - YouTube

<https://www.youtube.com/watch?v=v4-pwJtvqIq&t=19s>



### Dr. Masahiko Asami

Dr. Masahiko Asami, MD, FESC, FACC, is an Interventional Cardiologist at Mitsui Memorial Hospital, Tokyo, Japan. He specializes in structural heart disease (SHD). Dr. Asami has over 52 peer-reviewed publications regarding the subject matter, previously he performed a LIVE TAVI demonstration focused on patient benefits and setting-up for superior long-term outcomes, from Swiss Cardiovascular Center, Bern University Hospital - Bern, Switzerland.

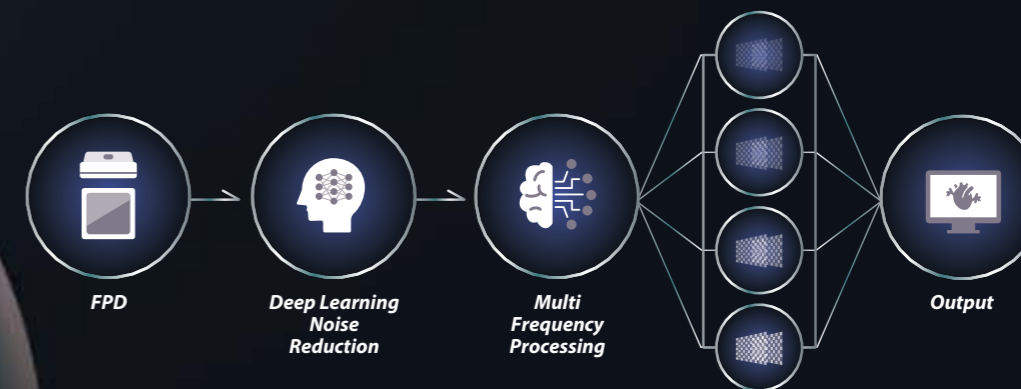






## See Clearer with aEvolve Imaging, in real-time

Clear fluoroscopic imaging enhances confidence and can help improve clinical outcomes, procedural efficiency and reduces the frequency of digital acquisition, leading to further dose reduction for patients and operators. With Deep Learning\* based noise reduction and multi-frequency processing aEvolve can deliver up to 2 times higher contrast-to-noise ratio compared to conventional image processing.



\*: aEvolve Imaging is not provided with a self-Learning function that allows Alphenix to modify its own programs. Therefore, training of the aEvolve Imaging algorithm is not performed at the end user's site.



## Pushing the Boundaries of Interventional Cardiology with Alphenix

Dr. Sanjeevan Pasupati, Director of Structural Heart Disease & Cardiovascular Research at Waikato Hospital in Hamilton, New Zealand, is an interventional cardiologist specialized in angioplasty and percutaneous interventions for valvular and structural heart disease. As one of New Zealand's leading cardiologists in structural heart disease, he has mentored many international and local sites in the development of Transcatheter Aortic Valve Implantation (TAVI). Dr. Pasupati is internationally renowned for testing and developing new devices for structural and coronary disease and is widely published in this area. He is also a speaker at interventional meetings around the world and sits on the scientific advisory boards of various cardiac device companies.

Waikato Hospital was the first comprehensive structural heart centre in New Zealand. It performs over one thousand PCIs a year and the number of complex PCIs and high-risk cardiac interventions is continually increasing. Dr. Pasupati attributes this increase to improvements in devices and pharmaceuticals, an increased understanding of equipment, and innovations in imaging technology.

"All of these advancements have an impact on the outcomes of angioplasty and have brought angioplasty indications more and more on par with bypass surgery for a lot of the

cases we perform," he says. "Now very seldom does a patient who comes with an acute cardiac coronary event go to a cardiac theatre. And if you want to push the boundaries, you need the right Cath Lab and ultrasound imaging."

The hospital's Alphenix system features a range of advanced technologies that help operators deliver the best possible outcomes to patients. "I would confidently recommend Canon interventional systems to any site looking to grow their interventional cardiology service, most importantly because they are the most reliable systems I have used."

Dr. Sanjeevan Pasupati,  
Waikato Hospital in Hamilton, New Zealand



**You really can push the boundaries with the right Cath Lab and echo imaging.**

**Dynamic Device Stabilizer (DDS) for real-time AI-assisted stent imaging**

“Dynamic Device Stabiliser technology has been a great addition to our department. Using deep learning it automatically detects balloon markers in real time, without any manual input,” claims Dr. Pasupati. “Once detected the markers are held stable and surrounding structures such as stents are magnified and enhanced to allow easier assessment of device placement and deployment.”

DDS, powered by Altivity, utilises deep learning to automatically detect balloon markers within an image. Once activated, DDS functions in an “always on” capacity and will detect and enhance any fluoroscopy or acquisition images when balloon markers are detected.

“DDS is a great compliment to my live fluoroscopy and digital acquisition,” Dr. Pasupati adds. DDS uses AI intelligence to give live stent enhanced images. Image quality lies between digital acquisition and stent enhanced (boost). This is obtained with radiation similar to live fluoroscopy with no processing delay which significantly improves workflow, accuracy and radiation.”

**Echo fusion technology**

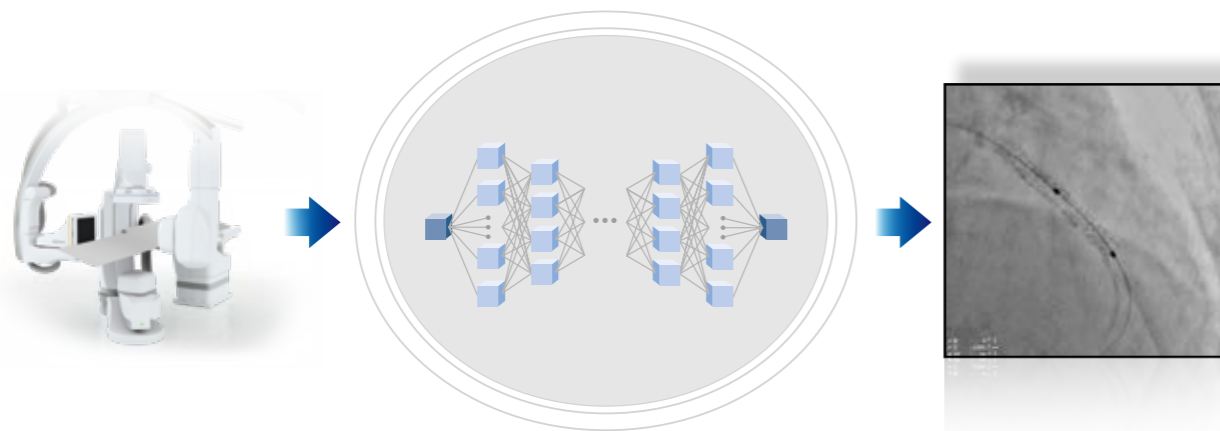
“The latest addition in advanced technology is to bring live echo fusion to the Cath Lab. Canon uses AI technology to automatically track the echo probe to maintain the accuracy of the fused images on the screen. This means we can better concentrate on the case without spending time to highlight the probe position with the orthogonal fluoro imaging. It also gives us more confidence knowing there is a higher degree of accuracy of the fused images because of the continuous re-registration when the c-arm is moved. This is a unique feature for Canon advancing in this space.”

- DDS uses deep learning to display stable stent-enhanced images that support decision-making in treatment.
- DDS provides live enhanced images not only in DA, but also in fluoroscopy to support treatment while reducing radiation exposure.
- An automatic display function offers seamlessly enhanced images for smoother procedures.

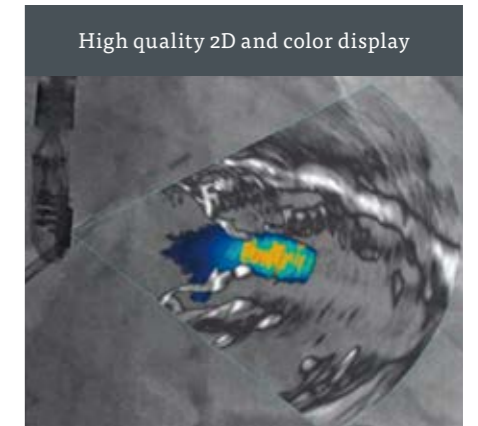


powered by **Altivity**

**Dynamic Device Stabilizer**



\*: Dynamic Device Stabilizer is an option of Angio Workstation. Angio Workstation contains the technologies that are powered by AI. The AI technology was trained during the development phase. When implemented into the product, the AI function no longer self-learns.



