INTERNET NEWS

BS Nguyễn Văn Công

Abdominal obesity linked to heart damage

Will Morton

Dec 1, 2025

Cardiovascular MRI shows that abdominal obesity is linked to harmful changes in heart structure, especially in men, according to a study presented December 1 at the RSNA meeting in Chicago.

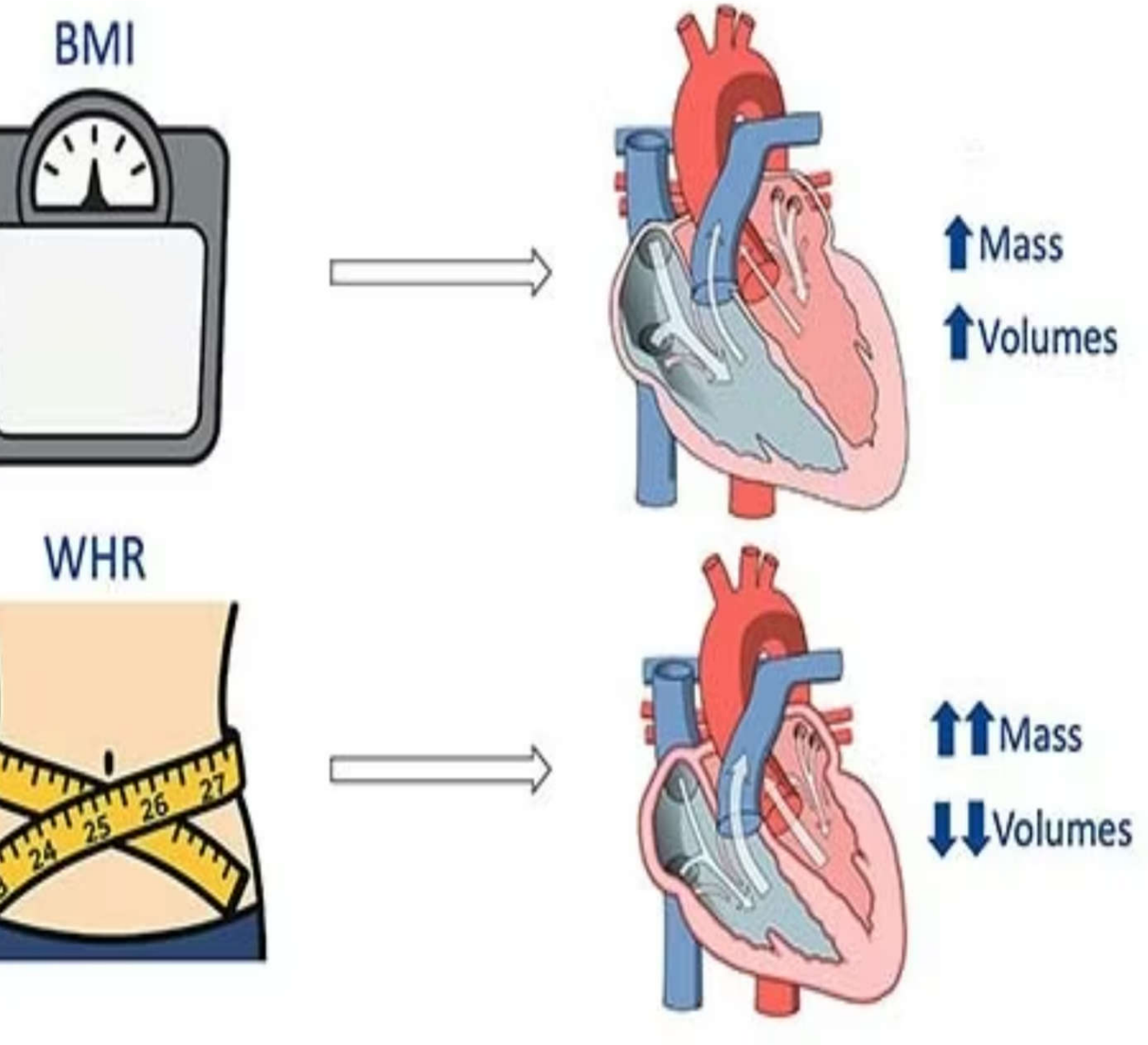
The finding is from an analysis of 2,173 subjects in whom researchers explored the effects of obesity on the heart based on waist-to-hip ratio (WHR) and body mass index, noted lead author Jennifer Erley, MD, of the University Medical Center Hamburg-Eppendorf, Germany, in a RSNA release.

