

# Optical Coherence Tomography in Lower Extremity Arterioplasty

Qinwen Luo<sup>1</sup>, Weiguo Xu<sup>2\*</sup>

<sup>1</sup>Zhuhai Clinical Medical College of Jinan University (Zhuhai People's Hospital, The Affiliated Hospital of Beijing Institute of Technology), Zhuhai, China

<sup>2</sup>Zhuhai Interventional Medical Center, Zhuhai People's Hospital (Zhuhai Hospital Affiliated with Jinan University), Zhuhai, China

Email: \*xwg315@sina.com

**How to cite this paper:** Luo, Q.W. and Xu, W.G. (2025) Optical Coherence Tomography in Lower Extremity Arterioplasty. *Journal of Biosciences and Medicines*, 13, 143-152. <https://doi.org/10.4236/jbm.2025.1310013>

**Received:** August 4, 2025

**Accepted:** October 14, 2025

**Published:** October 17, 2025

Copyright © 2025 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

Optical coherence tomography (OCT) offers unique advantages as a high-resolution real-time imaging tool for interventional therapies. It can be used to assess the characteristics of vascular and stents, guide interventional treatments, and provide clinicians with complete real-time imaging, all of which can improve surgical safety and efficacy. OCT is widely used in percutaneous coronary interventions with favorable outcomes. However, its application in peripheral vascular treatment is relatively limited, and sufficient trials to provide adequate clinical evidence to support its functionality are lacking. In this review, we outline the fundamental principles of OCT and discuss its potential use in interventions of the peripheral arteries, providing information for future research in this domain.

## Keywords

Optical Coherence Tomography, Peripheral Artery Disease, Interventional Therapy, Lower Limb Arterial Angioplasty

## 1. Introduction

With a globally aging population, the incidence of peripheral artery disease (PAD) has been steadily increasing every year, becoming a significant challenge in cardiovascular medicine. [1] Endovascular intervention remains the main approach to treating peripheral artery disease. Optical coherence tomography (OCT), as a high-resolution real-time imaging technique, has an axial resolution of up to 10 - 20  $\mu\text{m}$ , which is approximately 10 times higher than that of intravascular ultrasound

\*Corresponding author.

(IVUS). [2] OCT can clearly show the microscopic details of the vessel lumen and provides a more accurate description of the lesion from a more comprehensive dimension, which facilitates the diagnosis and treatment of diseases. OCT has been widely used in the coronary artery, [3] ophthalmology, [4] neurology, [5] dermatology, [6] and other clinical domains. Several studies have indicated that OCT of the peripheral vasculature is safe and feasible. [7] [8]

### Principles

OCT uses near-infrared light as the light source and a Michelson interferometer as the core optical structure to generate optical interference signals for imaging. Light is emitted by a low-coherence source (broadband light source), a superluminescent diode (SLD), which is coupled to a single-mode optical fiber. The light is divided into two parts at the optical fiber coupler: the reference light, which is collimated by a lens and reflected by a flat mirror, and the sample light beam, which focuses onto the tested sample via a lens. The backscattered light from the tested sample and the reference light reflected by the mirror converged on the detector. Interference occurs when the difference in the optical path length is within the coherence length of the light source. The output signal of the detector reflects the intensity of the backscattered light from the medium. [9] [10]

First-generation time-domain optical coherence tomography (TD-OCT) creates interference by adjusting the position of the reference arm to generate optical path length differences corresponding to depth, thereby providing depth information. Lateral scanning is performed by moving or rotating the samples horizontally. Owing to the uneven movement speed of the mechanical structure, the sample must remain stationary for an extended time during the collection process, leading to significant errors. New-generation frequency domain-OCT (FD-OCT) is an improved version of TD-OCT. It replaces the mechanical scanning structure of the reference arm with a spectrometer, and the depth information is obtained by Fourier transformation of the collected interference patterns. Signals from different depths within tissues can be acquired by adjusting the distance of the reference arm. In addition, signals from different depths can be obtained by emitting light waves of different wavelengths from the light source while keeping the reference mirror fixed. This eliminates the need for a mechanical arm to move, allowing scanning to be completed in a fixed position. Three-dimensional images of the samples are obtained by two-dimensional lateral scanning. FD-OCT systems offer faster acquisition times with a pull-back speed of 20 mm/s, allowing the scanning of 50 mm of arteries in approximately 3 s. Furthermore, FD-OCT provides an increased penetration depth, a higher sample line density per frame, and a wider scanning range. [11]-[13] Overall, FD-OCT, while maintaining the same high resolution as TD-OCT, has achieved an exponential increase in imaging speed through technological innovation, thus replacing TD-OCT as the mainstream in clinical practice.