Canon's Echo Fusion, powered by Altivity, uses deep learning for automatic probe detection within 5 seconds of pressing the fluoro pedal. The system operates as a function within the AlphaWorkstation and provides a 3D roadmap of the TEE overlaying live fluoroscopy. The marker and color Doppler are also displayed in parallel to the main image display. AI is used for automatic detection of the probe position, reducing the number of workflow steps and increasing examination speed.

**High-Definition (Hi-Def) imaging – successful magnification for bypass patients**

Canon's High-Definition imaging is a valuable tool when performing interventions on patients who have previously had bypass surgery. With additional metal on the chest wall, stent enhancing technologies are unable to segment the stent. Most detectors work on 150-200 micron pixels but the High-Def panel reduces the pixel size to 76 microns to minimize distortion when images are optically magnified. This allows stents to be better visualized when traditional enhancers or boosts fail. “This is great

when I need to check if a stent is adequately expanded or when I am trying to cross through a side hole when intravascular imaging can't be used or not available.” Alphenix interventional systems feature the world's first high-definition detector within the 30 x 40 cm detector panel. The high-definition part displays at 76-micron pixel imaging modes. At more than twice the spatial resolution of conventional flat panel detectors (FPD), the unique Hi-Def imaging mode allows you to effortlessly zoom up to 4 cm (1.5”) without losing image quality. This helps clinicians visualize fine details





and anatomical structures and deploy devices with accuracy and confidence. While Waikato Hospital doesn't perform paediatric structural heart procedures, Dr. Pasupati comments that Hi-Def imaging would be an asset to sites with paediatric service, as it would help visualize and position the smaller paediatric devices without increasing total procedural dose.



### I'm a control freak and Alphenix gives me greater control and flexibility.

"The tableside tablet is a game changer in the Canon lab that significantly improves workflow," Dr. Pasupati assures us. "I've configured it to what I like for diagnostic, interventional and structural procedures everything I need is in front of me with a click of a button." Cardiac Cath Labs often operate with skeleton staff and the radiographers are often busy. So having easy access to all necessary functionality I need improves the workflow and helps complete cases faster. "The Alphenix systems have great flexibility to support me in complex cardiology procedures. With resource restriction it's becoming imperative to be autonomous to manage the Cath Lab functions by the operator," he continues.

"Canon have been the pioneers with detectors moving fingertip to fingertip and head to toe without any table movement. The detectors remain self-aligned to the patient independent of C-arm movement. This improves the work flow with safe radial and other peripheral access. This is extremely valuable for supporting safe radial access. I'm a control freak and I like to control things myself. The Alphenix's flexibility and range of patient access allows me to stay focused on the patient." There is an increasing need for structural procedures to be performed under anaesthesia with or without TOE guidance. The Alphenix allows us to position the C-arm offset at 45 degrees

to the table, providing enough space for the echo system and giving the ICU and anaesthetic teams with keeping better visibility and communication between the teams. "Most Cath Labs use the 20 cm x 20 cm panels for coronary interventions. With the growth of the structural interventions performed in the same lab, the detectors have increased to 30 cm x 40 cm which can be bulky for day-to-day coronary use. Canon has a 30 cm x 30 cm detector which is a great compromise for both coronary and structural procedures. Canon also has one of the slimmest detector housing which eliminates the bulkiness and provides a greater field of view when needed.

**The 30 x 30 cm detector configuration means our lab is truly multi-purpose; well suited for structural and interventional procedures.**

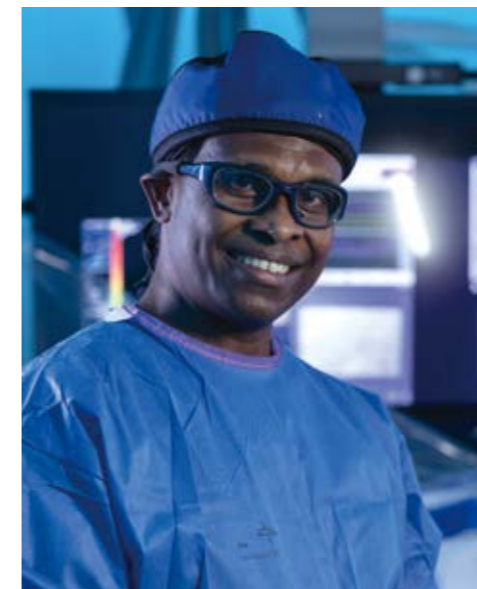
*Dr. Sanjeevan Pasupati,  
Director of Structural Heart Disease & Cardiovascular Research,  
Waikato Hospital, Hamilton, New Zealand*



The 30 x 30 cm configuration is a perfect balance and means that our lab is truly multi-purpose; well suited for structural and interventional procedures." The automatic cine replay function and additional reference monitor are extremely useful, particularly for structural work. "We utilise it almost daily for TAVI procedures," he says. "When we are deploying a valve, I have one

hand holding the valve and if you need to let go to access your previous run, the valve may move. On the Alphenix I don't need to do anything; I can always visualize the last view on my second screen. This is a superior feature of the Alphenix, one that helps with clinical confidence and workflow in complex cases." During deployment of Evolut core valves, Dr. Pasupati now does what is

called a cusp overlap technique, which involves a deep RAO caudal view. His team then rechecks the valve at the other end with an LAO projection. Having an additional reference monitor allows them to store and access both images, which makes life much easier.



**"The Alphenix is the most reliable interventional cardiology system. I have worked with."**

*Dr. Sanjeevan Pasupati,  
Director of Structural Heart Disease & Cardiovascular Research,  
Waikato Hospital, Hamilton, New Zealand*

**With more complex cases being treated in the cath-lab, DTS is a critical tool for operators to ensure that long cases are safe for patients.**

"With more complex cases being treated in the Cath Lab, Canon's Dose Tracking System is a critical tool to help ensure that long cases are safe for the patient. It is extremely valuable in long procedures like mitral clip implantation, CTO procedures and complex multivessel PCI. These procedures require a lot of fluoroscopy, it is common to remain in the same view for an extended period of time and they can involve high radiation

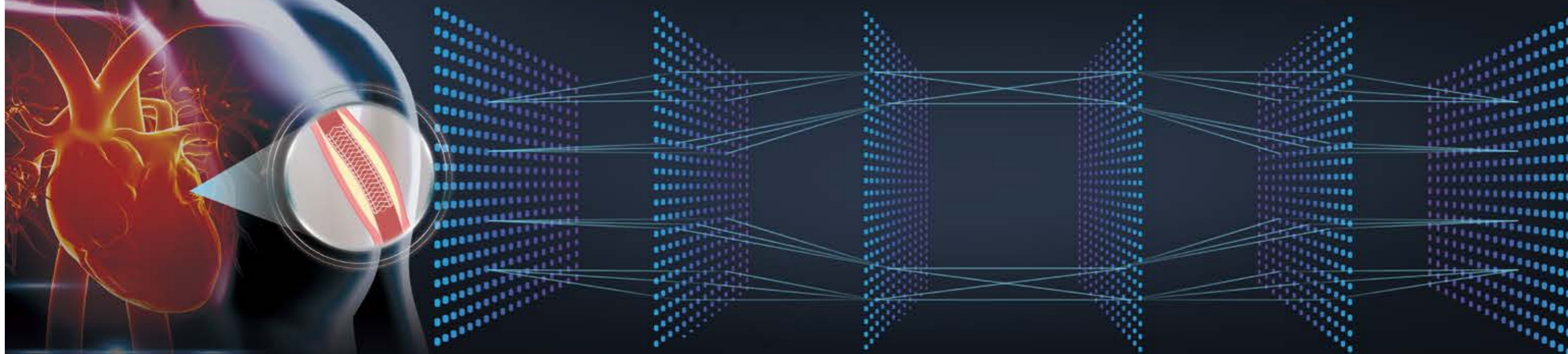
doses. As an operator you are very focused on the patient and the case and the real time patient dose feedback that DTS provides becomes critical. It provides alerts and allows me to modify my approach to ensure that dose thresholds are not exceeded and helps minimise the patient's risk of radiation injuries." "Cardiac catheterization labs need to be reliable and the Alphenix is the most reliable interventional cardiology system I have worked with," claims Dr. Pasupati. "Canon provide the best service and support in New Zealand. Downtime on our Alphenix interventional systems is minimal and Canon take a pro-active approach to ensuring that we are well supported."

