Appendix A. Search Strategy

Databases include: MEDLINE® and Cochrane Central Register of Controlled Trials

#	Searches	Results
1	intravascular.af.	38664
2	intra-vascular.af.	213
3	endovascular.af.	25176
4	endo-vascular.af.	19
5	endocoronary.af.	39
6	endo-coronary.af.	4
7	intra-coronary.af.	185
8	intracoronary.af.	9140
9	endoluminal.af.	3135
10	endo-luminal.af.	12
11	transluminal.af.	14444
12	trans-luminal.af.	26
13	intraluminal.af.	12949
14	intra-luminal.af.	232
15	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14	99011
16	magnetic resonance imaging.af.	267434
17	magnetic resonance angiography.af.	15201
18	exp magnetic resonance imaging/	248211
19	exp magnetic resonance angiography/	13573
20	elastography.af.	1320
21	thermography.af.	6803
22	microcirculatory resistance.af.	33
23	vascular resistance.af.	52918
24	thermodilution.af.	4613
25	exp Thermodilution/	2214
26	hemodynamics.af.	1373472
27	exp Hemodynamics/	5573667
28	exp endosonography/	7131
29	physiologic measurement*.af.	317
30	doppler ultrasound.af.	9293
31	coronary pressure.af.	475
32	doppler velocimetry.af.	1917
33	ultraso*.af.	345694
34	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 39 or 31 or 32 or 33	1135426

35	15 and 34	25060
36	exp coronary angiography/	43308
37	ultraso$.af.	345694
38	ffr.af.	740
39	fractional flow reserve.af.	562
40	coronary flow reserve.af.	1708
41	coronary flow velocity reserve.af.	302
42	angioscop$.af.	1645
43	optical coherence tomography.af.	7783
44	exp Tomography, Optical Coherence/	7592
45	blood flow velocity.af.	50933
46	exp Blood Flow Velocity/	48818
47	doppler flow wire.af.	138
48	pressure wire.af.	119
49	coronary pressure measurement.af.	24
50	exp endosonography/	7131
51	37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50	391562
52	36 and 51	6035
53	exp Ultrasonography, Interventional/	11056
54	exp Fractional Flow Reserve, Myocardial/	216
55	fractional flow reserve.af.	562
56	intravascular ultrasound.af.	4458
57	IVUS.af.	2408
58	53 or 54 or 55 or 56 or 57	13376
59	35 or 52 or 58	36105
60	exp myocardial ischemia/	333828
61	exp Angioplasty, Transluminal, Percutaneous Coronary/	28083
62	exp stents/	43030
63	exp Angioplasty, Balloon, Coronary/	28083
64	exp Myocardial Revascularization/	74525
65	exp drug-eluting stents/	3340
66	61 or 62 or 63 or 64 or 65	106773
67	60 and 66	54205
68	59 and 67	4136
69	remove duplicates from 68	3816
70	exp animals/ not humans.sh.	3584612
71	69 not 70	3726

Grey literature sources included:

Transcatheter Cardiovascular Therapeutics

Source: www.tctmd.com

Search	Key Words	Results	Relevant	Comments
1	IVUS	612	33	
2	FFR and OCT	2	0	
3	FFR, OCT	1		Already identified from #1
4	IVUS and OCT	10	2	1, out of 2, Already identified from #1
5	IVUS, OCT	5	5	3, out of 5, Already identified from #1
6	OCT, IVUS	1	1	Already identified from #1
7	FFR, IVUS	0		
8	IVUS, FFR	2	2	Already identified from #1
9	IVUS and FFR	9	1	Already identified from #1

The 33 potentially relevant ones have been sorted into:

- Maybes (possibly eligible) and Rejects
- A rescreening of these identified no eligible studies.

The American Heart Association (for years 2009-11)

Source:
http://pt.wkhealth.com/pt/re/aha/search.html;jsessionid=TKQLTTKjsJDhvNb1WqZB4ndlS8jYZbv4QjGd6n4hhKhwkH0nfv7k!552415737!181195629!8091!-1

Date of searches: 11/21/11

Limit databases to: (1) books; (2) commentaries/clinical updates [NOTE – Journals were not included as the relevant articles will have been picked up by the regular searches.]

Search	Key Words	Results	Relevant	Comments
1	IVUS	9	0	
2	FFR and OCT	0	-	
3	FFR, OCT	3	1	Already identified from #1
4	IVUS and OCT	0	-	
5	IVUS, OCT	na	na	*Application error (x3)*
6	OCT, IVUS	na	na	*Application error*
7	FFR, IVUS	na	na	*Application error*
8	IVUS, FFR	na	na	*Application error*
9	IVUS and FFR	0	-	
10	FFR	1	1	
11	OCT	5	0	

The American College of Cardiology and its i2 (Innovation in Intervention) summit conferences (for years 2009-11)

Source: www.cardiosource.org

Search	Key Words	Results	Relevant	Comments
1	IVUS - The searches were limited to clinical trials (journals were excluded).	62	1	Accessed these 2 relevant trials. Potentially relevant clinical trials include: - Angiography versus intravascular ultrasound-directed stent placement AVID trial (Date:2009-04-27)
2	FFR and OCT	5	0	
3	FFR, OCT	5	0	
4	IVUS and OCT	98	-	Did not scan since all result outputs were from journals
5	IVUS, OCT	98	-	Did not scan since all result outputs were from journals
6	OCT, IVUS	98	-	Did not scan since all result outputs were from journals
7	FFR, IVUS	49	-	Did not scan since all result outputs were from journals
8	IVUS, FFR	49	-	Did not scan since all result outputs were from journals
9	IVUS and FFR	49	-	Did not scan since all result outputs were from journals
10	FFR -The searches were limited to guidelines (journals were excluded)	12	0	
11	OCT	299	-	Did not scan since all result outputs were from journals

