



European Association of Cardiovascular Imaging

Certification in Cardiac Computed Tomography

Suggested reading list

Textbooks

Atlas of Cardiovascular Computed Tomography.

Budoff MJ, Achenbach SS, Hecht HS and Narula J.
Springer, 2nd Edition 2018.

CT of the Heart.

Schoepf UJ.
Springer, 2nd Edition 2019.

1. PRINCIPLES OF COMPUTED TOMOGRAPHY

Noninvasive coronary angiography by retrospectively ECG-gated multislice spiral CT.

Achenbach S, Ulzheimer S, Baum U, Kachelriess M, Ropers D, Giesler T, et al.
Circulation. 2000;102:2823–8.

High-pitch spiral acquisition: A new scan mode for coronary CT angiography.

Achenbach S, Marwan M, Schepis T, Pflederer T, Bruder H, Allmendinger T, et al.
J Cardiovasc Comput Tomogr. 2009; 3:117–121.

Physics of cardiac imaging with multiple-row detector CT.

Mahesh M, Cody DD.
RadioGraphics 2007;27(5):1495–1509.

Iterative reconstruction in cardiac CT.

Naoum C, Blanke P, Leipsic J.
J Cardiovasc Comput Tomogr. 2015;9:255–63.

Multisegment and halfscan reconstruction of 16-slice computed tomography for detection of coronary artery stenoses.

Dewey M, Laule M, Krug L, Schnapauff D, Rogalla P, Rutsch W, et al.
Investig Radiol. 2004;39:223–9.



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The evolution of image reconstruction for CT — from filtered back projection to artificial intelligence.

Willemink MJ and. Noël PB.

European Radiology 2019; 29 (5): 2185–2195.

2. CARDIAC CT EXAMINATIONS

Diagnostic accuracy of coronary computed tomography angiography: a comparison between prospective and retrospective electrocardiogram triggering.

Pontone G, Andreini D, Bartorelli AL, Cortinovis S, Mushtaq S, Bertella E et al.

J Am Coll Cardiol. 2009;54:346–355.

Patient preparation and scanning techniques.

Taylor CM, Blum A, Abbara S.

Radiol Clin North Am. 2010;48:675–86.

SCCT guidelines for the performance and acquisition of coronary computed tomographic angiography: A report of the society of Cardiovascular Computed Tomography Guidelines Committee: Endorsed by the North American Society for Cardiovascular Imaging (NASCI).

Abbara S, Blanke P, Maroules CD, Cheezum M, Choi AD, Han BK, et al.

J Cardiovasc Comput Tomogr. 2016 Nov - Dec;10(6):435-449.

Advances in cardiac CT contrast injection and acquisition protocols.

Scholtz J and Ghoshhajra B.

Cardiovasc Diagn Ther. 2017 Oct; 7(5): 439–451.

3. QUALITY & SAFETY

What are the basic concepts of temporal, contrast, and spatial resolution in cardiac CT?

Lin E, Alessio A.

J Cardiovasc Comput Tomogr. 2009 Nov-Dec;3(6):403-8.

Artifacts at Cardiac CT: Physics and Solutions.

Kalisz K, Buethe J, Saboo SS, Abbara S, Halliburton S, Rajiah P.

Radiographics. 2016;36(7):2064-2083.

SCCT guidelines on radiation dose and dose-optimization strategies in cardiovascular CT.

Halliburton SS, Abbara S, Chen MY, Gentry R, Mahesh M, Raff GL, Shaw LJ, Hausleiter J; Society of Cardiovascular Computed Tomography.

J Cardiovasc Comput Tomogr. 2011 Jul-Aug;5(4):198-224.



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Cardiac-Specific Conversion Factors to Estimate Radiation Effective Dose from Dose-Length Product in Computed Tomography.

Trattner S, Halliburton S, Thompson CM, Xu Y, Chelliah A, Jambawalikar SR, Peng B et al.
JACC Cardiovasc Imaging. 2018;11(1):64-74

Radiation Safety in Children with Congenital and Acquired Heart Disease: A Scientific Position Statement on Multimodality Dose Optimization from the Image Gently Alliance.

Hill KD, Frush DP, Han BK, Abbott BG, Armstrong AK, DeKemp RA et al.
JACC Cardiovasc Imaging. 2017 Jul;10(7):797-818.

Beta-blockers for cardiac CT: a primer for the radiologist.

Pannu HK, Alvarez Jr W, Fishman EK.
AJR Am J Roentgenol. 2006;186:S341-5.