"We are now on the 3rd generation of Canon Cath Labs at Waikato Hospital, and the latest image quality, workflow and range of advanced technology along with their impressive service made it an easy choice for us." //



## Accurate Stenting with Dynamic Device Stabilizer (DDS)

Interventional Cardiologists face challenges with stent visualization, device positioning and expansion. DDS utilizes Deep Learning\* to automatically detect balloon markers in real-time, magnifying and stabilizing the image on a separate screen to assist visualization and assessment. Structures like stents that surround the balloon markers can be accurately evaluated for precise placement and deployment.



\*: DDS is not provided with a self-Learning function that allows Alphenix to modify its own programs. Therefore, training of the DDS algorithm is not performed at the end user's site.



# Alphenix – the Perfect Combination of Flexibility, Workflow, and Image Quality:

## First class features, for a first-class cardiac system

Nadeem Mughal

The cardiac catheterisation labs at Royal North Shore hospital in Sydney, Australia provide interventional cardiology services to both the Royal North Shore public and private hospitals. The labs perform coronary angiography, PCI, infarct angioplasty, electro-physiology studies and support the hospitals expanding structural heart program. The department has a 30-year relationship with Canon Medical and currently has two Alphenix interventional cardiology systems, one installed in 2019 and the second in early 2023.

“We’re a busy department and so it’s important that we have a system with great workflow and flexibility – to help us complete procedures faster”, states Nadeem Mughal, the senior radiographer in charge of the Cath Labs. “We also need to ensure that our interventional systems are easy to

use and easy to train new cardiologists and radiographers.”

I like working with Canon interventional systems because they are easy to use, intuitive and can be configured to suit our department’s needs. The Alphenix’s hyper-handle



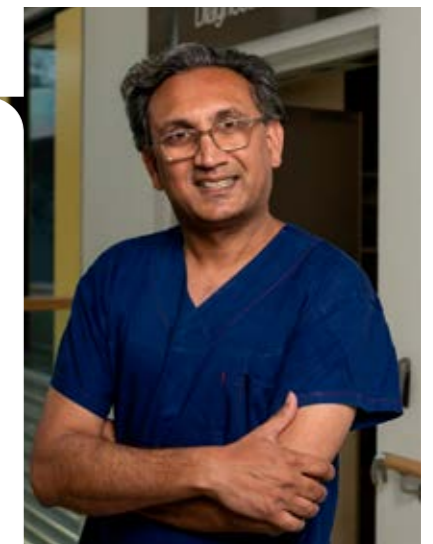
system is a great addition to our departments workflow. I love how I can configure it to have all the functionality I need right at my fingertips. I can control the lights, the playback runs, map images, fluoro controls all with one hand. Easy, one-handed access to all the functionality I require means that there is always one hand available to support the patient. It is also important for our cardiologists, as it means they can always maintain control of their catheter. This is essential at critical parts of a procedure, for example when they are about to deploy a stent or have just crossed a lesion in a chronic total occlusion case.

The system’s tableside tablet is also fully configurable and provides access to all the system’s features at the tableside. It provides seamless workflow and gives greater control and flexibility.

One of the biggest advantages of the Alphenix and one of my personal favorites is the cine automatic replay function. With the type of interventional work we perform, particularly infarct angioplasty, it is critical to have quick and easy access to visualize your last run, pause it and go through frame-by-frame. Having your last run play and pause in real time, parallel to live fluoro is a feature we rely on, and it gives the team a much better understanding of the stenosis and the interventional progress. It also allows other consultants to review previous runs from within the control room without interrupting the live fluoro of the primary operator and give any advice if needed. It’s a first-class feature for a first-class machine, our cardiologists love it and wouldn’t live without it. One of the biggest advantages of the Alphenix is the automatic continuous instant replay function. It allows you to view fluoro and a live replay on your reference screen simultaneously – giving the team a much better understanding of the stenosis and intervention progress

“One of the biggest advantages of the Alphenix is the automatic continuous instant replay function.”

Nadeem Mughal,  
Royal North Shore Hospital, Sydney, Australia.





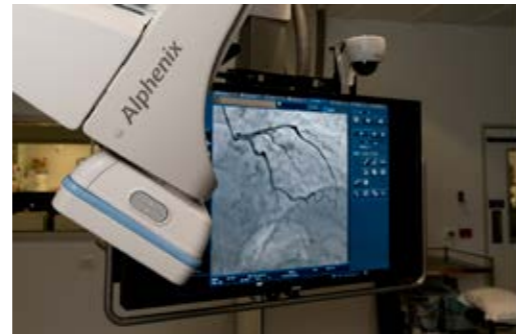
The Canon interventional systems C-arm movements are extremely flexible. The lateral and fingertip to fingertip coverage allows us to perform radial, femoral or carotid procedures seamlessly without moving the patient or pivoting the table, greatly improving our workflow.

Being able to move the C-arm completely to the side when treating an intubated patient means the ICU and anesthetic teams have un-interrupted access to the patient airway, a feature we all love.

*“The Alphenix produces high quality imaging that provides us with the confidence to perform complex cardiology procedures”*

*Nadeem Mughal,  
Royal North Shore Hospital, Sydney, Australia.*

The Alphenix's high quality imaging provides us with the confidence to perform complex cardiology procedures with ease. The fluoroscopy image quality is clear and allows us to visualize what we need across the wide variety of patients we see and procedures we perform.



### Personalised service important in providing critical cardiology services

#### Sometimes we have a cardiac patient on the table, and I need answers fast

In a busy cardiac Cath Lab providing elective and emergency procedures, it is important that if we experience an issue with our system that we get an accurate indication of when

the system will be fixed, and that any downtime is kept to a minimum. I have always been impressed by Canon's rapid response times.

With Canon's direct connect service option I can ring their engineers directly and explain the issue over the phone. This eliminates the need to go through a call center – which is extremely beneficial in the middle of breakdown. To be able

to directly connect allows me to troubleshoot with an expert and someone who knows my site, system and staff, immediately. Sometimes we have a patient on the table, and I need answers fast – speaking directly to an engineer helps ensure that we can find a solution as soon as possible.

A strength of the Canon team is their effective and professional communication, but at the same time we feel like we are dealing with friends rather than a large corporation

I consider the Canon engineers a part of our Cath Lab team. They are professional, pro-active and I have been impressed that they will visit



Nadeem and Steve Weston - Customer Service Manager, Canon Medical Systems ANZ

the department regularly. This pro-active approach means that potential problems can be identified early. On a recent visit, one of the Canon engineers noticed a humming from our system, he was able to immediately locate and order a new x-ray tube from a local warehouse and have it replaced that day, after hours. This meant that there was no impact to our service and our ability to provide care to our patients.

Royal North Shore Hospital have recently installed their second Alphenix Core+ cardiac interventional system and have been impressed with the support they have received from the entire Canon project team. Nadeem commented that both the hospitals Canon systems were installed in record time.

With a growing structural heart program and increasing demand for cardiac labs to perform complex procedures on high-risk patients, Nadeem is looking forward to the department benefitting from the advanced technologies of

the new Alphenix such as Spot ROI and the image quality improvements from the new dedicated cardiac tube. //





# Enhancing Visualization in Interventional Procedures Using Alphenix High-Definition (Hi-Def) Technology

Since its introduction in late 2018, Canon's Alphenix Hi-Def Detector – the world's first true Hi-Def detector for all X-ray guided therapies – has been integrated into clinical practices in many centers across the world. Dr. Barry Bertolet, an interventional cardiologist at North Mississippi Medical Center in Tupelo, Mississippi, USA, describes the benefits that Hi-Def imaging has made at the largest rural hospital in the USA, aiding not only in diagnosis, but also performing interventions across a wide spectrum of cardiovascular diseases.

The North Mississippi Medical Center is a 640-bed regional referral center in Tupelo, MS, USA. The hospital is the largest private not-for-profit hospital in Mississippi and the largest non-metropolitan hospital in America. It serves almost 730,000 people from 24 counties in North Mississippi, Northwest Alabama and parts of Tennessee. The North Mississippi Medical Center is also a two-time U.S. Congress Baldrige Award Winner and an IBM Watson Top 50 CardioVascular Hospital. However, Mississippi faces a common public health problem: it has one of the largest obese populations in USA, and the disease states associated with obesity – such as diabetes, hypertension, and dyslipidemia – have a high prevalence. Acquiring an Alphenix system with Hi-Def Detector in 2022 has enabled North Mississippi Medical Center to enhance the delivery of care to this high-risk patient population.

“Being able to see what you're doing in the Cath Lab is key for diagnosis and optimal delivery of therapy, and that ends up being the beauty of Hi-Def,” said Dr. Bertolet. “Canon's Hi-Def imaging modality allows us to now zoom the image up to 1.5 inches at a 76-micron resolution, without losing image quality. This helps us look at the fine details, visualize anatomic structures, and deploy devices in precise location with extra confidence.” “There are a wide variety of cases in which I've used the Hi-Def and it has helped me in my clinical practice,” he continued.