## 2. Assessing Atherosclerotic Plaque

Atherosclerosis of the intima in the lower extremity arteries is a significant cause

of peripheral artery atherosclerotic occlusive disease. The degree of atherosclerotic narrowing in the lower-extremity arteries is closely associated with the clinical progression of the disease. Intravascular OCT can effectively identify the morphological characteristics of atherosclerotic plaques in lower extremity arteries and serves as an ideal tool for assessing plaque characteristics.

On the OCT images, the calcified plaque regions appear as well-defined inhomogeneous low signals, the fibrotic plaque regions appear as homogeneous high signals, and the lipid plaque regions appear as diffuse low signals with a signal-rich fibrous cap covering them. [3] The more calcification and fibrous tissue a plaque contains, the higher the grayscale median value of the plaque is. In a retrospective study, Hartwig *et al.* [14] included 140 patients who underwent lower limb revascularization with an Ocelot catheter. The median grayscale plaque value in the proximal cap of occlusive lesions effectively predicted the success rate of catheter passage through chronic occlusions of the superficial femoral artery by comparing plaque morphology in the proximal cap, midpoint, and distal cap of the lesion.

### 3. Evaluation of Thrombus Morphology Characteristics

Thrombosis is a critical factor that influences patient prognosis after stent implantation. Studies have indicated that intrastent thrombosis can cause intrastent restenosis, affecting long-term patency. [15] Intravascular OCT not only provides abundant information about plaque characteristics, but also effectively assesses intrastent thrombosis and its morphological characteristics. In OCT images, thrombi are depicted as prominent masses that adhere to the luminal surface or float within the lumen. They are categorized as red and white thrombi, with the former showing high-attenuation areas and the latter showing low-attenuation areas. Hideaki *et al.* [16] reported a case of follow-up after implantation of a paclitaxel-coated nitinol drug-eluting stent (Zilver PTX); the results revealed that the coverage of the stent strut increased, but some mural thrombi remained within the stent, which may guide the optimal duration of dual antiplatelet therapy for patients treated with drug-eluting stents (DES); however, the relationship between them still needs to be further explored.

### 4. Femoral Artery Lesion

Endovascular OCT not only effectively identifies balloon-induced dissections, but may also help avoid the risk of implantation of a stent in the false lumen during surgery and can achieve full coverage of dissections. [17] [18] Furthermore, intravascular OCT has been used for real-time assessment of post-treatment conditions in the femoral artery. Using its high axial resolution, strut malapposition and tissue prolapse can be clearly visualized after stent placement. Strut malapposition is defined as the axial distance from the strut surface to the lumen surface of >200  $\mu\text{m}$  or the axial distance from the strut surface to the lumen surface greater than the thickness of the stent. Tissue prolapse is defined as any visible tissue protrud-

ing into the lumen between the stent struts. These factors are closely associated with the progression of ISR of in-stent restenosis. [7]

Digital subtraction angiography (DSA) remains the gold standard for diagnosing lower extremity arterial stenosis. However, intravascular OCT, as an adjunct to DSA, can effectively identify components that may not be adequately visualized using conventional DSA. Gregory *et al.* [19] described a patient who underwent percutaneous endovascular angioplasty for femoral artery restenosis, and whose immediate postoperative OCT revealed a restrictive dissection that was not adequately visualized using DSA, accurately measuring the extent and depth of the dissection. Karnabatidis *et al.* [7] reported that in 20 patients with atherosclerotic diseases of the femoropopliteal artery after balloon angioplasty, five cases of severe dissections with significant luminal damage were identified by intravascular OCT, and three of them were not visualized by DSA. This suggests that the combination of intravascular OCT and DSA can improve the detection rate of vascular dissections.

OCT can also be used to assess directional atherectomy (DA). Konstantinos *et al.* [20] reported a case in which directional atherectomy with Silver Hawk, followed by balloon angioplasty, was performed using intravascular OCT, which yielded optimal vascular imaging and OCT results. Chi *et al.* [21] demonstrated that OCT after DA provides high-resolution images of baseline plaque burden and offers insight into the effects and complications of directional atherectomy, including microscopic dissections, residual clots, and suboptimal minimal lumen areas.