4. INTERPRETATION OF CT IMAGES

A systematic approach for analysis, interpretation, and reporting of coronary CTA studies.

Karlo CA, Leschka S, Stolzmann P, Glaser-Gallion N, Wildermuth S, Alkadhi H.
Insights Imaging 2012;3:215-228.

SCCT guidelines for the interpretation and reporting of coronary CT angiography: a report of the Society of Cardiovascular Computed Tomography Guidelines Committee.

Leipsic J, Abbara S, Achenbach S, Cury R, Earls JP, Mancini GJ, et al.
J Cardiovasc Comput Tomogr. 2014;8(5):342-58.

CAD-RADS™: Coronary Artery Disease - Reporting and Data System: An Expert Consensus Document of the Society of Cardiovascular Computed Tomography (SCCT), the American College of Radiology (ACR) and the North American Society for Cardiovascular Imaging (NASCI). Endorsed by the American College of Cardiology.

Cury RC, Abbara S, Achenbach S, Agatston A4, Berman DS, Budoff M et al.
JACC Cardiovasc Imaging. 2016 Sep;9(9):1099-1113.

5. CARDIAC ANATOMY ON CT

Coronary veins: comprehensive CT-anatomic classification and review of variants and clinical implications.

Saremi F, Muresian H, Sánchez-Quintana D.
Radiographics. 2012;32(1):E1-32.



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6. CORONARY ARTERY DISEASE ASSESSMENT

SCCT guidelines for the interpretation and reporting of coronary CT angiography: a report of the Society of Cardiovascular Computed Tomography Guidelines Committee.

Leipsic J, Abbara S, Achenbach S, Cury R, Earls JP, Mancini GJ, et al.

J Cardiovasc Comput Tomogr. 2014;8(5):342–58

Congenital coronary artery anomalies: a bridge from embryology to anatomy and pathophysiology—a position statement of the development, anatomy, and pathology ESC Working Group.

Pérez-Pomares JM, de la Pompa JL, Franco D, Henderson D, Ho SY, Houyel L, et al.

Cardiovasc Res. 2016 Feb 1;109(2):204-16

Use of coronary computed tomographic angiography to guide management of patients with coronary disease.

Williams MC, Hunter A, Shah AS, et al.

J Am Coll Cardiol. 2016;67:1759–1768.

Atherosclerotic plaque characteristics by CT angiography identify coronary lesions that cause ischemia: a direct comparison to fractional flow reserve.

Park HB, Heo R, ó Hartaigh B, Cho I, Gransar H, Nakazato R, et al.

JACC Cardiovasc Imaging. 2015;8:1–11.

Coronary computed tomographic angiography as a gatekeeper to invasive diagnostic and surgical procedures: results from the multicenter CONFIRM (Coronary CT Angiography Evaluation For Clinical Outcomes: An International Multicenter) Registry.

Shaw LJ, Hausleiter J, Achenbach S, et al.

J Am Coll Cardiol. 2012;60:2103–2114.

Diagnosis of obstructive coronary artery disease using computed tomography angiography in patients with stable chest pain depending on clinical probability and in clinically important subgroups: meta-analysis of individual patient data.

Haase R, Schlattmann P, Gueret P, Andreini D, Pontone G, Alkadhi H, et al.

BMJ. 2019 12;365:l1945.

Guidelines ESCcP, and 2013 ESC guidelines on the management of stable coronary artery disease: the task force on the management of stable coronary artery disease of the European society of cardiology.

Task Force M, Montalescot, G., Sechtem, U., Achenbach, S. et al.

Eur Heart J. 2013; 34: 2949–3003

ESC/EACTS guidelines on myocardial revascularization: The task force on myocardial revascularization of the European society of cardiology (ESC) and the European association for cardio-thoracic surgery (EACTS) developed with the special contribution of the European association of percutaneous cardiovascular interventions (EAPCI).

Task Force M, Windecker, S., Kolh, P., Alfonso, F. et al.

Eur Heart J. 2014; 2014: 2541–2619.



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Coronary CT angiography versus standard evaluation in acute chest pain.

Hoffmann U, Truong QA, Schoenfeld DA, et al.

N Engl J Med. 2012;367:299–308.

Triple rule out versus coronary CT angiography in patients with acute chest pain: results from the ACIC Consortium.

Burris AC 2nd, Boura JA, Raff GL, et al.

JACC Cardiovasc Imaging. 2015;8:817–825.

Multidetector computed tomography coronary angiography for the assessment of coronary in-stent restenosis.

Andreini D, Pontone G, Mushtaq S, Pepi M, Bartorelli AL.