Canon invented the world's first Hi-Def detector – offering more than twice the spatial resolution of conventional flat panel detectors (FPD) – for resolving fine anatomical and device details. This unique hybrid 12" × 12" or 12" × 16" FPD combines Hi-Def imaging technology based on crystalline silicon that boosts spatial resolution up to 6.6 line pairs per millimeter (lp/mm) with 76 micron pixels (Figure 1). With the Hi-Def detector, Alphenix system offers six standard modes with 16", 12", 8", 6", 4.3" or 3.3" fields of view (FOV) and three Hi-Def modes with 3", 2.3" or 1.5" FOV, allowing

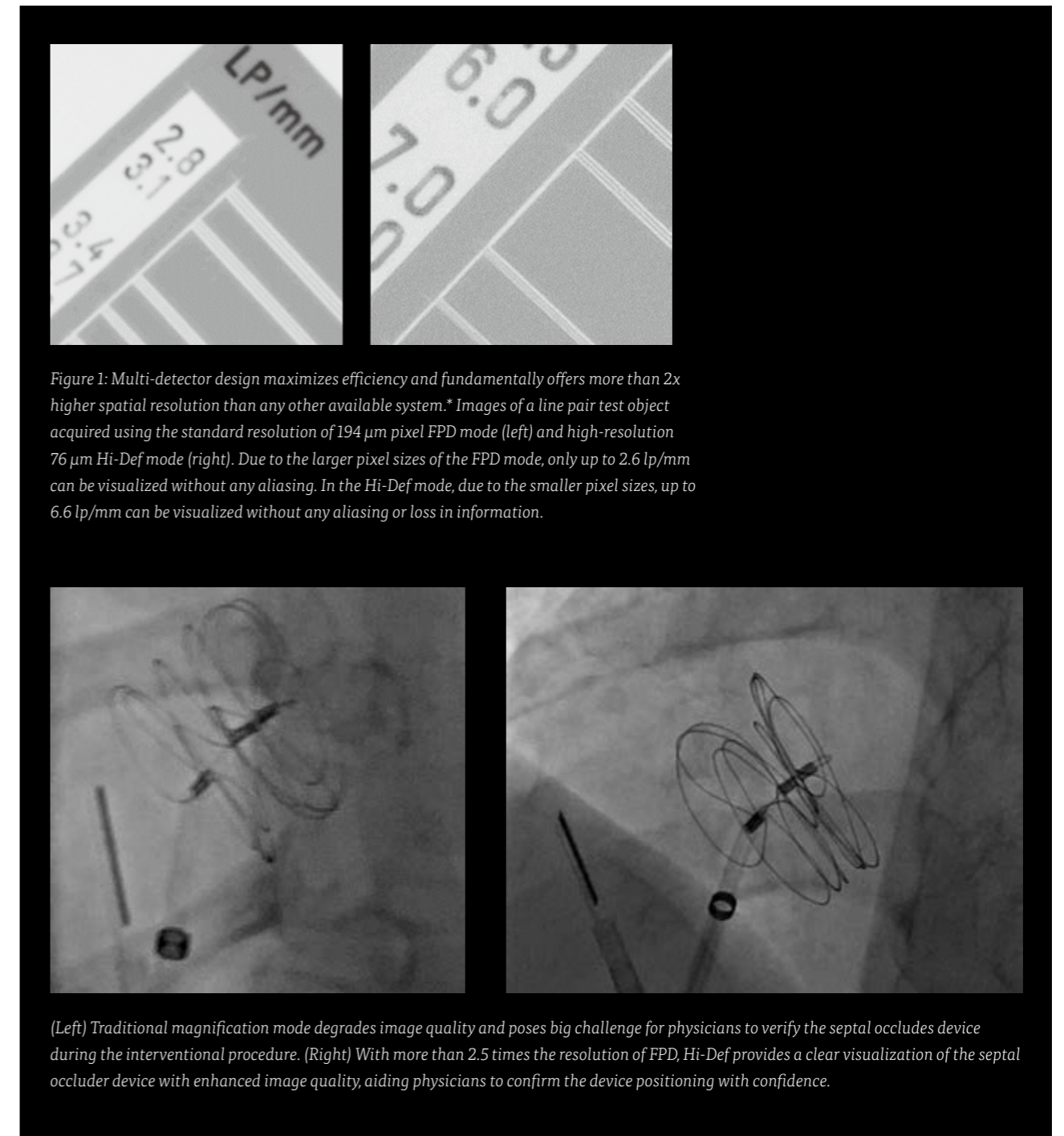
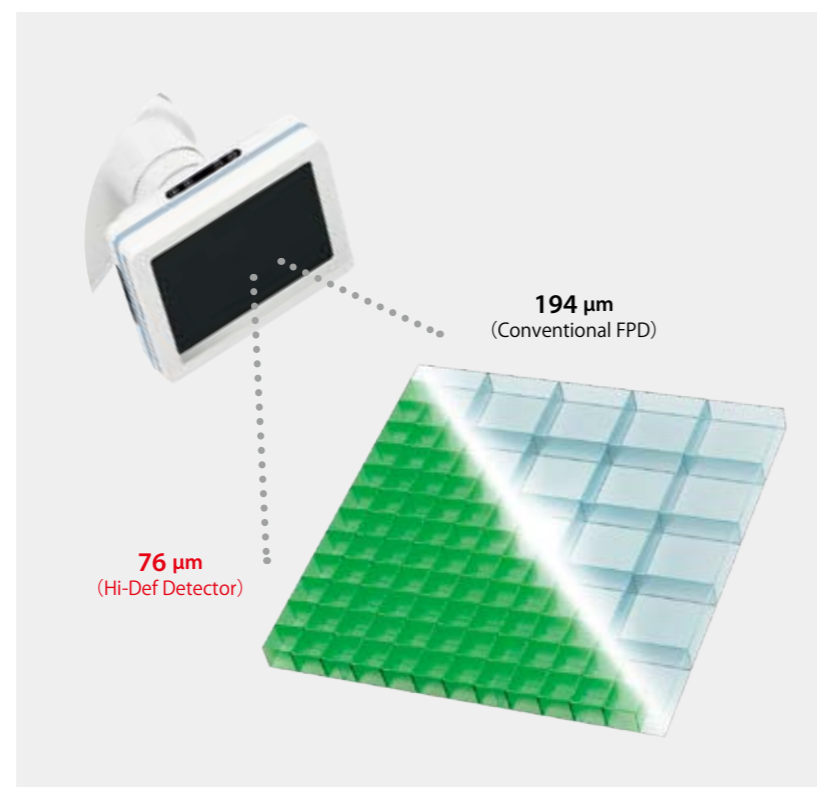


Figure 1: Multi-detector design maximizes efficiency and fundamentally offers more than 2x higher spatial resolution than any other available system.\* Images of a line pair test object acquired using the standard resolution of 194  $\mu\text{m}$  pixel FPD mode (left) and high-resolution 76  $\mu\text{m}$  Hi-Def mode (right). Due to the larger pixel sizes of the FPD mode, only up to 2.6 lp/mm can be visualized without any aliasing. In the Hi-Def mode, due to the smaller pixel sizes, up to 6.6 lp/mm can be visualized without any aliasing or loss in information.

(Left) Traditional magnification mode degrades image quality and poses big challenge for physicians to verify the septal occluder device during the interventional procedure. (Right) With more than 2.5 times the resolution of FPD, Hi-Def provides a clear visualization of the septal occluder device with enhanced image quality, aiding physicians to confirm the device positioning with confidence.

increased spatial resolution without interruption of procedure workflow. At any given point in time, both modes are available, and when needed, the selection between the two modes can be quickly changed using an FOV switch, without adding additional delay to the procedure.

