INTERNET NEWS

BS. Nguyễn Văn Công

New Contrast Agent for Ultrasound Imaging Ensures Affordable and Safer Medical Diagnostics

By MedImaging International staff writers
Posted on 22 Jan 2025

und imaging is an affordable and non-invasive
stic method that uses widely available equipment.
er, its results are often not highly accurate, and the image
is heavily dependent on the operator's skill. In contrast,
ues like MRI and CT scans are not always accessible due
high cost, lack of available equipment, and potential
aused by the contrast agents used in these methods.
ontrast agents are toxic, and CT scans expose patients to
diation doses. On the other hand, ultrasound imaging
ntrast agents can significantly improve the quality of
for internal organs, such as the heart, liver, and brain.
hanced ultrasound technique could be useful for
sing a wide array of diseases in the cardiovascular, liver,
and female reproductive systems. Ultrasound contrast
are often microbubbles made from proteins, lipids, or
rs. Proteins enhance image quality, while lipids and
rs provide stability, extending the time available for
stics. Despite these benefits, further improvements in
rformance are still needed.

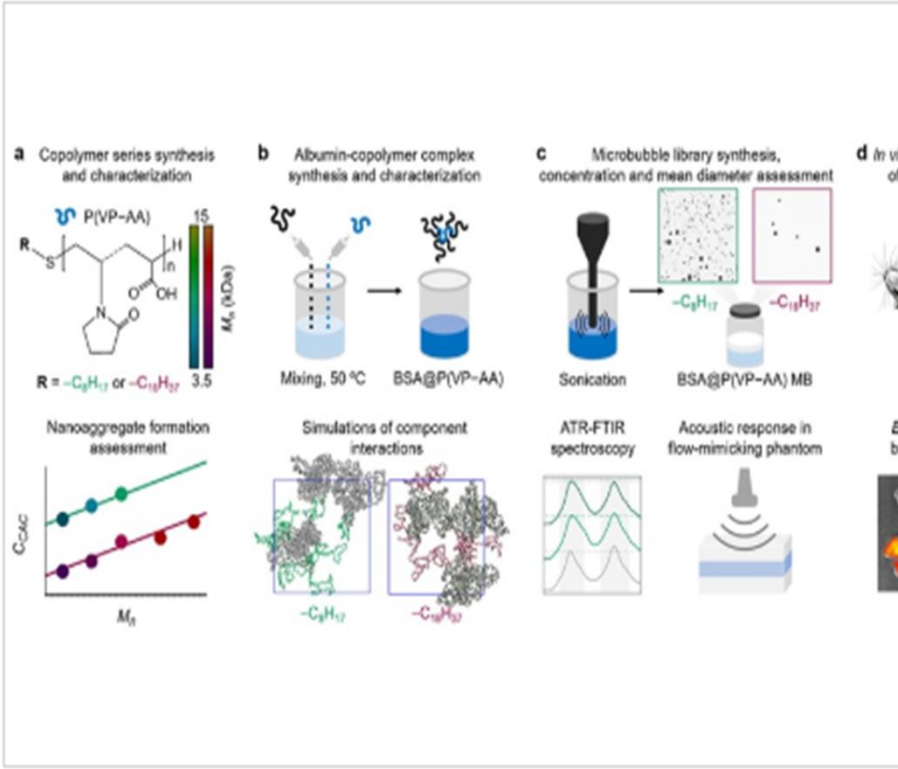


Image: Experimental design of the study (Photo courtesy of Tatiana Estifeeva et al./Biomaterials Advances)

chers at Skolkovo Institute of Science and Technology (Skoltech, Moscow, Russia) have developed and te
-polymer microbubbles for medical ultrasound imaging. When injected intravenously, these microbubble
t agents, improving image quality. Tested in rats, the new microbubbles stayed in the bloodstream longer
y available alternatives, giving doctors more time to complete the examination. This enhanced contrast c
trasound a viable alternative to MRI and CT scans, which are more expensive and potentially harmful. T
hers created the first "hybrid" microbubble formulation by combining a protein called albumin with a cop

rmulation resulted in 100 different microbubble types for ultrasound imaging, from which the most effect
t agent was chosen and tested on a rat's beating heart. The selection process involved multiple steps: eval
ubble size, concentration, and acoustic response in organ phantoms and animals. Compared to a protein-b
ithout the added copolymer, the hybrid microbubbles showed significant improvements in both image co
time they remained in the bloodstream, which was one and a half to two times longer.

te the new contrast agent, the team combined bovine serum albumin—a commonly used protein in pharm
ng in microbubble production—with biocompatible polymers. They tested 100 different combinations, va
polymer and the polymer's proportion in the mixture from 2% to nearly 50%. The challenge was to find t
between microbubble stability, concentration, and ultrasound response. Formulations that did not produc
ubbles were discarded, and the remaining candidates were tested on a blood vessel phantom to measure b
ncentration, and acoustic response. This process led to the identification of the most promising formulati
n compared with pure albumin microbubbles and a saline injection in animal trials.