Am J Cardiol. 2010;105:645–55.

Use of 64-slice CT in symptomatic patients after coronary bypass surgery: evaluation of grafts and coronary arteries.

Malagutti P, Nieman K, Meijboom WB, van Mieghem CA, Pugliese F, Cademartiri F, et al.

Eur Heart J. 2007;28:1879–85.

Functional Evaluation of Coronary Disease by CT Angiography.

Gonçalves Pde A, Rodríguez-Granillo GA, Spitzer E, Suwannasom P, Loewe C, Nieman K, Garcia-Garcia HM.

JACC Cardiovasc Imaging. 2015 Nov;8(11):1322–35.

Noninvasive fractional flow reserve derived from coronary CT angiography: clinical data and scientific principles.

Min JK, Taylor CA, Achenbach S, Koo BK, Leipsic J, Nørgaard BL, et al.

JACC Cardiovasc Imaging. 2015;8:1209–22.

Diagnostic performance of noninvasive fractional flow reserve derived from coronary computed tomography angiography in suspected coronary artery disease: the NXT trial (Analysis of Coronary Blood Flow Using CT Angiography: Next Steps).

Nørgaard BL, Leipsic J, Gaur S, Seneviratne S, Ko BS, Ito H, NXT Trial Study Group, et al.

J Am Coll Cardiol. 2014;63:1145–55.

Clinical outcomes of fractional flow reserve by computed tomographic angiography-guided diagnostic strategies vs. usual care in patients with suspected coronary artery disease: the prospective longitudinal trial of FFR(CT): outcome and resource impacts study.

Douglas PS, Pontone G, Hlatky MA, et al.

Eur Heart J. 2015;36:3359–3367.

Static and dynamic assessment of myocardial perfusion by computed tomography.

Danad I, Szymonifka J, Schulman-Marcus J, Min JK.

Eur Heart J Cardiovasc Imaging. 2016 Aug;17(8):836–44.



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Fractional flow reserve and myocardial perfusion by computed tomography: a guide to clinical application.

Schuijf JD, Ko BS, Di Carli MF, Hislop-Jambrich J, Ihdahid AR, Seneviratne SK, Lima JAC.
Eur Heart J Cardiovasc Imaging. 2018 Feb 1;19(2):127-135.

Coronary CT Angiography and 5-Year Risk of Myocardial Infarction.

SCOT-HEART Investigators, Newby DE, Adamson PD, Berry C, et al.
N Engl J Med. 2018 Sep 6;379(10):924-933. doi: 10.1056/NEJMoa1805971. Epub 2018 Aug 25.

Coronary Computed Tomography Angiography as the Investigation of Choice for Stable Chest Pain.

Min JK, Newby DE.
JAMA Cardiol. 2019 Jul 3. doi: 10.1001/jamacardio.2019.2071

Comparison of International Guidelines for Assessment of Suspected Stable Angina: Insights From the PROMISE and SCOT-HEART.

Adamson PD, Newby DE, Hill CL, et al.
JACC Cardiovasc Imaging. 2018 Sep;11(9):1301-1310. doi: 10.1016/j.jcmg.2018.06.021.

7. CORONARY CALCIUM IMAGING

2016 SCCT/STR guidelines for coronary artery calcium scoring of noncontrast noncardiac chest CT scans: a report of the Society of Cardiovascular Computed Tomography and Society of Thoracic Radiology.

Hecht HS, Cronin P, Blaha MJ, Budoff MJ, Kazerooni EA, Narula J, et al.
J Cardiovasc Comput Tomogr. 2017;11:74–84.

Clinical indications for coronary artery calcium scoring in asymptomatic patients: expert consensus statement from the Society of Cardiovascular Computed Tomography.

Hecht H, Blaha MJ, Berman DS, Nasir K, Budoff M, Leipsic J, et al.
J Cardiovasc Comput Tomogr. 2017; 11:157–68.

8. ATHEROSCLEROTIC PLAQUE IMAGING

Histopathologic characteristics of atherosclerotic coronary disease and implications of the findings for the invasive and noninvasive detection of vulnerable plaques.

Narula J, Nakano M, Virmani R, Kolodgie FD, Petersen R, Newcomb R, et al.
J Am Coll Cardiol. 2013;61:1041–51.

Comprehensive plaque assessment by coronary CT angiography.

Maurovich-Horvat P, Ferencik M, Voros S, Merkely B, Hoffmann U.
Nat Rev Cardiol. 2014 J;11(7):390-402.



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Coronary plaque characterization using CT.

Saremi F and Achenbach S.