## Confirm with confidence

“In this very nice example of septal occluder case, Hi-Def makes a big difference. With the Gore® Cardioform Device, the FDA recommends fluoroscopic evaluation to ensure that the locking the loop is complete. If the locking the loop does not go through

the eyelets, then you need to remove it at that time. The Hi-Def view enables me to confirm with confidence that the lock loop has gone through, and it captured all the eyelets before releasing the occluder. The details in the Hi-Def image are superior to those captured under traditional magnification” (Figure 1)

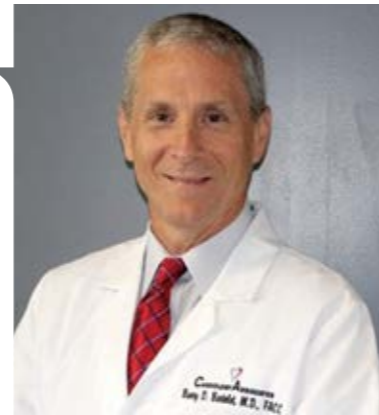
## Evaluate stent structure

Stent fracture is associated with restenosis, thrombosis, ischemic events, and need for target lesion revascularization. “Most relevant studies that are available today still say that we ought to utilize fluoroscopy to evaluate stent fracture,



**“Being able to use Hi-Def to accurately deploy cardiovascular devices adds to the proceduralist’s confidence and is a huge in achieving a successful result and better patient outcome.”**

Dr. Barry Bertolet, Director of the Cardiac Catheterization Lab at the North Mississippi Medical Center in Tupelo, Mississippi, USA.



with or without contrast. In order to determine if there’s evidence of stent fracture, and in fact, based on the fracture pattern, there are different stages of the fracture that can be determined by this fluoroscopic imaging.” Dr. Bertolet explained while pointing on the Figure 2 “In this case, when I go into the hi-def mode, I can visualize where we have done the metal bypass, and where there is in-stent restenosis. More importantly, I can actually see almost where these stents overlap under Hi-Def mode and there’s a large area of overlap where

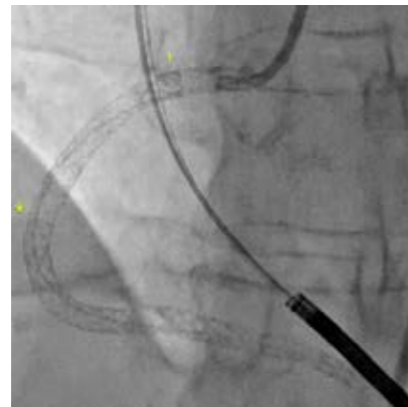


Figure 2: Overlapping stents (+) and stent fracture (\*) under Hi-Def mode.

I can’t see the stent struts as well (asterisk in Figure 2). This is suggestive of a Type 1 stent fracture in this particular zone as a cause of the in-stent restenosis in this area, which helped us then determine the method of therapy that I needed to deliver to this area.”

**Avoid complications**

“Another thing that I think that Hi-Def can really help with in interventional cardiology is placement of devices to avoid complications.” commented by Dr. Bertolet. When treating in-stent restenosis with Plain Old Balloon Angioplasty (POBA), one of the limitations is edge-related complications with balloon dilation outside the stent that leads to edge dissections and suboptimal outcomes. “In this case, there was a mid left anterior descending in-stent restenosis lesion in a tough area to see. To avoid complications of edge dissection, I was able to place the markers of the balloon within the stent by using Hi-Def mode and had a controlled inflation under Hi-Def (Figure 3). This could be very important if we move to use drug-eluting balloons for coronary in-stent restenosis, which hopefully will come soon.”

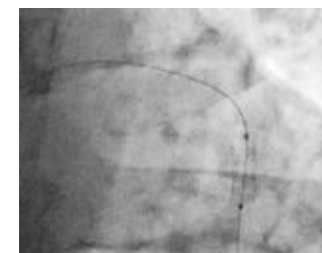


Figure 3: Hi-Def mode assists operators to precisely place the PTCA balloon and avoid the risk of dissection.

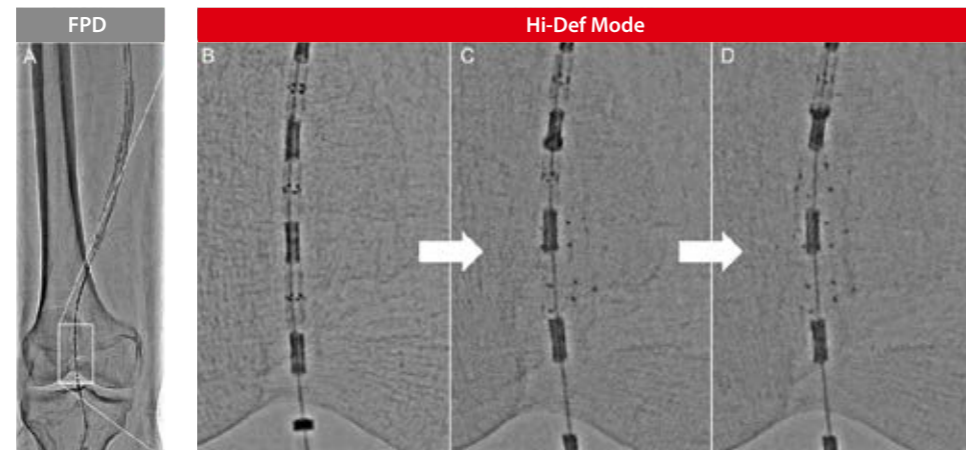


Figure 4: Changing from the FPD mode (A) to Hi-Def mode is seamless with an FOV switch button. Hi-Def can be used to improve real time visualization of stent structure (B-D) during complex peripheral arterial interventions.

**Complex Peripheral Arterial Intervention**

In addition to interventional cardiology cases, Dr. Bertolet also performed peripheral arterial interventions under Hi-Def imaging. When using the TACK Endovascular System, a minimal-metal dissection repair device purposely built for precision treatment of post- PTA peripheral arterial dissections, Dr. Bertolet finds conventional fluoroscopy poses big challenge in visualizing the TACK scaffolds. “With Hi-Def, I can actually see individual TACK scaffolds (Figure 4). Not only I can see them much more clearly, but also see precisely how to deploy them. Being able to see the deployment and accurately place these devices where we want them under Hi-Def is a huge advantage in the specialists’ confidence in achieving a successful result and better patient outcome.” said Dr. Bertolet.

In another peripheral arterial intervention case, Dr. Bertolet successfully resolved complication with Hi-Def. “This is another leg case that I did that ended up with an occlusive dissection of the popliteal blood vessel and some reconstituted flow very distally. In Hi-Def mode, the end of the tape can be seen. I was able to see where exactly to place my Supera™ stent and deploy it under Hi-Def. Precisely placing this stent allowed me to ensure that I covered the zone of dissection and provided the appropriate therapy for the patient.” (Figure 5)

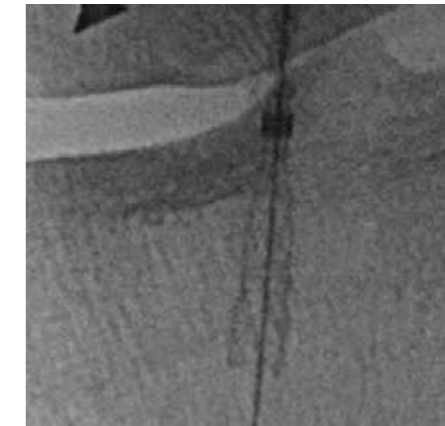


Figure 5: Precisely placing the stent under Hi-Def mode allowed the operator to ensure the zone of dissection is covered along the popliteal artery.

**Diagnosis of Small Vessel Disease**

Thromboangiitis obliterans (Buerger’s Disease) is caused by small blood vessels that become inflamed and swollen – usually as an adverse reaction to tobacco. The blood vessels then narrow or get blocked by blood clots (thrombosis). Blood vessels of the hands and feet are mostly affected. “Seeing what you need to, particularly in the small vessels can be a big advantage in diagnosis.” Dr. Bertolet shared his experience of using Hi-Def to diagnose small vessel disease. “This gentleman was suspected to have Buerger’s Disease. We wanted to do an angiogram in order to help us make that diagnosis. With hi-def mode we could detect the corkscrew appearance of the vessels that is classic in Thromboangiitis obliterans (Figure 6). It really helped in this gentleman to have a clearer angiographic diagnosis of Buerger Disease.”

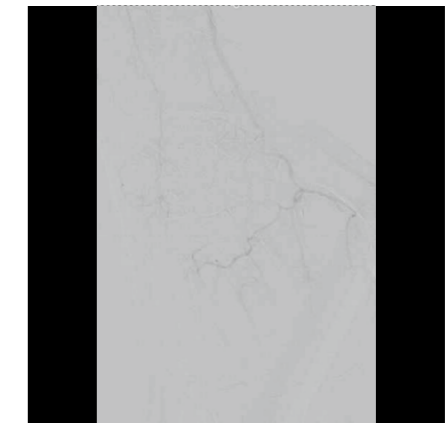


Figure 6: Corkscrew appearance of thromboangiitis obliterans (Buerger Disease) is revealed under Hi-Def mode.