“Abdominal obesity according to WHR is associated to concentric remodeling, while a higher body mass is associated with ventricular dilatation,” she said.

While body mass index (BMI) is a measure of general obesity calculated from a person’s weight and height, waist-to-hip ratio (WHR) is a measure of abdominal obesity, the accumulation of visceral fat deep around internal organs. In this study, Erley and colleagues analyzed the effects of these two measures on the heart, based on sex.

Out of the 2,173 subjects (43% female, mean age 64 years old), 80% of whom were obese according to the WHR (≥ 0.85 in females, ≥ 0.90 in males), and 20% were obese based on BMI (BMI ≥ 30). Participants had no known cardiovascular disease.

According to the results, increases in WHRs were associated with a higher left ventricular (LV) mass and lower ventricular volumes, and their association with right ventricular volumes was weaker in females than in males.



Pictogram showing the results of the research. An increase in waist-to-hip ratio (WHR) is associated with a higher left ventricular (LV) mass and lower ventricular volumes. Its association with right ventricular (RV) volumes is weaker in women than in men. An increase in body mass index (BMI) is associated with ventricular dilatation and a higher LV mass, although this relationship is also weaker in women.

Meanwhile, an increase in BMI was associated with ventricular dilatation and a higher LV mass, and this relationship was also weaker in females, according to the researchers.

“[Abdominal obesity] appears to lead to a potentially pathological form of cardiac remodeling, concentric hypertrophy, where the heart muscle thickens, but the overall size of the heart doesn’t increase, leading to smaller cardiac volumes. In fact, the inner chambers become smaller, so the heart holds and pumps less blood. This pattern impairs the heart’s ability to relax properly, which eventually can lead to heart failure,” she said.

Regarding sex-specific differences, Erley suggested that male patients may be more vulnerable to the structural effects of obesity on the heart, which is a finding not widely reported in earlier studies. She said that rather than focusing on reducing overall weight, middle-aged adults should focus on preventing abdominal fat accumulation through regular exercise, a balanced diet, and timely medical intervention, if necessary.

From a radiologist's perspective, she added that clinicians typically think of cardiomyopathy, hypertensive heart disease, or some other form of disease when they see this cardiac remodeling pattern, rather than connecting it to obesity in reports.

“This study should alert radiologists and cardiologists to be more aware that this remodeling could be attributed independently to obesity,” Erley said.

GLP-1 drugs reduce heart plaque progression in diabetes patients

Kate Madden Yee

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- HICAGO -- CT angiography (CCTA) shows that GLP-1 receptor agonists curb the advancement of heart plaques in patients with type 2 diabetes, according to a study highlighted at the RSNA meeting.
- The results could be good news for people with diabetes, as they tend to be at higher risk of cardiovascular disease.
- "[Our] study demonstrates that GLP-1 receptor agonists have a superior effect in slowing the progression of coronary atherosclerotic plaques at the vascular level in type 2 diabetes patients," wrote a team led by Junyan Zhang, PhD, of Sichuan Hospital in Chengdu, China.
- It has been unclear how noninsulin glucose-lowering therapies affect the progression of heart plaques in these patients, Zhang and colleagues noted. To address the knowledge gap, the researchers used CCTA to assess the impact of five noninsulin diabetes therapies via a study that included data regarding 3,520 vessels from serial CCTA images of diabetic patients taken from the TOuCh for CATheter Ablation (TOCCATA) study.
- Patients were categorized into five treatment groups: metformin (1,271 vessels), DPP-4 inhibitors (316 vessels), GLP-1 receptor agonists (GLP-1 RAs, 308 vessels), SGLT-2 inhibitors (SGLT2i, 877 vessels), and thiazolidinediones (TZDs, 288 vessels).

