

EKOS Bibliography

(All peer reviewed unless otherwise noted)

Clinical Applications

Venous & Arterial Occlusions

Arko FR, Arko MZ, Murphy EH. "Endovascular Intervention for Lower-Extremity Deep Vein Thrombosis". *Vascular Disease Management*, Vol. 8, No. 3, March 2011, pE71-E79.

Crouch S, Hill D, Bridwell D. "New Technology for the Treatment of Peripheral Arterial and Venous Occlusions: Ultrasound Accelerated Thrombolysis". *Journal of Radiology Nursing*, 2008; 27(1):14-21.

Doomernik DE, Schrijver AM, Zeebregts CJ, de Vries J-PPM, Reijnen MMPJ. "Advancements in Catheter-directed Ultrasound-Accelerated Thrombolysis". *Journal of Endovascular Therapy*, 2011;18:418-434.

Grommes J, Strijkers R, Greiner A, Mahnken AH, Wittens CHA. "Safety and Feasibility of Ultrasound-accelerated Catheter-directed Thrombolysis in Deep Vein Thrombosis". *European Journal of Vascular and Endovascular Surgery*, 2011; 41:526-532.

Khan IR, Reeves JG, Riesenman PJ, Kasirajan K. "Simultaneous Arterial and Venous Ultrasound-Assisted Thrombolysis for Phlegmasia Cerulea Dolens". *Annals of Vascular Surgery*, 2011;25:696.e7-696.e10.

Karthikesalingam A, Young EL, Hinchliffe RJ, Loftus IM, Thompson MM, Holt PJE. "A Systematic Review of Percutaneous Mechanical Thrombectomy in the Treatment of Deep Venous Thrombosis". *European Journal of Vascular and Endovascular Surgery*, 2011;41:554-565.

Lin PH, Ochoa LN, Duffy P. "Catheter-Directed Thrombectomy and Thrombolysis for Symptomatic Lower-Extremity Deep Vein Thrombosis: Review of Current Interventional Treatment Strategies". *Perspectives in Vascular Surgery and Endovascular Therapy*, Vol. 22, No. 3, p152-163.

Marchigiano G, Riendeau D, Morse CJ. "Thrombolysis of Acute Deep Vein Thrombosis". *Critical Care Nursing Quarterly*, 2006; 29:312-323.

Motarjeme A. "Ultrasound-Enhanced Thrombolysis". *Journal of Endovascular Therapy*, 2007; 14(2):251-256.

Parikh S, Motarjeme A, McNamara T, Raabe R, Hagspiel K, Benenati J, Sterling K, Comerota A. "Ultrasound-accelerated Thrombolysis for the Treatment of Deep

Vein Thrombosis: Initial Clinical Experience". Journal of Vascular and Interventional Radiology, 2008; 19(4) 521-528.

Clinical Applications

Venous & Arterial Occlusions, continued

Raabe R. "Ultrasound-accelerated Thrombolysis in Arterial and Venous Peripheral Occlusions: Fibrinogen Level Effects", JVIR, August 2010; 21:1165-1172

Schrijver AM, Reijnen MMPJ, van Oostayen JA, Nolthenius RPJT, van der Valk PHM, Hoksbergen AWJ, Lely RJ, Fioole B, Vroegindewey DV, van Leersum M, de Vries JPPM. "Dutch Randomized Trial Comparing Standard Catheter-Directed Thrombolysis Versus Ultrasound-Accelerated Thrombolysis for Thromboembolic Infrainguinal Disease (DUET): Design and Rationale". Trials, 2011;12:20.

Schrijver AM, Reijnen MMPJ, van Oostayen JA, Hoksbergen AWJ, Lely RJ, van Leersum M, de Vries JPPM. "Initial Results of Catheter-Directed Ultrasound-Accelerated Thrombolysis for Thromboembolic Obstructions of the Aortofemoral Arteries: A Feasibility Study". Cardiovascular and interventional Radiology, 2011;May 2 [Epub ahead of print].

Schrijver AM, Vos JA, Hoksbergen AWJ, Fioole B, Fritschy WM, Hulsebos RG, de Jong SC, Reijnen MPPJ, de Vries JPPM. "Ultrasound-Accelerated Thrombolysis for Lower Extremity Ischemia: Multicenter Experience and Literature Review". Journal of Cardiovascular Surgery, 2011;52(4):467-476.

Sheridan, R.L., "Case 41-2009: A 16 Year-Old Boy with Hypothermia and Frostbite", New England Journal of Medicine, December 31, 2009; 2654-62.

Vendanthem, S., Millward, SF., Cardella, JF, Hofmann, LV, Razavi, MK, Grassi, CJ, Sacks, D, Kinney, TB. Society of Interventional Radiology Position Statement: Treatment of Acute Iliofemoral Deep Vein thrombosis with Use of Adjunctive Catheter-Directed Intrathrombus Thrombolysis, JVIR, July 2009, Vol. 20, No. 7S. S332-S335.