**Hi-Def: A Helpful Tool In The Cath Lab**

Dr. Bertolet stated, “I have found hi-def imaging extremely helpful in a variety of Cath Lab Imaging cases. “These examples show that the modality has been useful not only in achieving proper diagnosis, such as for coronary dissection, and small vessel disease like Buerger disease, but also to help with successful Interventions in a variety of cases right across the cardiovascular spectrum.” //

The clinical results, performance and views described in this case study are the experience of the clinician. Results may vary due to clinical setting, patient presentation and other factors. Many factors could cause the actual results and performance of Canon’s product to be materially different from any of the aforementioned.



Professor Ziyad M. Hijazi is Chief Medical Officer and Chair of the Department of Cardiovascular Diseases at Sidra Medicine, a women's and children's hospital in Doha, Qatar. Prof. Hijazi is also the Chief of International Patient Services at hospital as well as a Professor of Pediatrics and Medicine at Weill Cornell Medicine, New York, USA.

## Assisting World Class Cardiology for Decades

With nearly 40 years of experience in Congenital Cardiology, Prof. Hijazi has pioneered several ground-breaking Interventional procedures in this field. He is one of the world's leading experts in the nonsurgical repair of congenital and structural heart defects in children and adults and the development of novel transcatheter devices. He has published more than 360 papers and nine books. He also runs many clinical trials related to novel technologies.

Professor Hijazi describes how Canon Medical and Toshiba Medical Systems before that, have provided exceptional performance for over 20 years, most recently through the Canon Alphenix Interventional Cardiology System.

### Support for pioneering breakthroughs

Professor Hijazi's history with Canon stretches back many years to the Year 2000, when he was at the University of Chicago in Chicago, USA. By this time, Prof. Hijazi had already pioneered several 'world firsts' in Cardiac Interventional Cardiology. In 1993, he performed the first multiple coil closure of patient ductus arteriosus (PDA). In 1997, he was the first in the USA to use the Amplatzer device to close atrial septal defects (ASDs) and in

2000, he first outlined how intra-cardiac echocardiology can be used to assist in guiding transcatheter closure of ASDs and patent foramen ovale (PFO in children and adults).

"I moved to Chicago from Boston, where there was a Infinix-i system from Toshiba Medical Systems, which is now Canon Medical Systems. I liked this system very much, so, I wanted the same one for the new lab at the University of Chicago," he said. "We installed a Infinix-i, and I used it for





### Better in many clinical scenarios

Prof. Hijazi moved from Chicago to Sidra Medicine in Doha, Qatar in 2014. Prof. Hijazi opted to install the Canon Interventional Cardiology system – the Alphenix in the hospital's Heart Center, which was established under his guidance.

“When I came here, they had installed different systems, but the features of the lab were not the ones that I am used to, specifically the radiation dose,” he said. “We are dealing with children, so, radiation dose is extremely important for us. And I was not happy with the lack of movement in the lateral camera on the previous system. When it came time to invest in a new lab, we acquired a Canon Alphenix, which we are very happy with, particularly the image quality, the resolution, radiation dose and lateral camera mobility.”

“There are many clinical scenarios in which we believe the Alphenix has an edge over other systems,” he continued. “Within the context of the children, my goal is to image the child's heart with the least amount of radiation dose possible. We conducted our own study to compare radiation between systems and we found that the Alphenix works with the lowest dose possible. Secondly, the system's 3D Angiography is fantastic. It allows us to perform 3D Angiography and reconstruction in a few seconds. This allows our decisions to be made in a few minutes and we don't have to wait for reconstruction. The Alphenix is also a more user-friendly system that anybody can learn to use.”

### Significant ergonomic advantages

The physical versatility of the Alphenix supports optimal ergonomics for specialist, support staff and patients.

“The location of the system, where I stand with the patient, and where the monitors are for viewing is very important to me. With the Alphenix,

several years. It was great in terms of the mobility of the Cath Lab, the image quality, and the radiation dose.”

Within this time, Prof. Hijazi became the first in the USA to perform percutaneous valve implantation for patients with defective pulmonary valves, using the Edwards SAPIEN valve (2005). He was also the first in the country, to perform periventricular pulmonary bypass (2008).

### Exceptional visibility

In 2007, Prof. Hijazi moved to Rush University in Chicago. At that time, the Institution had another Interventional system, which was not from Toshiba Medical.

“It was a great machine, but I was not happy with the features of the

lab itself,” remarked Prof. Hijazi. “For example, I was not able to raise the lateral camera up and down without touching the table. This is a very important consideration for me because I am tall, and sometimes some of the other operators are not. I don't want to keep bracing the table up and down, I want to raise the lateral camera. That was a first priority. Secondly, moving the frontal camera from one angle to the other is also very important. For example, you need capability to move the frontal camera to work on the groin or the legs. The movement of other machines was not as simple and easy as the Infinix-i. So, when the time came for the University to buy a second machine, I requested the one from Toshiba Medical. We installed a Infinix-i lab, and I was very happy with it for many years. It was the first hybrid lab in the City of Chicago.”

I can flip the machine 180° and this allows me to work from the left side of the patient, and in front of me. The frontal camera can be moved to enable work all the way to the groin and legs. This is not possible with other machines. The lateral camera moves up and down. And to my knowledge, the Alphenix is the only machine in the industry to offer this possibility. As well as this, the screen is visible without having to turn because the machines don't move, or the monitors are fixed on one side. With the Alphenix system, you can move the monitors and that's a big plus for us. In addition, you can perform multiple measurements without having to exit the system.”

“The table is sturdy. About a year ago, I catheterized a patient who was 160 kilograms in weight and we performed the procedure without any problem,” he added. “The Alphenix's feature features are combined in a system that is versatile, user friendly, and simple to use.”



Sidra Medical and Research Center

### Service and support

Prof. Hijazi also considers service as a key feature in the effectiveness of the Alphenix system.

“Service from the engineers and communication from the system provider is incredibly important. My relationship with Canon Medical Systems is very good. We are always informed about what's coming up and what's new.

“Over the last 30+ years, I have used every system available, and have found Canon Medical System's advanced,

versatile and user friendly,” he concluded. “Many Cath Lab directors in the region and outside call me and ask what to buy. I tell them that it is vital to visit other Cath Labs and experience the system features themselves. However, I also tell them that they should certainly consider Canon's Alphenix, because it has the lowest radiation, most robust table, and is the only system that has the up and down lateral camera movement. We've been so happy with the Canon system that our second Cath Lab is being installed as we speak!” //







## Support Structural Heart Disease (SHD) treatment with Echo Fusion



Complexity in Structural Heart Disease is increasing, with new procedures requiring accuracy and efficiency. With intelligent Deep Learning\* technology, Echo Fusion automatically identifies the echocardiography probe and fuses the fluoroscopic image without additional operator input. This auto-registration streamlines workflow, reducing procedure time and improving operator confidence - eliminating the need for orthogonal projections for fusion.

\*: Echo Fusion is not provided with a self-Learning function that allows Alphenix to modify its own programs. Therefore, training of the Echo Fusion algorithm is not performed at the end user's site.



# Vive La Resolution! HD 76-micron High-Definition (Hi-Def) Detector

As Interventional Cardiology becomes more complex, the need for better imaging capacities increases. Dr. Salman Arain, Associate Professor of Medicine at the University of Texas Health Sciences Center in the USA, explains how Canon's Alphenix Hi-Def Detector can provide solutions for better diagnosis, procedure planning and execution, troubleshooting in complex cases, and can even contribute to the development of new procedures.

## Meaningful Innovation Overcomes Challenges

"We operate within an increasingly complex world in the Cath Lab," remarked Dr. Arain. "Our target vessels are smaller. Interventions are more complicated and the tools that we are required to use have become more intricate. Angiography alone is limited in several ways to treat to treat these fairly complex lesion subsets."

"Some solutions have been proposed, but most of these lack real-time applicability, especially during the manipulation of

catheter, guidewires and devices," he continued. "However, higher resolution of the image improves vessel anatomy, leads to better procedure outcomes, and improves safety in the Lab."