Overall, the investigators reported the following:

- At the vascular level, the GLP-1 RAs group showed a significant reduction in the risk of stenosis progression compared to the metformin group (adjusted hazard ratio [HR], 0.68 [with one as reference], p = 0.024).
- The DPP-4 inhibitors group showed an increased trend in the risk of stenosis progression (adjusted HR 1.31, p = 0.039).
- There were no significant differences in the SGLT-2 inhibitors and the TZDs groups (adjusted HR 0.99 [p = 0.9] and 1.28 [p = 0.086], respectively).
- "The findings emphasize the importance of selecting treatment regimens based on atherosclerotic burden and provide a basis for radiologists to guide personalized treatment strategies for T2DM patients using CCTA," Zhang and colleagues concluded.

CLINICAL NEWS | WOMENS IMAGING

ACR talks BI-RADS version 2025 with AuntMinnie

Amerigo Allegretto
Dec 8, 2025

The American College of Radiology (ACR) in December released the latest version o BI-RADS, the guide that radiologists use for standardized breast imaging terminolog and reporting.

The BI-RADS Manual (formerly “Atlas”) includes updates across five sections of breast imaging. These include mammography, ultrasound, MRI, contrast-enhanced mammography (CEM), and auditing and outcomes monitoring.

The latest version of BI-RADS (BI-RADS v2025) also contains revisions from the earli version based on member feedback, more clinical images, and updates about the latest technology in imaging equipment.

“It helps us all speak the same language,” said Mary Newell, MD, chair of the ACR Committee on BI-RADS. “In the end, the most important part of it is that it benefits patients. When we’re all talking the same language … the best thing is that our patients benefit from it.”

This version replaces the previous version of BI-RADS that was published in 2013. The committee reviewed available research and expert comments to create evidence-based material for BI-RADS. Newell said this reflects changes in breast imaging over the past decade.

“As in all parts of life, things have advanced,” she said. “We felt it was time for an update -- new images, new concepts -- so we got to work on it.”

Mary Newell, MD, highlights some of the changes made to BI-RADS with the latest version released by the ACR.

The ACR highlighted that BI-RADS reporting allows radiologists to communicate results to the referring physician with final assessment and specific management recommendations. It also provides mechanisms for peer review and quality assurance data to improve patient care quality.

Along with over 900 clinical images (including synthetic images) and updated breast composition descriptors, BI-RADS v2025 contains new descriptors for elasticity assessment on breast ultrasound and MR imaging for breast implants. Nonmass lesions on ultrasound and digital breast tomosynthesis (DBT) are also covered in the latest version.

Dana Smetherman, MD, CEO of the ACR, said this is a result of “years of hard work” and will benefit the breast imaging community.

“A lot has changed. We have several new modalities that were not really in common use,” she said. “We wanted to make sure that when this got out into practice, that it would really be useful and reflect how breast radiology is being practiced today.”

Dana Smetherman, MD, describes what breast radiologists have to look forward to when using the ACR's latest version of BI-RADS.

BI-RADS v2025 is available in both hard and electronic copies. Stamatia Destounis, MD, a coauthor on BI-RADS version 2025, said having this available electronically allows for easier editing for later updates.

“If edits have to be made, it will be much more seamless and will hopefully be out more quickly,” she said. “I think it will be easier to look for things for someone in training or someone who wants to refresh themselves on a section.”

Pulse X-ray device for stereo imaging and few-projection tomography of explosive and fast processes

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Abstract. This paper describes the operation principles and design features of the device for single pulse X-raying of explosive and high-speed processes, developed on the basis of a Tesla transformer with lumped secondary capacitor bank. The circuit with the lumped capacitor bank allows transferring a greater amount of energy to the discharge circuit as compared with the Marks-surge generator for more effective operation with remote X-ray tubes connected by coaxial cables. The device equipped with multiple X-ray tubes provides simultaneous X-raying of extended or spaced objects, stereo imaging, or few-projection tomography.