AJR Am J Roentgenol. 2015 Mar;204(3):W249-60

Plaque imaging with CT—a comprehensive review on coronary CT angiography based risk assessment.

Kolossváry M, Szilveszter B, Merkely B, and Maurovich-Horvat P.

Cardiovasc Diagn Ther. 2017 Oct; 7(5): 489–506.

9. CONGENITAL STRUCTURAL HEART DISEASE (IN ADULT PATIENTS)

Sequential segmental analysis.

Anderson RH and Shirali G.

Ann Pediatr Cardiol. 2009 Jan-Jun; 2(1): 24–35.

CT of congenital heart disease: normal anatomy and typical pathologic conditions.

Goo HW, Park IS, Ko JK, Kim YH, Seo DM, Yun TJ, Park JJ, Yoon CH.

Radiographics. 2003 Oct;23 Spec No:S147-65.

Technical principles of computed tomography in patients with congenital heart disease.

Stinn B, Stolzmann P, Fornaro J, Hibbeln D, Alkadhi H, Wildermuth S, Leschka S.

Insights Imaging. 2011 Jun;2(3):349-356.

Computed Tomography Imaging in Patients with Congenital Heart Disease Part I: Rationale and Utility. An Expert Consensus Document of the Society of Cardiovascular Computed Tomography (SCCT): Endorsed by the Society of Pediatric Radiology (SPR) and the North American Society of Cardiac Imaging (NASCI).

Han BK, Rigsby CK, Hlavacek A, Leipsic J, Nicol ED, Siegel MJ et al.

J Cardiovasc Comput Tomogr. 2015 Nov-Dec;9(6):475-92.

Computed Tomography Imaging in Patients with Congenital Heart Disease, Part 2: Technical Recommendations. An Expert Consensus Document of the Society of Cardiovascular Computed Tomography (SCCT): Endorsed by the Society of Pediatric Radiology (SPR) and the North American Society of Cardiac Imaging (NASCI).

Han BK, Rigsby CK, Leipsic J, Bardo D, Abbara S, Ghoshhajra B et al.

J Cardiovasc Comput Tomogr. 2015 Nov-Dec;9(6):493-513.

Venous Anomalies of the Thorax.

Demos TC, Posniak HV, Pierce KL, Olson MC and Muscato M.

American Journal of Roentgenology. 2004;182: 1139-1150.



10. MYOCARDIAL IMAGING

Computed tomography of cardiomyopathies.

Kalish K and Rajiah P.

Cardiovasc Diagn Ther. 2017 Oct; 7(5): 539–556.

Assessment of the myocardium with cardiac computed tomography.

Clayton B, Roobottom C, Morgan-Hughes G.

Eur Heart J Cardiovasc Imaging. 2014 Jun;15(6) :603-9.

Analysis of Ventricular Function by Computed Tomography.

Rizvi A, Roderick C, Deaño RC, Bachman DP, Xiong G, Min JK and Truong QA.

J Cardiovasc Comput Tomogr. 2015; 9(1): 1–12.

11. VALVULAR HEART DISEASE

Paravalvular leakage in patients with prosthetic heart valves: cardiac computed tomography findings and clinical features.

Koo HJ, Lee JY, Kim GH, Kang JW, Kim YH, Kim DH2 et al.

Eur Heart J Cardiovasc Imaging. 2018 Dec 1;19(12):1419-1427.

Computed tomography imaging in the context of transcatheter aortic valve implantation (TAVI) / transcatheter aortic valve replacement (TAVR): An expert consensus document of the Society of Cardiovascular Computed Tomography.

Blanke P, Weir-McCall JR, Achenbach S, Delgado V, Hausleiter J, Jilaihawi H, et al.

J Cardiovasc Comput Tomogr. 2019 Jan - Feb;13(1):1-20.

Mitral Valve Imaging with CT: Relationship with Transcatheter Mitral Valve Interventions.

Weir-McCall JR, Blanke P, Naoum C, Delgado V, Bax JJ, Leipsic J.

Radiology. 2018 Sep;288(3):638-655.

12. MISCELLANEOUS ACQUIRED STRUCTURAL HEART DISEASE

Radiography of cardiac conduction devices: a comprehensive review.

Aguilera AL, Volokhina YV, Fisher KL.

Radiographics.2011;31:1669–82.

Left atrial appendage studied by computed tomography to help planning for appendage closure device placement.

Wang Y, Di Biase L, Horton RP, Nguyen T, Morhanty P, Natale A.

J Cardiovasc Electrophysiol. 2010;21:973–82.