To address these challenges, Canon Medical developed the Hi-Def imaging detector with a 76 micron pixel, high resolution imaging modes. In comparison, the standard flat panel detector (FPD) in conventional angiography systems is in the range of 150 - 200 micron pixel resolution. The Alphenix Hi-Def detector provides more than two times higher spatial

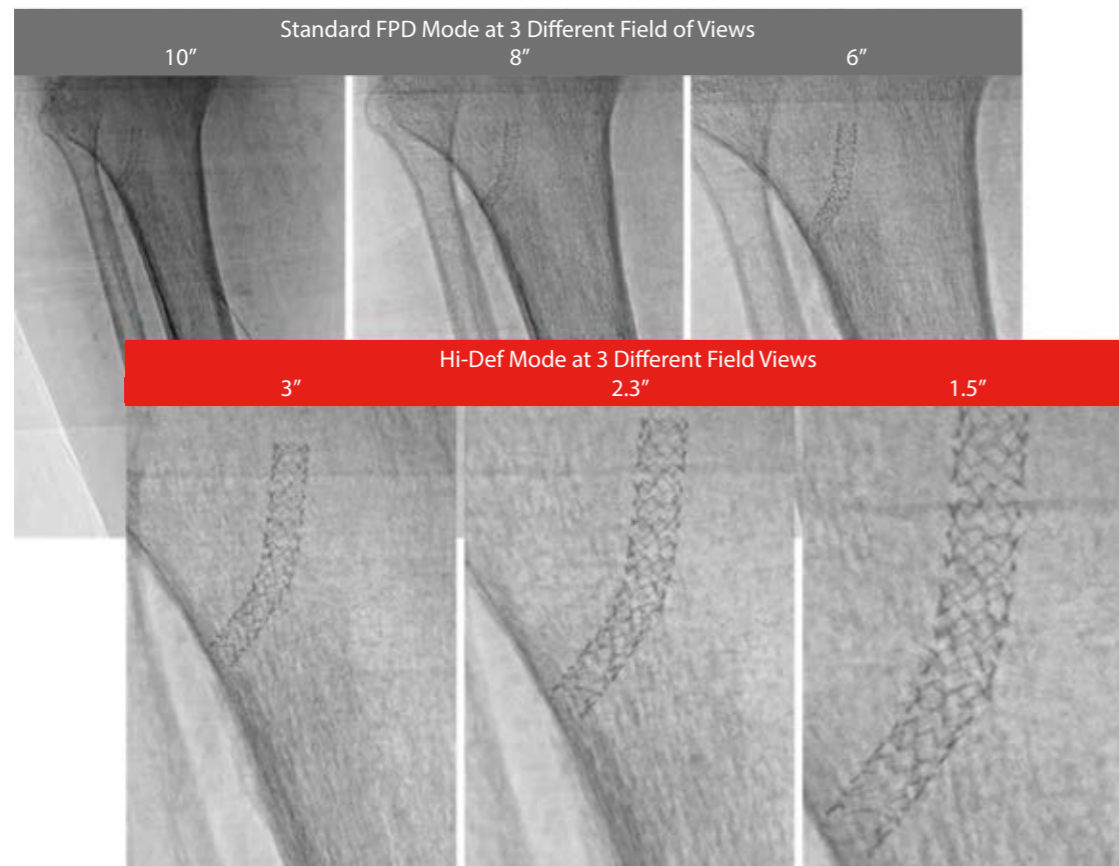


Figure 1: The unique Alphenix Hi-Def detector offers multiple standard modes at 16", 12", 10", 8" 6" and 4.3" FOVs and three additional Hi-Def modes with 3" 2.3" and 1.5" FOV, delivering increased spatial resolution without interruption of procedure workflow.

resolution than any other available system. Images can be zoomed up to 1.5 inches at 76-micron resolution without losing image quality, helping clinicians visualize fine details, anatomical structures and deploy devices with accuracy and confidence.

"With Hi-Def you can go into 3.0 inches, 2.3 inches and up to 1.5 inches field-of-views (FOVs) and with this you can actually see the different stent struts, for example" said Dr. Arain. "You simply push a button to get Hi-Def, and push a button to come off Hi-Def. It allows you to do diagnosis and better procedure planning, procedure execution, troubleshooting into complex cases, and even the development of new procedures," he added. "I have many examples of how successful Hi-Def has already been in my workflow."

## Diagnosis and Procedure Planning

"This is a 75-year-old patient presented with ischemia, in-stent re-stenosis and a non-ST Elevation MI. After multiple attempts and different guides, we could not get any guide to engage the RCA ostium. With the Hi-Def view, we could see what the problem really was - Not only does he have a stent with proximal under expansion, there is also a broken wire that is hanging out at the ostium. Apparently, he had an intervention done outside the hospital and no one told him, but the wire broke in place. In fact the wire was hanging in the aorta somewhere (Figure 2A)" explained Dr. Arain. "Under Hi-Def guidance, we passed the hydrophilic wire, and it went through the under expanded portion (Figure 2B). Once it passed through, I switched to lower resolution view in the FPD (Figure 2C). I didn't have to use a separate piece of equipment."

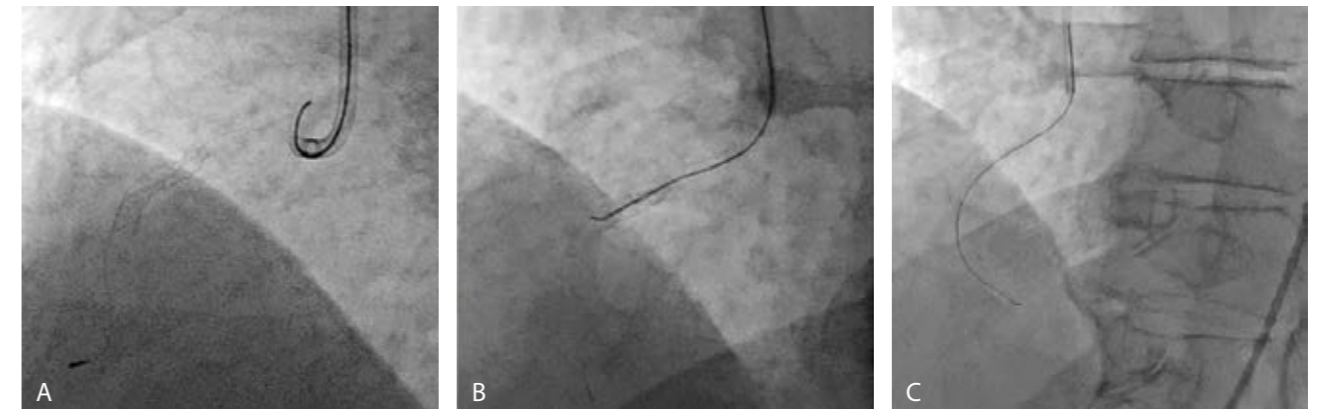


Figure 2: (A) Hi-Def mode reveals a broken wire and under expanded stent from a previous intervention that impedes the guide engagement at RCA ostium. (B) A hydrophilic wire successfully crosses the stent under Hi-def guidance. (C) Standard FPD FOV is switched from Hi-Def FOV once the wire crosses the under expanded stent to continue to intervention.

## Procedure Execution

"At the time of intervention, we switched to Hi-Def again. We completed this case by performing a high-pressure angioplasty and expanded the stent. We used the guide extender

and a second wire provided more stability. This was possible to do accurately, because of Hi-Def imaging. (Figure 3). Within the same case, we not only used Hi-Def to diagnose the problem, but also treat it in the most optimal way.

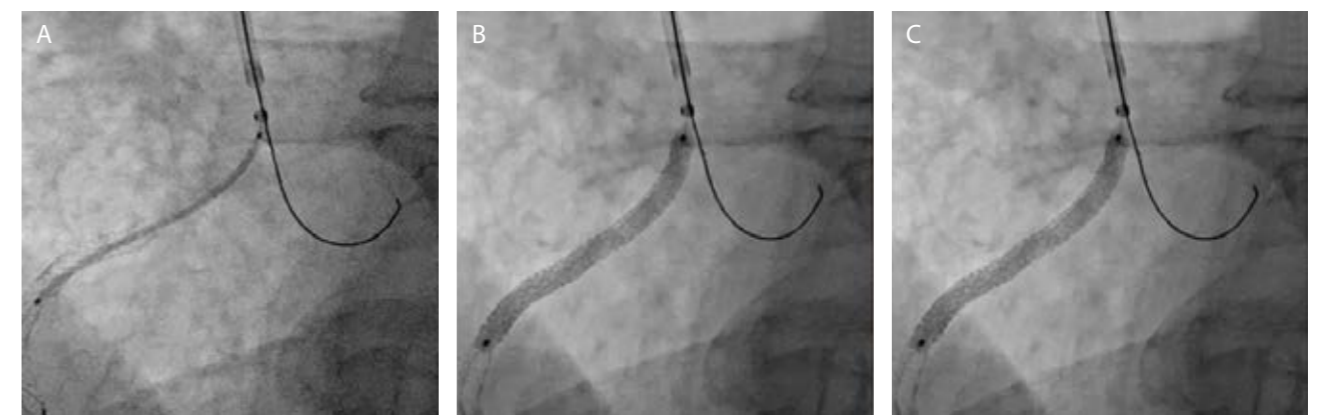


Figure 3: (A) Hi-Def is turned on during the intervention to position the stent for optimal outcome. (B) A stent is expanded by high pressure balloon under Hi-Def. (C) Switching from Hi-Def mode to standard FPD mode is done seamlessly to complete the procedure.