OCT can also be used for the long-term follow-up of patients after stent implantation. OCT can accurately measure neointimal thickness [22] and provides visual observation of postoperative restenosis. Tomoi *et al.* [23] used OCT to observe neointimal thickness and apposition on each strut, the incidence of extra-stent lumen (ESL), peristrut low-intensity area (PLIA), and neovascularization at 1-mm intervals. They compared vascular responses at 6 and 12 months after Zilver PTX treatment for femoral artery lesions. The results showed a gradual increase in the average thickness of the neointima within the stent (480  $\mu\text{m}$  vs. 540  $\mu\text{m}$ ,  $p < 0.001$ ), low-intensity areas around the stent (29% vs. 44%,  $p < 0.001$ ), and the formation of new vessels (14% vs. 27%,  $p < 0.001$ ). This suggests that even 12 months after Zilver PTX implantation, delayed vascular healing and persistent inflammation may have occurred. Additionally, intravascular OCT can quantify inflammatory indicators within the stent after the procedure. [24] Clinical studies have confirmed that inflammatory reactions within the vessel contribute to restenosis in the stent, ultimately affecting the long-term clinical prognosis. [15]

## 5. Infrapopliteal Artery Lesion

Currently, the use of intravascular OCT to understand and assess lesions in inferior inguinal arterial stenosis remains in the exploratory stage. OCT not only provides high-quality images and an accurate assessment of the vascular lumen and wall, [25] [26] but also clearly displays various characteristics of lesions, such as thrombi, different types of plaques, and macrophage infiltration. An accurate

identification of these characteristics can better guide the treatment of inferior inguinal arterial stenosis to improve the long-term patency of the below-knee arteries. [25]

Intravascular OCT can also be used in the long-term follow-up of patients after implantation of an inferior inguinal artery stent to assess post-treatment results. In a single-center prospective study, 12 patients with inferior inguinal arterial stenosis who underwent DES implantation were followed using OCT. The results revealed that lipid neointima and neovascularization were observed in 84.2% and 68.4% of the 19 DES implants, respectively. Furthermore, the percentage of restenosis was higher in symptomatic patients than in asymptomatic patients. [8] Recent studies have shown that in-stent restenosis in the lower extremity arteries is strongly associated with intimal atherosclerosis. [27]

## 6. Utilization of Oct-Derived Devices

OCT-derived intravascular therapeutic devices mainly include the Ocelot and Pantheris products from Avinger, which are produced in the United States. Ocelot is an OCT-equipped chronic total occlusion (CTO) crossing catheter with a helical wedge at its distal end, allowing the catheter to rotate forward through occluded arteries. This not only guides the catheter safely, preventing possible vascular endothelial damage and perforation, but can also be used to diagnose plaque morphology, which can improve the safety and efficacy of treatment. [28]-[32] In the prospective, single-arm, multicenter Vision study, [33] Ocelot catheters were used for the treatment of 198 lesions alone or in combination with adjunctive therapies such as stent implantation. The study did not report clinically significant perforations, 0.5% dissections, or 2% embolic events. Stavroulakis *et al.* [34] investigated the long-term results of Ocelot catheters combined with drug-eluting balloon (DCB) angioplasty for intravascular reconstruction. The results indicated that in 33 patients with 37 lesions, reconstruction occurred in only 5% of the patients within 12 months, with low perioperative complications.

Another OCT-derived device, Pantheris, combines OCT imaging fibers with an atherectomy device, which has a curved tip containing an OCT imaging fiber, a cutting blade, and a balloon underneath the cutting device that adjusts the angle of incision to accurately remove the hyperplastic neointima without damaging the vessel wall and achieving a larger lumen. Schwindt *et al.* [33] used the Pantheris device for directional atherectomy, removing 62% of lesions without damaging or contacting the adventitia; in 82% of excised tissue, the adventitia was less than 1%. In a multicenter prospective study, [35] eleven patients underwent atherectomy using the Pantheris device. The results showed a 94% intimal plaque removal rate with no mechanical complications. At 6 months of follow-up, only 18% (n = 2) of the patients experienced revascularization of the target lesion. These studies confirmed the safety and effectiveness of OCT-guided directional atherectomy for the treatment of femoropopliteal occlusive disease, with satisfactory long-term clinical outcomes.