tests, the contrast agent was injected into a rat's tail vein, followed by an ultrasound exam of its heart. T
published in *Biomaterials Advances*, revealed that while the image without contrast showed few details,
vith the protein contrast only displayed the ventricles, the hybrid agent provided a clear view of the entire
r heart. Moreover, the effect lasted up to 7 minutes, compared to just 3 minutes with standard agents. The
hers believe the new agent's high contrast could make it a valuable tool for diagnosing infertility in wome
g blood vessels in the brain, although further work is needed to fully explore its potential.

Predicts Cardiovascular Risk from CT Scans

MedImaging International staff writers

ted on 20 Jan 2025

vascular disease remains the leading cause of death y, claiming more than 17 million lives annually. ying individuals at high risk is an ongoing ge that requires more accurate methods. chers are now turning to artificial intelligence (AI) prove the prediction of heart failure and other vascular events, including estimating the timing of vents, by developing an AI model that learns from scans.

ollaborative effort involving researchers from Case n Reserve University (Cleveland, OH, USA) aims lge this gap by developing advanced AI tools to e calcium-scoring computed tomography (CT) a commonly used diagnostic tool. A calcium- g CT is a non-invasive, low-cost heart scan that res the amount of calcified plaque in the coronary s. This plaque, which can narrow or block the s, is an indicator of the risk of a heart attack. In n to evaluating coronary plaque, these scans e valuable information about the aorta, heart shape, muscles, and liver.

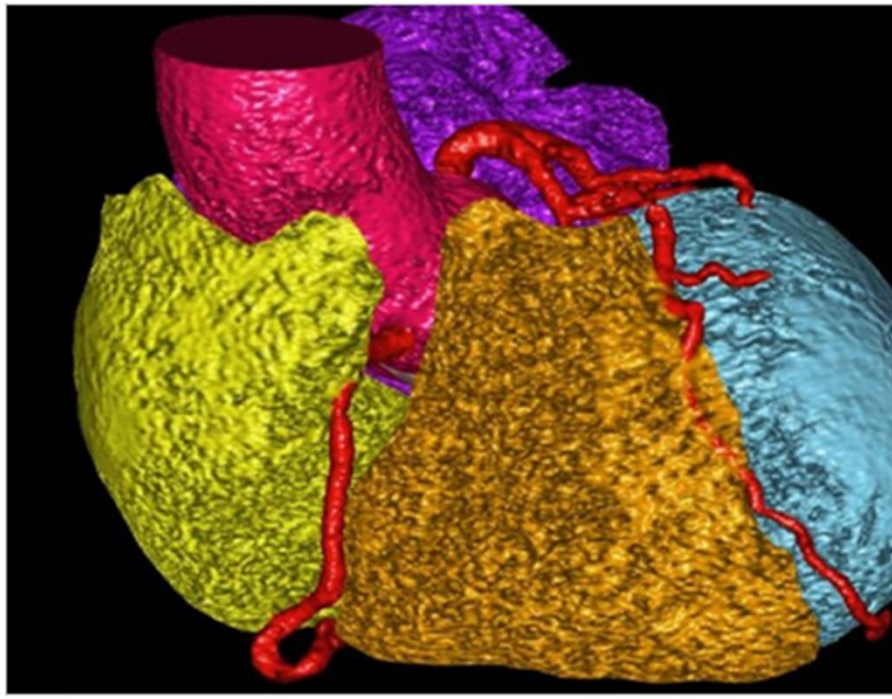


Image: AI can be used to identify different cardiac segments in CT scan (Photo courtesy of Sadeer Al-Kindi/ Houston Methodist)

project creates AI-driven predictive models that analyze data from
ium-scoring CT scans alongside clinical risk factors and demographics
AI model will learn to extract new insights from CT images and use th
ings to estimate cardiovascular event risk in large patient populations.
se insights include measurements of coronary calcium, heart shape, boo
position, bone density, and visceral fat, as well as age and other risk
ors. AI can process these correlations faster and more thoroughly than
itional methods. The research team aims to gain a deeper understanding
heart health and body composition interact, enabling clinicians to mor
rately identify at-risk patients. By utilizing existing screening CT data
two major health systems, the research demonstrates AI's potential to
e longstanding clinical challenges in a cost-effective and scalable mann

is project represents a significant leap forward in personalized healthca
project leader Shuo Li, a Case Western Reserve professor of biomedica
neering and computer and data sciences. “It has the potential to set new
dards for cardiovascular disease prevention and management, as well a
ance the forefront of using AI to analyze images for transformational
thcare.