Wissgott C, Richter A, Kamusella P, Steinkamp H. "Treatment of Critical Limb Ischemia Using Ultrasound-Enhanced Thrombolysis (PARES TRIAL): Final Results". Journal of Endovascular Therapy, 2007; 14(4):438-443.

Graft thrombosis

Stambo, GW, Gabriel, Y. "Endovascular treatment of a chronically occluded limb of endograft with combination TNK pharmacological and EKOS thrombolytic catheter system". Radiography, 2011; 17(1): 81-83.

Safety of EKOS Technology

EKOS ultrasound is safe in vivo

Prokop AF, Soltani A, Roy RA. "Cavitation Mechanisms in Ultrasound-Accelerated Fibrinolysis". *Ultrasound in Medicine and Biology*, 2007; 33:924-33.

Prokop AF, Soltani A, Roy RA. "Mechanisms Responsible for Ultrasound-accelerated Fibrinolysis in the Presence and Absence of Optison™." *IEEE International Ultrasonics Symposium 2006*, 1D-3.

Raabe R, "Ultrasound-Accelerated Thrombolysis in Arterial and Venous Peripheral Occlusions: Fibrinogen Level Effects." *JVIR*, 2010; 21:1165-1172.

Soltani A, Singhal R, Jorge L. Garcia, Narayan R. Raju. "Absence of Biological damage from prolonged exposure to intravascular ultrasound: A swine model". *Ultrasonics*, 2007; 46:60-7.

Soltani A. "The safety of using low intensity ultrasound to enhance thrombolysis". *Official Proceedings of ISTU 2005*, 233-238.

Drugs are unaffected by EKOS ultrasound field

Soltani A, Soliday C. "Effect of ultrasound on enzymatic activity of selected plasminogen activators." *Thrombosis Research*, 2007; 119: 223-228.

Soltani A. "The safety of high frequency, low intensity ultrasound to enhance thrombolysis." *Official Proceedings of ISTU 2005*, 233-238.

Soltani A, Prokop AF, Vaezy S. "Stability of alteplase in presence of cavitation" *Ultrasonics* 2008, 48; 109-116.

Science of Ultrasound Drug Delivery

Drug penetration into a clot is enhanced by ultrasound

Atar S, Luo H, Nagai T, Sahm R, Fishbein M, Siegel R. "Arterial Thrombus Dissolution In Vivo by Use of a Transducer-Tipped, High Frequency Ultrasound Catheter and Local Low-Dose Urokinase Delivery". *Journal of Endovascular Therapy*, 2001; 8:282-290.

Atar S. "The Use of Transducer-Tipped Ultrasound Catheter for Recanalization of Thrombotic Arterial Occlusions". *Echocardiography*, Vol. 18, No. 3, April 2001, p233-37

Science of Ultrasound Drug Delivery

Drug penetration into a clot is enhanced by ultrasound, continued

Francis C, Blinc A, Lee S, Cox C. "Ultrasound Accelerates Transport of Recombinant Tissue Plasminogen Activator Into Clots". *Ultrasound in Medicine and Biology*, 1995; 21(3):419-424.

Siddiqi F, Blinc A, Braaten J, Francis C. "Ultrasound Increases Flow Through Fibrin Gels". *Thrombosis and Haemostasis*, 1995; 73:495-498.

EKOS proprietary waveforms are more effective at drug delivery

Soltani A, Volz KR, Hansmann DR. "Effect of modulated ultrasound parameters on ultrasound-induced thrombolysis." *Physics in Medicine and Biology*, 2008; 53:6837-6847.

Soltani A, Volz KR, Hansmann DR. "Effect of constant versus variable ultrasound operating parameters on ultrasound-enhanced thrombolysis." *Cerebrovascular Disease*, 2008; 26(suppl 1):1-20.

Gene Therapy

Amabile PG. "High-Efficiency Endovascular Gene Delivery Via Therapeutic Ultrasound". *Journal of the American College of Cardiology*, 2001; 37(7):1975-1980.

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Research Bibliography

Pulmonary Embolism

The EkoSonic™ Endovascular System is intended for the controlled and selective infusion of physician – specified fluids including thrombolytics, into the peripheral vasculature. The EkoSonic™ Endovascular System is also intended for the infusion of solutions into the Pulmonary Arteries.

Disclaimer

Use of the EKOS System in pulmonary embolism has not been approved or cleared by the FDA. EKOS Corporation is the manufacturer of the EKOS Systems described in the reference(s) below. The author of this study has no financial interest in EKOS Corporation or its products.