## 7. Limitations

Intravascular OCT has some limitations. Low tissue penetration of low-coherence near-infrared light and the influence of high blood levels make the evaluation of diseased vessels in lower limb lesions with vessel wall thickness > 2 mm and vessel lumen diameter > 7 mm poor. [2] [25] [36] When lesions have a side-branch blood supply or proximal stenosis, it is difficult to completely flush the blood from the vessel lumen using contrast medium or saline, and the image quality acquired by OCT is poor. OCT scans a relatively short length of the vessel in one step, necessitating repeated scans and increasing the total fluid volume during the procedure, which can be a burden for patients with dialysis or heart failure. OCT adopts a single-track design that requires a guidewire to guide delivery. The catheter is difficult to push into heavily calcified occluded lower-extremity vessels and may damage the vessels; its ability to explore distal vessels is limited. However, it has been shown that the contrast agent used for OCT imaging can exacerbate renal failure. [37] However, CO<sub>2</sub> can also be used as a blood-clearance medium to capture OCT images with the same results as iodinated contrast agents. [38] Compared with IVUS, the catheter cost of OCT is higher, and the operation requires blood removal to obtain clear images, which limits its practicality in areas with rich blood flow. However, its resolution advantage is crucial when evaluating fine structures.

## 8. Conclusion

Intravascular OCT, a high-resolution intravascular imaging technology, is not yet used for routine treatment in lower-extremity vascular disease interventions, but it possesses unique advantages over other imaging modalities. Compared to IVUS, OCT not only accurately measures the diameter of the vascular lumen, [39] guiding the selection of balloon or stent size and positioning, [40] but it also provides superior visualization of the layers of the vascular wall, various plaque characteristics, and conditions in the stent compared to IVUS. [2] [25] [41] Unlike DSA, intravascular OCT offers advantages such as shorter acquisition times, higher resolution, and reduced radiation exposure. It can clearly display detailed features within the lower-extremity vascular lumen, providing a reliable reference for interventional procedures. In the future, with advances in intravascular technologies and equipment updates, we believe that intravascular OCT will be more widely explored and will find increasing application in the field of lower-limb vascular interventional therapy.