1. Introduction

X-ray imaging takes a prominent place among various methods for studying the movement and distribution of materials. In a number of cases, X-ray imaging happens to be virtually the only method that makes it possible to obtain reliable data on the internal structure of the object. In the case of single and fast or explosive processes, one usually applies pulse X-raying. The scientists of the Lavrentyev Institute of Hydrodynamics of the Siberian Branch of the Russian Academy of Sciences have been developing their own pulse X-ray devices of the PPX series (Portable Pulse X-ray) since the inception of the Institute. The PIR-4, PIR-600/1200, and PIR-100/240 devices have been developed for the operating voltages of 100 kV up to 1200 kV [1]. The most recent modern device of the series is PIR-200M (Figure 1).

Figure 1. General view of the PIR-200M pulsed X-ray device (left); internal layout (right).

2. Principals of operation and characteristics

The PIR-200M pulse X-ray device consists of the following functional main components: a high-voltage unit, a remote control panel with a 15-meter long connecting cable, and external radiation head units with up 10-meter long high-voltage cables. Radiation heads allow for the use of pulse X-ray tubes of the types of IMA6-D, IMA5-320D, IRTP2-240 and IRTP3-D.

The operational principle of the X-ray device is as follows. The PIR-200M pulse X-ray device is based on a non-ferrous oil insulated Tesla transformer (Figure 2), an inhomogeneous forming line with ceramic capacitors, and a high-voltage cables. A nanosecond-long X-ray radiation is generated in a sealed vacuum tube with explosive emission.

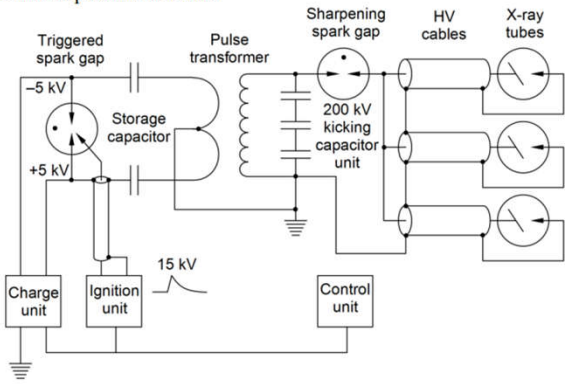


Figure 2. Circuit diagram of PIR-200M based on Tesla transformer.

The X-ray device is controlled via a remote control panel (Figure 3). The device can be started in three ways: manually, by pressing a button on the control panel, by an electric pulse signal of the amplitude from 5 V to 300 V, and by a contact sensor (by contacts short-circuit).

Figure 3. Control panel for the PIR-200M device.

The the X-ray device generates single bremsstrahlung pulses on the start command.

The main power supply of the PIR-200M is ~220 V 50 Hz line. The power consumption rate is not more than 50 W. The device contains a built-in battery of 12 V and 3.2 Ah, which allows for autonomous operation (up to 100 X-ray flashes and 4 hours in a standby mode).

The X-ray device has the following parameters:

- the duration of the X-ray pulse at half-height is 40 ns in the case of an IMA6-D tube and 80 ns in the case of an IMA5-320D tube;
- the delay since the start command until the X-ray radiation is 2 μs with dispersion of 50 ns;
- the output voltage is 200 kV;
- output dose per pulse for an IMA5-320D tube with a kovar window measured at 21 cm from focus is 75 mR;
- the device is powered by the alternate current line of 220 V, 50 Hz or by built-in battery 12 V;
- it is possible to start the device both by a TTL electric pulse of 5 V and a contact sensor;
- delay time from control panel built-in time generator – from 1 to 999 μs;
- the dimensions of the PIR-200M pulse X-ray device are 570×280×680 mm.

The device is designed to be in parallel connection with one to three external X-ray tubes (Figure 4). This technical solution is not available in any other domestic or foreign model. This allows for stereo imaging, few-projection tomography, and simultaneous X-raying of extended or spaced objects.