AI model enables earlier detection of diabetes through chest x-rays

w artificial intelligence model finds that x-ray images collected during routine medical car
ide warning signs for diabetes, even in patients who don't meet the guidelines for elevated
model could help physicians detect the disease earlier and prevent complications, says a m
tutional team which published the findings in Nature Communications.

lying the computational method known as deep learning to images and electronic health
rd data, the researchers developed a model that successfully flagged elevated diabetes risk
retrospective analysis, often years before patients were diagnosed with the disease. That's
ficant, the researchers say, given the prevalence of diabetes in the U.S. has more than doub
the past 35 years.

ent guidelines suggest screening patients for type 2 diabetes if they are between 35 and
ears old and have a body mass index (BMI) in the overweight to obese range. Many studie
ever, have found this strategy misses a significant number of cases, particularly in racial/et
orities for whom BMI is a less effective predictor of diabetes risk. Patients with undiagnose
etes are at much higher risk for complications from the disease including irreversible organ
age and even death.

year, millions of Americans receive chest x-rays for chest pain, difficulty breathing, injur
re surgeries. Emory alone completes on average about 200,000 radiographs annually. Whil
logists are not looking for diabetes when they assess these x-rays, the images become part
nt's medical record and could be analyzed later for diabetes or other conditions.

est x-rays provide an 'opportunistic' alternative to universal diabetes testing," says Judy Wa
oya, MD, assistant professor of radiology and imaging sciences, and the lead researcher fr
ry. "This is an exciting potential application of AI to pull out data from tests used for other
ons and positively impact patient care."

AI model was trained on more than 270,000 x-ray images from 160,000 patients, with deep learning
rmining the image features that best predicted a later diagnosis of diabetes. Because chest x-rays are
mon way to detect diabetes, the researchers also used explainable AI techniques to determine how a
the model made its determinations. The methods pointed to the location of fatty tissue as important
rmining risk, a logic that aligns with recent medical findings that visceral fat in the upper body and
omen is associated with type 2 diabetes, insulin resistance, hypertension and other conditions.

en the novelty of the approach and the startling results, the researchers who first developed the mode
ed to the Emory team to perform external validation of the model. When the Emory team applied the
el to a separate group of nearly 10,000 patients, they found the model predicted risk better than a sir
el based on non-image clinical data alone.

ome cases, the chest x-ray warned of high diabetes risk as early as three years before the patient ever
ved a diagnosis. The model's output also provides a numerical risk score that could potentially help
cians customize the treatment approach for patients

betes is a chronic disease where body fat distribution matters. The longer the duration of the disease
vorse the glycemic control, the higher the risk of complications," says Francisco Pasquel, MD, asso
essor in Emory's Division of Endocrinology, Metabolism and Lipids. "The opportunistic approach o
g chest x-rays to identify those at the highest risk of diabetes, even before a spike or drop in blood s
s occurs, is a promising method that may help improve outcomes through early preventive measure
ment."

research team will now explore how to further validate the model and incorporate it into electronic
rd systems so it can provide an alert to physicians to pursue traditional diabetes screening of patient
ged as high risk based on x-ray results.

'll then turn to investigating how well chest x-rays can help diagnose other conditions, such as vasc
ase, congestive heart failure, and chronic obstructive pulmonary disease.

HDX INTERNATIONAL

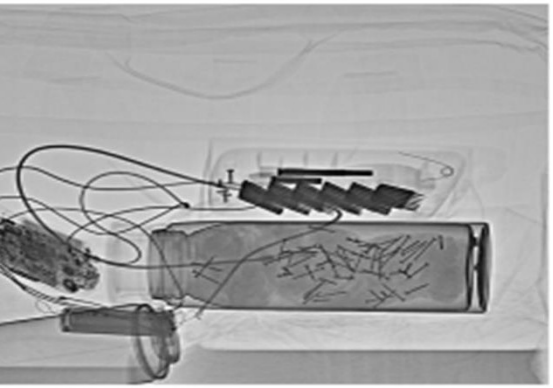
TRACELINE™ PX3-S PORTABLE X-RAY SYSTEM

ADD TO QUOTE

The PX3 portable X-ray inspection system seamlessly combines advanced DR X-ray imaging technology, a low-dose pulsed X-ray source, and cutting-edge digital image processing capabilities. This potent blend provides versatile support across applications such as security inspections, VIP protection, EOD, Customs, and border control contraband searches. It guarantees high-resolution images and exceptional penetration performance, addressing the diverse needs of critical scenarios.