## Authors' Contributions

Qinwen Luo: Conceptualization, investigation, and writing of the original draft.  
Weiguo Xu: Writing, reviewing, and editing.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] Criqui, M.H. and Aboyans, V. (2015) Epidemiology of Peripheral Artery Disease. *Circulation Research*, **116**, 1509-1526. <https://doi.org/10.1161/circresaha.116.303849>
- [2] Spiliopoulos, S., Kitrou, P., Katsanos, K. and Karnabatidis, D. (2017) FD-OCT and IVUS Intravascular Imaging Modalities in Peripheral Vasculature. *Expert Review of Medical Devices*, **14**, 127-134. <https://doi.org/10.1080/17434440.2017.1280391>
- [3] Araki, M., Park, S.J., Dauerman, H.L., *et al.* (2022) Optical Coherence Tomography in Coronary Atherosclerosis Assessment and Intervention. *Nature Reviews Cardiology*, **19**, 684-703.
- [4] Adejumo, T., Son, T., Ma, G., Rahimi, M., Dadzie, A., Ding, J., *et al.* (2025) Doppler OCT Verifies Pulsation-Induced Anisotropic Vessel Lumen Dynamics in the Human Retina. *Optics Letters*, **50**, 3903-3906. <https://doi.org/10.1364/ol.555324>
- [5] Xie, J.S., Donaldson, L. and Margolin, E. (2022) The Use of Optical Coherence Tomography in Neurology: A Review. *Brain*, **145**, 4160-4177. <https://doi.org/10.1093/brain/awac317>
- [6] Abignano, G., Aydin, S.Z., Castillo-Gallego, C., Liakouli, V., Woods, D., Meekings, A., *et al.* (2013) Virtual Skin Biopsy by Optical Coherence Tomography: The First Quantitative Imaging Biomarker for Scleroderma. *Annals of the Rheumatic Diseases*, **72**, 1845-1851. <https://doi.org/10.1136/annrheumdis-2012-202682>
- [7] Karnabatidis, D., Katsanos, K., Paraskevopoulos, I., Diamantopoulos, A., Spiliopoulos, S. and Siablis, D. (2010) Frequency-Domain Intravascular Optical Coherence Tomography of the Femoropopliteal Artery. *CardioVascular and Interventional Radiology*, **34**, 1172-1181. <https://doi.org/10.1007/s00270-010-0092-8>
- [8] Paraskevopoulos, I., Spiliopoulos, S., Davlouros, P., Karnabatidis, D., Katsanos, K., Alexopoulos, D., *et al.* (2013) Evaluation of Below-the-Knee Drug-Eluting Stents with Frequency-Domain Optical Coherence Tomography: Neointimal Hyperplasia and Neoatherosclerosis. *Journal of Endovascular Therapy*, **20**, 80-93. <https://doi.org/10.1583/12-4091.1>
- [9] Huang, D., Swanson, E.A., Lin, C.P., Schuman, J.S., Stinson, W.G., Chang, W., *et al.* (1991) Optical Coherence Tomography. *Science*, **254**, 1178-1181. <https://doi.org/10.1126/science.1957169>
- [10] Fujimoto, J.G., Brezinski, M.E., Tearney, G.J., Boppart, S.A., Bouma, B., Hee, M.R., *et al.* (1995) Optical Biopsy and Imaging Using Optical Coherence Tomography. *Nature Medicine*, **1**, 970-972. <https://doi.org/10.1038/nm0995-970>
- [11] Yoon, J.H., Di Vito, L., Moses, J.W., *et al.* (2012) Feasibility and Safety of the Second-Generation, Frequency Domain Optical Coherence Tomography (FD-OCT): A Multicenter Study. *Journal of Invasive Cardiology*, **24**, 206-209.
- [12] Takarada, S., Imanishi, T., Liu, Y., Ikejima, H., Tsujioka, H., Kuroi, A., *et al.* (2009) Advantage of Next-Generation Frequency-Domain Optical Coherence Tomography Compared with Conventional Time-Domain System in the Assessment of Coronary Lesion. *Catheterization and Cardiovascular Interventions*, **75**, 202-206. <https://doi.org/10.1002/ccd.22273>
- [13] Bezerra, H.G., Costa, M.A., Guagliumi, G., Rollins, A.M. and Simon, D.I. (2009) Intracoronary Optical Coherence Tomography: A Comprehensive Review: Clinical and Research Applications. *JACC: Cardiovascular Interventions*, **2**, 1035-1046. <https://doi.org/10.1016/j.jcin.2009.06.019>
- [14] Hartwig, J.W., Braet, D.J., Smith, J.B., Bath, J. and Vogel, T.R. (2021) Optical Coherence Tomography and Plaque Morphology for Revascularization of the Superficial