Figure 4. High-voltage connector unit of the PIR-200M consist of 3 sockets.

The table compares the characteristics of the PIR-200M device and those of the closest counterparts [2-4] intended for the single-flash radiography of fast processes. The table shows that the PIR-200M device has characteristics comparable to the best other counterparts, while having a number of advantages.

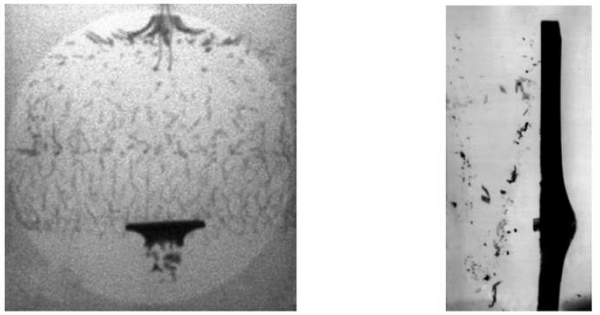
Table 1. Comparison with analogs.

	Pulserad 43733A	ScFl-300	Argument 150-200	PIR-200M
1. Operating voltage, kV	300	100-300	150-230	100-240
2. Current, kA	5	10	-	4
3. Pulse dose, mR[a]	8	9	0.15 ÷ 1.2 [b]	1,8 ÷ 8[b]
4. Flash duration, ns	30	20	4 ÷ 7	20 ÷ 80[c]
5. Focal spot size, mm	5	1	1.5 ÷ 2.3	2 ÷ 3[c]
6. Weight, kg	146	200	6,5 ÷ 17	55

[a] a distance of 1 m from the anode.
[b] for various voltages and different tubes.
[c] for different tubes.

3. Examples of application

The doses given in the tables can be used to obtain good-quality images per flash on distances of up to 2 meters on standard X-ray film with luminescent intensifying screens, on ImagePlate screens, or solid matrices (Figures. 5 and 6). The objects under control can move with velocities of up to 10 kilometers per second.



a b

Figure. 5. X-ray image of the exploding detonator; below is the coin perforated by the fragment of the detonator (a); interaction of the 7.62-mm bullet and the 12-mm steel target; the steel core and the shell expansion are seen (b).

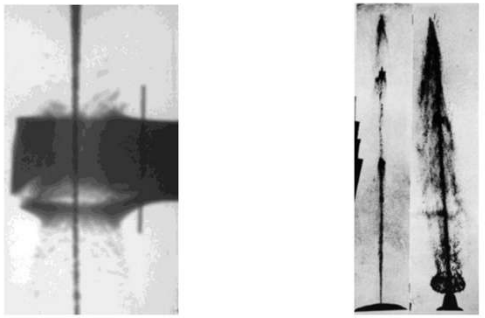


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Figure 6. (a) interaction of the copper shaped-charge jet with the aluminum target; (b) diesel fuel injection and spraying inside the combustion chamber.

The PIR-200M device is suitable for the X-raying of low-dense and medium-dense objects. It performed well in the X-raying of shaped-charge jets, the objects of inner, outer, and terminal ballistics, dynamic processes in brightly glowing media, foam, aerosols, and fragmentation fields.

4. Conclusions

This paper describes the development of a small device for the X-raying of single high-speed and explosive processes according to the characteristics not inferior to the best counterparts in the world.

When the device is equipped with several tubes, it is possible to perform the simultaneous X-raying of extended or spaced objects, stereo imaging, and few-projection tomography.

The PIR-200M device is capable for X-raying in a wide range of densities and thicknesses (from 0.1 mm of aluminum to 24 mm of steel).

The objects of X-raying can move with velocities of up to 10 km/s, and the image blurring does not exceed the space resolution of the detectors.


Ray Tube
Color touch screen
Power button
Charging port
carryx
Wireless remote control
Portable handheld
Multi-purpose,
portable,
stable tripod stand
Metal box
Lightweight and portable
Convenient for use outside