ICATIONS

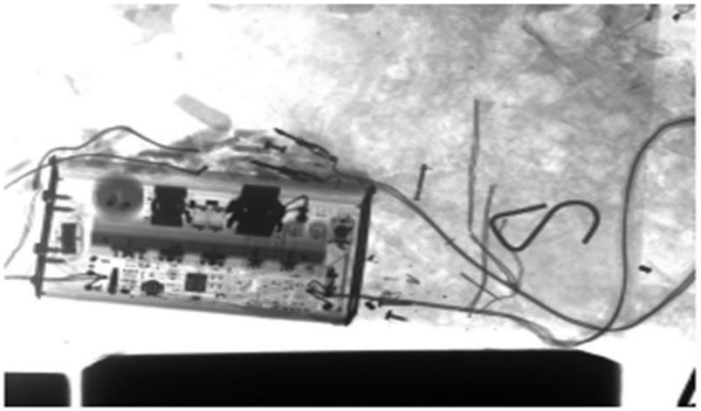
er Control



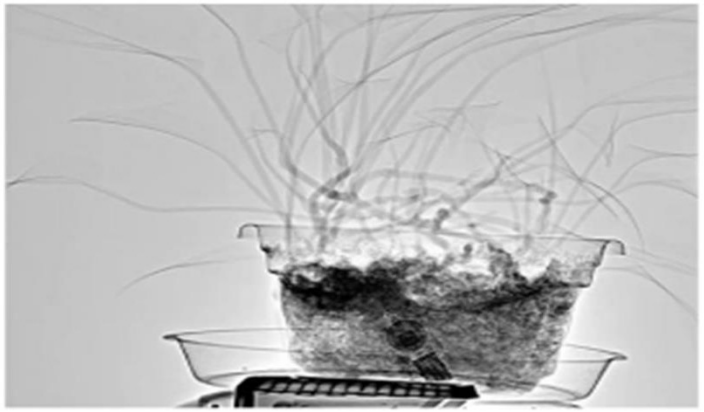
VIP protection

CBRN Defense

Fire&Arson Invistigation



TSCM



YSTEM

ideal system suitable for various public security applications.
all size, light weight, easy operation, and stable performance.

- 1717X/1417X/1013X imaging panel options with high-definition imaging quality
- Wired & wireless operation modes
- 12.2" windows11 touch-screen tablet / 14" windows11 touch-screen Laptop
- Compatible with most commercial X-ray sources
- Suitable for all terrains and harsh weather conditions
- Lightweight and portable,complete system can be integrated into rugged Pelican wheeled carry cases

X3-S SOFTWARE

1. **Touchscreen software**
   User-friendly interface for intuitive operation.
2. **Intelligent image optimization**
   One-touch optimization algorithm.
3. **High-definition image review**
   Distortion-free magnification to capture every detail.
4. **Automatic measurement**
   Dimensions, thickness, spatial resolution, signal-to-noise ratio, etc.
5. **Stitching function**
   Automatic and manual stitching capabilities.

ONTROLLER

eless range: Up to 150m
den Sources Support: DeWalt 20V

PX3-S IMAGING PANEL

Portable flat panel detector: Lightweight, thin, and durable



Imaging Panel Model	1717X	1417X	1013X
Panel Size	460×460×15mm	460×384×15mm	362×269×15
Imaging area(inch)	17×17	14×17	10×13
Weight(including battery)	3.4kg	3kg	2.3kg
Thickness	15mm	15mm	15mm
Pixel Size	100μm		
Spatial Resolution	5 lp/mm		
Wireless	Build-in WiFi Gigabit		
Protection Level	IP56	IP55	IPX5
Battery Life	8hrs	8.5hrs	8.5hrs

.aptop & Tablet

Users are advised to select and purchase suitable laptop computer locally

- Ruggedized Tablet: EM-I20A
- Up to a 12.2" Full IPS display
- Windows 11, i5-1235U
- 16GB + 512GB

- Screen touch laptop: Thinkpad L14
- Up to a 14" Full IPS display
- Windows 11, i5-1335U
- 16GB + 512GB

X-RAY GENERATOR

With superior penetrating ability, Golden Engineering pulsed X-Ray generators are smaller, lighter and safer than alternative technologies

XRS4

XRS3

XR200

	XRS4	XRS3	XR200
KVP	370KV	270KV	150KV
Penetration	Up to 100mm steel plate	Up to 85mm steel plate	Up to 26mm plate
Pulse Rate	9 pulse/second	15pulse/second	10pulse/sec
Weight	8.3kg with battery	5.3kg with battery	4.8kg with b
Battery working time	3000 pulses per charge	5500 pulses per charge	6000 pulses charge

**PX3 is compatible with all industrial X-ray source*

ACCESSORIES

Communication Cables

The 50m communication cables provide reliable and fast data transmission between the different parts of the system.

Detector Stand

The Detector Stand is a bespoke accessory that holds the Detector securely in an upright position (portrait or landscape).

Detector Frame (Optional)

Tripod

Tripod height adjustable, 360 degree rotation, can meet a variety of scene use

Battery for x-ray generator