- Femoral Artery. *Quantitative Imaging in Medicine and Surgery*, **11**, 290-299. <https://doi.org/10.21037/qims-20-707>
- [15] Lichtenberg, M.K., Carr, J.G. and Golzar, J.A. (2017) Optical Coherence Tomography: Guided Therapy of In-Stent Restenosis for Peripheral Arterial Disease. *The Journal of Cardiovascular Surgery*, **58**, 518-527. <https://doi.org/10.23736/s0021-9509.17.09946-3>
- [16] Aihara, H., Soga, Y. and Kuramitsu, S. (2015) Serial Optical Coherence Tomography Assessments at 2- and 4-Month Follow-Up after Paclitaxel-Eluting Stenting of the Superficial Femoral Artery. *Cardiovascular Intervention and Therapeutics*, **30**, 138-141. <https://doi.org/10.1007/s12928-014-0261-9>
- [17] Marmagkiolis, K., Lendel, V., Leesar, M.A., *et al.* (2014) Use of Optical Coherence Tomography during Superficial Femoral Artery Interventions. *Journal of Invasive Cardiology*, **26**, 220-223.
- [18] Porto, I., Ducci, K.J., Angioli, P., Grotti, S., Falsini, G., Vergallo, R., *et al.* (2014) Optical Frequency-Domain Imaging to Guide Implantation of a Paclitaxel-Eluting Stent in the Femoral Artery. *Journal of Endovascular Therapy*, **21**, 456-459. <https://doi.org/10.1583/13-4634.1>
- [19] Stefano, G.T., Mehanna, E. and Parikh, S.A. (2013) Imaging a Spiral Dissection of the Superficial Femoral Artery in High Resolution with Optical Coherence Tomography—Seeing Is Believing. *Catheterization and Cardiovascular Interventions*, **81**, 568-572. <https://doi.org/10.1002/ccd.24292>
- [20] Marmagkiolis, K., Lendel, V. and Cilingiroglu, M. (2015) OCT Evaluation of Directional Atherectomy Compared to Balloon Angioplasty. *Cardiovascular Revascularization Medicine*, **16**, 373-375. <https://doi.org/10.1016/j.carrev.2015.02.003>
- [21] Chi, W.K., Tan, G., Chan, C.Y. and Yan, B. (2019) Optical Coherence Tomography Evaluation of Superficial Femoral Artery Directional Atherectomy. *Journal of Invasive Cardiology*, **31**, E93-E94. <https://doi.org/10.25270/jic/19.3105.e93>
- [22] Fujimoto, T., Tsubata, H., Zen, K., Ogura, E. and Matoba, S. (2023) Optical Coherence Tomography Finding for Restenosis in the Superficial Femoral Artery Treated with Paclitaxel-Coated Balloon. *Cardiovascular Intervention and Therapeutics*, **39**, 93-94. <https://doi.org/10.1007/s12928-023-00955-6>
- [23] Tomoi, Y., Kuramitsu, S., Soga, Y., Aihara, H., Ando, K. and Nobuyoshi, M. (2015) Vascular Response after Zilver PTX Stent Implantation for Superficial Femoral Artery Lesions: Serial Optical Coherence Tomography Findings at 6 and 12 Months. *Journal of Endovascular Therapy*, **22**, 41-47. <https://doi.org/10.1177/1526602814566577>
- [24] Hoyt, T., Feldman, M.D., Okutucu, S., Lendel, V., Marmagkiolis, K., McIntosh, V., *et al.* (2020) Assessment of Vascular Patency and Inflammation with Intravascular Optical Coherence Tomography in Patients with Superficial Femoral Artery Disease Treated with Zilver PTX Stents. *Cardiovascular Revascularization Medicine*, **21**, 101-107. <https://doi.org/10.1016/j.carrev.2019.07.009>
- [25] Eberhardt, K.M., Treitl, M., Boesenecker, K., Maxien, D., Reiser, M. and Rieger, J. (2013) Prospective Evaluation of Optical Coherence Tomography in Lower Limb Arteries Compared with Intravascular Ultrasound. *Journal of Vascular and Interventional Radiology*, **24**, 1499-1508. <https://doi.org/10.1016/j.jvir.2013.06.015>
- [26] Kawamori, H., Konishi, A., Shinke, T., Akahori, H., Ishihara, M., Tsujita, H., *et al.* (2021) Efficacy of Optical Frequency Domain Imaging in Detecting Peripheral Artery Disease: The Result of a Multi-Center, Open-Label, Single-Arm Study. *Heart and Vessels*, **36**, 818-826. <https://doi.org/10.1007/s00380-020-01758-y>