Amankwah KS, Seymour K, Costanza MJ, Gahtan V. "Ultrasound Accelerated Catheter Directed Thrombolysis for Pulmonary Embolus and Right Heart Thrombus Secondary to Transvenous Pacing Wires". *Vascular and Endovascular Surgery*, 2011;45(3):299-302.

Banovac, F., Buckley, D.C., et al. "Reporting Standards for Endovascular Treatment of Pulmonary Embolism". *Journal of Vascular and Interventional Radiology*, 2010; 21:44-53.

Chamsuddin A, Nazzal L, Kang B, Best I, Peters G, Panah S, Martin L, Lewis C, Zeinati C, Ho H, Venbrux A. "Catheter-directed Thrombolysis with the Endowave System in the Treatment of Acute Massive Pulmonary Embolism: A retrospective Multicenter Case Series". *Journal of Vascular and Interventional Radiology*, 2008; 19(3):372-376.

Engelhardt TC. "Ultrasonic-Enhanced Thrombolysis for PE". *Vascular Disease Management*, Vol. 8, No. 3, March 2011, pE62-E64.

Engelhardt T. "Endovascular Treatment of Acute Pulmonary Embolism". *Endovascular Today*, Vol. 10, No. 2, February 2011, p70-74 (non peer reviewed)

Engelhardt TC, Taylor AJ, Simprini LA, Kucher N. "Catheter-directed ultrasound-accelerated thrombolysis for the treatment of acute pulmonary embolism". *Thrombosis Research*, 2011;128:149-152.

Kuo, W.T., Gould, M.K., et al. "Catheter-directed Therapy for the Treatment of Massive Pulmonary Embolism: Systematic Review and Meta-analysis of Modern Techniques". *Journal of Vascular and Interventional Radiology*, 2009; 20(11):1431-1440.

Lin, P., Annambhotla, S., et al. "Comparison of Percutaneous Ultrasound-Accelerated Thrombolysis versus Catheter-Directed Thrombolysis in Patients with Acute Massive Pulmonary Embolism". *Vascular*, 2009; 17 (Suppl 3):S137-147.

Lin PH, Chen H, Bechara CF, Kougias P. "Endovascular Interventions for Acute Pulmonary Embolism". *Perspectives in Vascular Surgery and Endovascular Therapy*, Vol. 22, No. 3, p171-182.

Shah KJ, Scileppi RM, Franz RW. "Treatment of Pulmonary Embolism using Ultrasound-Accelerated Thrombolysis Directly into Pulmonary Arteries". *Vascular and Endovascular Surgery*, 2011; August; 45(6) 541-8.

Stambo, G.W., Montague, B. "Bilateral EKOS EndoWave™ Catheter thrombolysis of Acute Bilateral Pulmonary Embolism in a Hemodynamically Unstable Patient". *Southern Medical Journal*, 2010; 3(5):455-457

Stroke

The EkoSonic SV™ Endovascular System is intended for regional infusion of contrast materials into selected vessels in the neurovasculature. The EkoSonic SV™ Endovascular System may be used for controlled, regional infusion into selected vessels.

Disclaimer

Use of the EKOS EkoSonic SV™ System in the treatment of ischemic stroke has not been approved or cleared by the FDA. EKOS Corporation is the manufacturer of the EKOS Systems described in the references below. The authors of these articles have no financial interest in EKOS Corporation or its products and received no compensation for writing the articles. The National Institutes of Health and EKOS Corporation provided funding for the IMS II study. There are no significant risks or safety concerns known to EKOS Corporation that are not discussed in the articles.

Broderick J. et al. "The Interventional Management of Stroke (IMS) II Study." *Stroke*, 2007; 38:2127-2135.

Doomernik DE, Schrijver AM, Zeebregts CJ, de Vries J-PPM, Reijnen MMPJ. "Advancements in Catheter-directed Ultrasound-Accelerated Thrombolysis". *Journal of Endovascular Therapy*, 2011;18:418-434.

King S, Khatri P, Carrozella J, Spilker J, Broderick J, Hill M, Tomsick T. "Anterior Cerebral Artery Emboli in Comobined Intravenous and Intra-arterial rtPA Treatment of Acute Ischemic Stroke in the IMS I and II Trials". *American Journal of NeuroRadiology*, 2007; 28:1890-1894.

Mahon B, Nesbit G, Barnwell S, Clark W, Marotta T, Weill A, Teal P, Qureshi A. "North American Clinical Experience with the EKOS MicroLysUS Infusion Catheter for the Treatment of Embolic Stroke", *American Journal of Neuroradiology*, 2003; 24(3):534-538.

Tomsick, T, Broderick J, Carrozella J, Khatri P, Hill M, Palesch Y, Khoury J. "Revascularization results in the Interventional Management of Stroke II Trial". *American Journal of NeuroRadiology*, 2008; 29:582-587.