

Dose reduction in dual-energy CT-angiography in patients after endovascular aortic repair - does omitting non-contrast and arterial phase affect the diagnostic accuracy?

# Authors

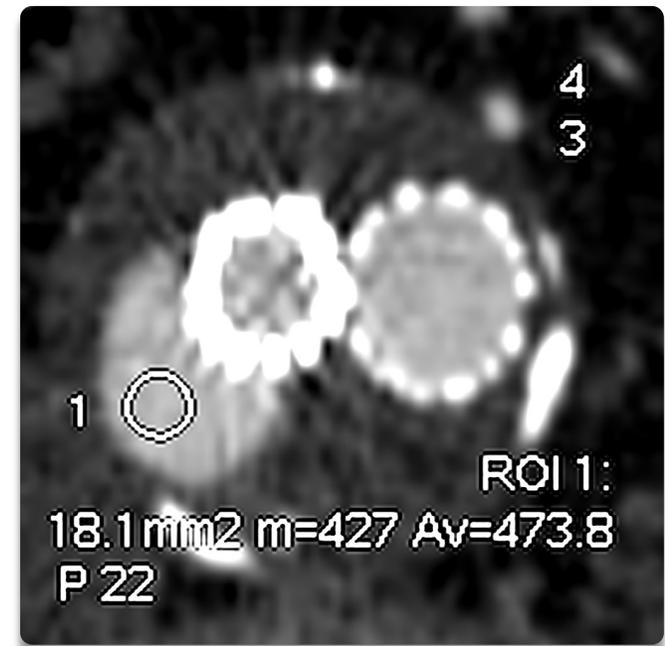
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No relevant conflicts of interest to disclose.

# Purpose

Analysis of the influence of shortened examination protocols on the sensitivity of dual-energy CT in detection of endoleaks and possible radiation effective dose (ED) reduction.



# Materials and methods

- ▶ CT scans of 97 patients were enrolled in this study.
- ▶ CT scans were obtained using a dual-energy fast-kVp switching scanner.
- ▶ True Non Contrast (TNC) phase was obtained using single energy, arterial and delayed phase using dual-energy acquisition. Virtual non contrast (VNC) phase was reconstructed from delayed phase.
- ▶ Analysis of the repeatability of endoleak diagnosis by both observers was performed and the sensitivity of shortened study protocols was calculated.
- ▶ The average ED in shortened study protocols was calculated.

# Materials and methods

## Reading sessions

Endoleak assessment

- ▶ I – full triphasic examination – TNC, arterial, delayed
- ▶ II - biphasic – VNC, arterial, delayed (2 blinded readers)
- ▶ III – monophasic - VNC, delayed (2 blinded readers)

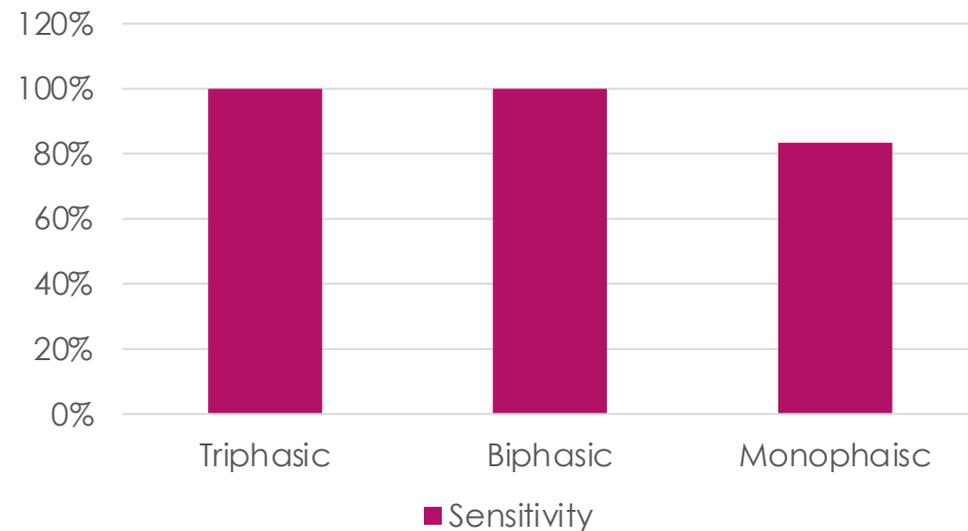
## Scanning parameters in TNC and both DECT acquisitions

Parameter	TNC	DECT – arterial and delayed
Tube voltage (kV)	120	80-140
Tube current (mAs)	100-200	360
Pitch	0,984:1	0,984:1
Lamp rotation time (s)	0,6	0,6
Slice thickness (mm)	0,625	0,625

# Results

- ▶ During session 2. and 3., the differences between the two readers in number of endoleaks diagnosed were not statistically significant ( $p > 0.05$ ).
- ▶ In biphasic protocol 53 endoleaks were diagnosed – with 100% sensitivity comparing to triphasic protocol.
- ▶ In monophasic protocol 44 endoleaks were diagnosed.
- ▶ Comparing to triphasic protocol, monophasic study has **sensitivity of 83.33%, 92.54%, specificity, 89.69% accuracy, PPV 83.33%, NPV 92.54%** in endoleak diagnosis.

Sensitivity of 3 examination protocols



# Results

- ▶ Calculated mean Effective Dose (ED) of triphasic study was 27,95 mSv.
- ▶ Biphasic protocol led to 23,28% of mean ED reduction,
- ▶ Monophasic protocol led up to 61,73% mean ED reduction.



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# Conclusion

- ▶ Omission of TNC phase can lead to  $\frac{1}{4}$  ED reduction. Omission of both TNC and arterial phase can lead to about 60% dose reduction but with drop in diagnostic accuracy in endoleak detection.

# References

1. **Flors L, Leiva-Salinas C, Norton P, et al.** Endoleak detection after endovascular repair of thoracic aortic aneurysm using dual-source dual-energy CT: suitable scanning protocols and potential radiation dose reduction. *Am J Roentg.* 2013, Vol. 200, 2, pp. 451-60.
2. **Agrawal M, Oliveira G, Kalva S, et al.** Prospective comparison of reduced-iodine-dose virtual monochromatic imaging dataset from dual-energy CT angiography with standard-iodine-dose single-energy CT angiography for abdominal aortic aneurysm. *Am J Roentg.* 2016, Vol. 207, 6.