**Troubleshooting: The Microcatheter That Wouldn't Pass!**

"This issue with a microcatheter that just doesn't go forward comes up often when we are doing complex PCI or CTO" remarked Dr. Arain. "This patient has multiple stents, history of bypass, failed bypass, multiple CTOs and recurrent in-stent stenosis. We were able to get a wire across, but when we were trying to advance our microcatheter, it failed to cross. We switched to Hi-Def mode and found that the tip of the microcatheter was getting caught on the edge (Figure 4). We solved the problem by passing a 1.0 balloon then a 1.5 balloon angioplasty and smoothed out the transition (Figure4). After angioplasty, we took the same microcatheter

and it slipped across easily. (Figure 4) We then switched out to FPD mode with a wiggle wire, we could then identify the area that needs treatment and complete the intervention."

**Development of New Procedures**

"We have also seen some excellent use of Hi-Def in peripheral vasculature. Here, Hi-Def showed that the anterior tibial stent was fractured, but the stenosis was in the proximal edge. This case demonstrates that in you can use all of your other functions, such as digital subtraction and roadmap etc. while in the Hi-Def mode. (Figure 5)"

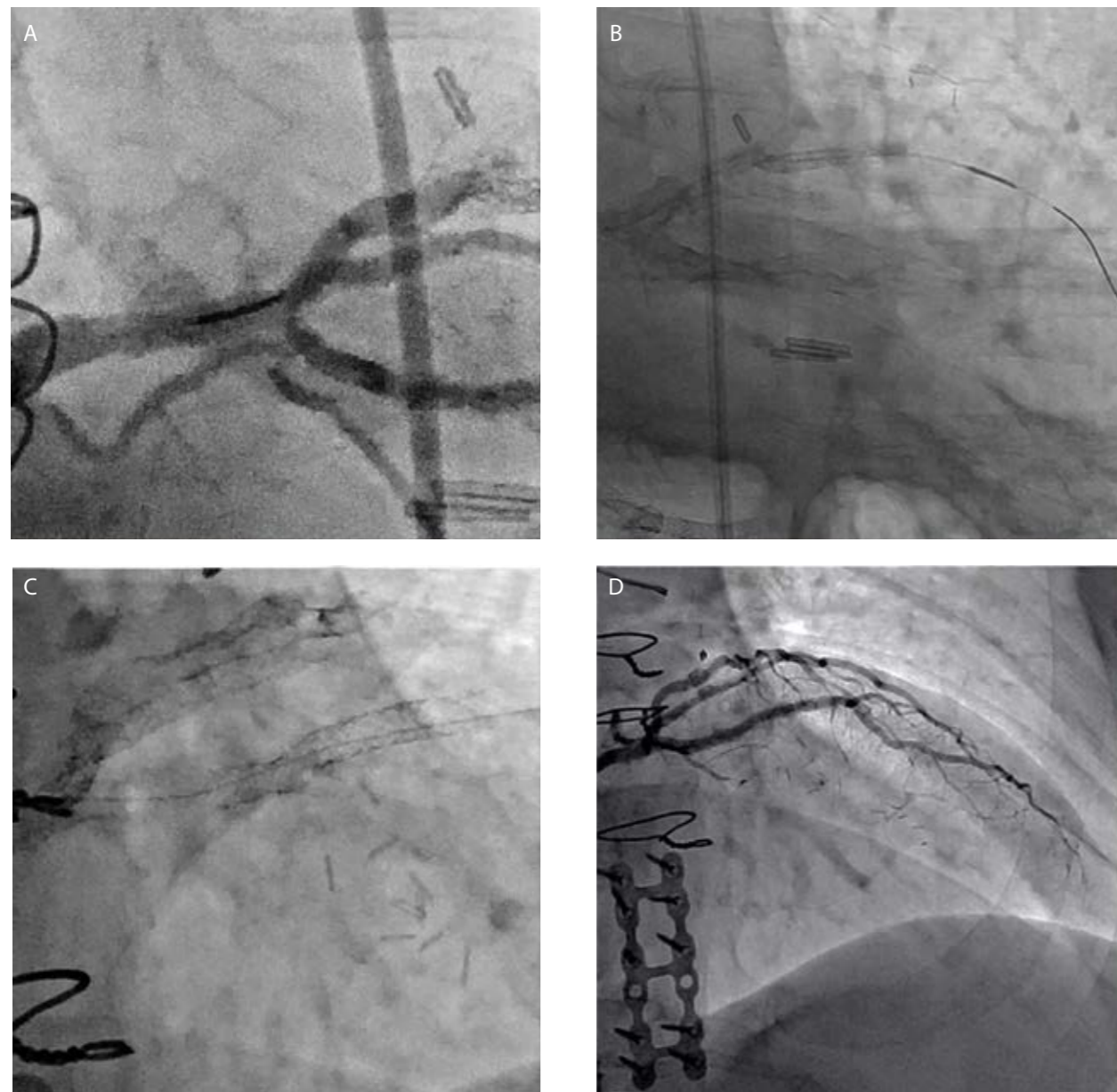


Figure 4: When a microcatheter was unable to advance, Hi-Def mode was switched on and it successfully revealed that the tip of the microcatheter was getting caught on the edge (A). Balloon angioplasty was performed resulted the same microcatheter to cross easily (B) in FPD mode. Switching back to Hi-Def when deploying overlapping stents (C). The patient underwent successful intervention as shown in standard FPD view (D)



*"Hi-Def allows me to do diagnosis and better procedure planning, procedure execution, troubleshooting into complex cases, and even the development of new procedures."*

Dr. Salman A. Arain, MD, FACC, FSCAI.  
Associate Professor of Medicine at the University of Texas Health Sciences Center in the USA



Figure 5: The 3" x 3" Hi-Def mode (B) showing complete fracture and avulsion of one of the previously placed stents which was not visible under the 12" x 12" FOV FPD mode (A). The Hi-Def mode was subsequently used to accurately size and precisely deploy a stent across the stenosis within the popliteal artery (C, D).

"We have worked on many hands over the past two years. Patients often present with scleroderma. A lot of them have small vessel disease at the level of the ulnar, or the palmar arches and sometimes in the digits. What we found out is you can use some of these more contemporary tools to get into these smaller branches and angioplasty them.

This is a young woman who has had a painful non-healing ulcer for over a year. Each digit is supposed to have two palmar branches, but she has only one in the middle finger and even that has a total occlusion (Figure A). We switched to the Hi-Def with a guidewire to cross, then a tip injection to confirm the wire was in the true lumen of the vessel. We did



Figure 6: Chronic total occlusion in the middle finger (A) Guidewire advanced to the distal digit under the Hi-Def mode (B). A tip injection from the microcatheter under the Hi-Def confirmed the wire is in true lumen (C). Final confirmation of revascularization in standard FPD view (D). The middle finger was completely healed (F) a few months later compared to the ulcer prior to intervention (E).



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a 1.0 balloon angioplasty and drove the knuckle wire to cross the distal digit CTO.”

“It’s not amazing because I did it. It’s amazing because we have the tools and the technology to do this. So, not only do you need the right kind of wires and microcatheters. What you also need is the right kind of visualization technology to see these.”

### **Redefine Intervention with Hi-Def Imaging**

“Hi-Def 76 is an essential tool in the Cath Lab. As you do more and more complex procedures, you don’t have to rely on the traditional imaging techniques. We can go one better. Hi-Def is an alternative to IVUS and ideal for when vessels are even too small for IVUS. We have on-demand Hi-Def magnifications, across all imaging types” said Dr. Arain. “The improved visualization allows you to see devices better, image them, and deploy them better. it allows you to manip-

ulate wires better into microscopic channels that are not even visible. And it leads to improved technical outcomes.”

“And last but not the least,” Dr. Arain added. “We have actually found that the total radiation doses decrease because we can see better and focus on such a small area of the heart.” //

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*The clinical results, performance and views described in this case study are the experience of the clinician. Results may vary due to clinical setting, patient presentation and other factors. Many factors could cause the actual results and performance of Canon’s product to be materially different from any of the aforementioned. //*



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