- [27] Müller, A., Bradaric, C., Kafka, A., Joner, M., Cassese, S., Xhepa, E., *et al.* (2023) Prevalence and Patterns of In-Stent Neoatherosclerosis in Lower Extremity Artery Disease. *EuroIntervention*, **18**, 1462-1470. <https://doi.org/10.4244/eij-d-22-00615>
- [28] Schwindt, A., Reimers, B., Scheinert, D., Selmon, M., Pigott, J.P., George, J.C., *et al.* (2013) Crossing Chronic Total Occlusions with the Ocelot System: The Initial European Experience. *EuroIntervention*, **9**, 854-862. <https://doi.org/10.4244/eijv9i7a139>
- [29] Selmon, M.R., Schwindt, A.G., Cawich, I.M., Chamberlin, J.R., Das, T.S., Davis, T.P., *et al.* (2013) Final Results of Thechronic Total Occlusioncrossing with Theocelot System II (CONNECT II) Study. *Journal of Endovascular Therapy*, **20**, 770-781. <https://doi.org/10.1583/13-4380mr.1>
- [30] Schaeffers, J.F., Schwindt, A.G., Maritati, G., Torsello, G. and Pannucio, G. (2018) Outcome after Crossing Femoropopliteal Chronic Total Occlusions Based on Optical Coherence Tomography Guidance. *Vascular and Endovascular Surgery*, **52**, 27-33. <https://doi.org/10.1177/1538574417740057>
- [31] Nowakowski, P., Buszman, P., Janas, A., Kiesz, S. and Buszman, P. (2019) Five-Year Outcomes after Revascularization of Superficial Femoral Artery Occlusion Using Ocelot Catheter. *Advances in Interventional Cardiology*, **15**, 472-476. <https://doi.org/10.5114/aic.2019.90222>
- [32] Sewall, L. (2015) Treatment of Chronic Total Occlusions Using the Avinger Ocelot Crossing Catheter. *Seminars in Interventional Radiology*, **32**, 370-373. <https://doi.org/10.1055/s-0035-1564703>
- [33] Schwindt, A.G., Bennett Jr., J.G., Crowder, W.H., Dohad, S., Janzer, S.F., George, J.C., *et al.* (2017) Lower Extremity Revascularization Using Optical Coherence Tomography-Guided Directional Atherectomy: Final Results of the Evaluation of the Pantheris Optical Coherence Tomography Imaging Atherectomy System for Use in the Peripheral Vasculature (VISION) Study. *Journal of Endovascular Therapy*, **24**, 355-366. <https://doi.org/10.1177/1526602817701720>
- [34] Stavroulakis, K., Bisdas, T., Torsello, G., Argyriou, A., Bollenberg, L. and Schwindt, A. (2019) Optical Coherence Tomography Guided Directional Atherectomy with Antirestenotic Therapy for Femoropopliteal Arterial Disease. *The Journal of Cardiovascular Surgery*, **60**, 191-197. <https://doi.org/10.23736/s0021-9509.19.10843-9>
- [35] Cawich, I., Paixao, A.R.M., Marmagkiolis, K., Lendel, V., Rodriguez-Araujo, G., Rollefson, W.A., *et al.* (2016) Immediate and Intermediate-Term Results of Optical Coherence Tomography Guided Atherectomy in the Treatment of Peripheral Arterial Disease: Initial Results from the Vision Trial. *Cardiovascular Revascularization Medicine*, **17**, 463-467. <https://doi.org/10.1016/j.carrev.2016.07.002>
- [36] Allemang, M.T., Lakin, R.O., Kanaya, T., Eslahpazir, B.A., Bezerra, H.G. and Kashyap, V.S. (2014) The Use of Dextran and Carbon Dioxide for Optical Coherence Tomography in the Superficial Femoral Artery. *Journal of Vascular Surgery*, **59**, 238-240. <https://doi.org/10.1016/j.jvs.2013.03.006>
- [37] Morcos, R., Kucharik, M., Bansal, P., Al Taii, H., Manam, R., Casale, J., *et al.* (2019) Contrast-Induced Acute Kidney Injury: Review and Practical Update. *Clinical Medicine Insights: Cardiology*, **13**, 1-9. <https://doi.org/10.1177/1179546819878680>
- [38] Memon, S., Janzer, S. and George, J.C. (2022) Safety and Outcomes of Combined Carbon Dioxide Angiography and Oct-Guided Femoro-Popliteal Chronic Total Occlusion Crossing and Directional Atherectomy in Patients with Chronic Kidney Disease. *Vascular*, **30**, 72-80. <https://doi.org/10.1177/1708538121994373>
- [39] Maehara, A., Ben-Yehuda, O., Ali, Z., Wijns, W., Bezerra, H.G., Shite, J., *et al.* (2015) Comparison of Stent Expansion Guided by Optical Coherence Tomography versus

- Intravascular Ultrasound: The ILUMIEN II Study (Observational Study of Optical Coherence Tomography [OCT] in Patients Undergoing Fractional Flow Reserve [FFR] and Percutaneous Coronary Intervention). *JACC: Cardiovascular Interventions*, **8**, 1704-1714. <https://doi.org/10.1016/j.jcin.2015.07.024>
- [40] Dallan, L.A.P., Zimin, V.N., Lee, J., Gharaibeh, Y., Kim, J.N., Pereira, G.T.R., *et al.* (2022) Assessment of Post-Dilatation Strategies for Optimal Stent Expansion in Calcified Coronary Lesions: *Ex Vivo* Analysis with Optical Coherence Tomography. *Cardiovascular Revascularization Medicine*, **43**, 62-70. <https://doi.org/10.1016/j.carrev.2022.05.004>
- [41] Pavillard, E. and Sewall, L. (2020) A Post-Market, Multi-Vessel Evaluation of the Imaging of Peripheral Arteries for Diagnostic Purposes Comparing Optical Coherence Tomography and Intravascular Ultrasound Imaging (SCAN). *BMC Medical Imaging*, **20**, Article No. 18. <https://doi.org/10.1186/s12880-020-0420-7>