The abstracts/posters, from the 2011 Annual Scientific Session and i2 Summit, on the topic of "Intravascular Diagnostics" have been manually screened. (Source: http://www.abstractsonline.com/EPosterViewer/ViewTopicControls.aspx?topicKey=a7c6a2f6-5c03-4c41-9771-2dc139a21177)

Out of 43 posters, _1_ was a maybe and _42_ were rejects. (NB- the one "maybe" article has been saved in the folder. This study was later rejected. Most of the posters are irrelevant – the studies are mostly about characterization of plaques (especially the

comparison of different techniques for measuring severity of stenosis); other studies describe the validation of parameters derived from one technique with another accepted technique.

The abstracts/posters, from the 2011 Annual Scientific Session and i2 Summit, on the following additional topics were also manually screened:

- Imaging in the cath lab; angiography & QCA (Source: http://www.abstractsonline.com/EPosterViewer/ViewTopicControls.aspx?topicKey=c91029b9-92c1-4b49-bd82-82929ced8d34)
    - No relevant posters were found.

ClinicalTrials.gov

Source: http://clinicaltrials.gov/ct2/search

Search	Key Words	Results	Relevant	Comments
1	IVUS and angioplasty	25	2	
2	IVUS and angiography	70	1	Already identified from #1
3	FFR and OCT	2	0	
4	FFR, OCT	2	0	Same studies as in 3
5	Fractional Flow Reserve, OCT	3	0	
6	Fractional Flow Reserve, Optical Coherence Tomography	2	0	
7	FFR and Optical Coherence Tomography	1	0	This study is one of the 2 studies from 6
8	IVUS, OCT	26	0	
9	IVUS, Optical Coherence Tomography	21	0	
10	Intravascular Ultrasound, OCT	18	0	
11	Intravascular Ultrasound, Optical Coherence Tomography	18	0	
12	FFR, IVUS	15	1	
13	FFR, Intravascular Ultrasound	11	1	Already identified from #12
14	Fractional Flow Reserve, IVUS	16	1	Already identified from #12
15	Fractional Flow Reserve, Intravascular Ultrasound	13	1	Already identified from #12
16	FFR, angiography	16	0	
17	Fractional Flow Reserve, angiography	19	1	FAME study
18	OCT , angiography	128	0	Most trials on macular degeneration
19	Optical Coherence Tomography, angiography	81	0	Most trials on macular degeneration
20	Angiography, IVUS, OCT and FFR	2	0	

Appendix B. List of Excluded References

The 438 excluded references (of the 519 total) excluded for reasons other than being a narrative review or case report are listed below.

Aarnoudse, W., Fearon, W. F., Manoharan, G., Geven, M., van, de, V, Rutten, M., De, Bruyne B., and Pijls, N. H. Epicardial stenosis severity does not affect minimal microcirculatory resistance. Circulation.110(15):2137-42. 10-12-2004.
UI - 15466646
Reject Reason: No direct comparison between techniques

Abaci, A., Oguzhan, A., Topsakal, R., Seyfeli, E., Yilmaz, Y., Eryol, N. K., Basar, E., and Ergin, A. Intracoronary electrocardiogram and angina pectoris during percutaneous coronary interventions as an assessment of myocardial viability: comparison with low-dose dobutamine echocardiography. Catheterization & Cardiovascular Interventions.60(4):469-76. 2003.
UI - 14624423
Reject Reason: No comparator of interest

Abizaid, A., Pichard, A. D., Mintz, G. S., Abizaid, A. S., Klutstein, M. W., Satler, L. F., Mehran, R., Leiboff, B., Kent, K. M., and Leon, M. B. Acute and long-term results of an intravascular ultrasound-guided percutaneous transluminal coronary angioplasty/provisional stent implantation strategy. American Journal of Cardiology.84(11):1298-303. 12-1-1999.
UI - 10614794
Reject Reason: No direct comparison between techniques

Abizaid, A., Albertal, M., Ormiston, J., Londero, H., Ruygrok, P., Seixas, A. C., Feres, F., Mattos, L. A., Staico, R., Silva, R. L., Webster, M., Stewart, J., Paoletti, F., Kataoka, T., Fitzgerald, P., Sousa, A., and Sousa, J. E. IMPACT Trial: angiographic and intravascular ultrasound observations of the first human experience with mycophenolic acid-eluting polymer stent system. Catheterization & Cardiovascular Interventions.66(4):491-5. 2005.
UI - 16283680
Reject Reason: No direct comparison between techniques

Agostoni, P., Vermeersch, P., Semeraro, O., Verheye, S., Van, Langenhove G., Van den, Heuvel P., Convens, C., Van den, Branden F., and Bruining, N. Intravascular ultrasound comparison of sirolimus-eluting stent versus bare metal stent implantation in diseased saphenous vein grafts (from the RRISC [Reduction of Restenosis In Saphenous Vein Grafts With Cypher Sirolimus-Eluting Stent] trial). American Journal of Cardiology.100(1):52-8. 7-1-2007.
UI - 17599440
Reject Reason: Not relevant to KQs

Ahmed, J. M., Mintz, G. S., Waksman, R., Lansky, A. J., Mehran, R., Wu, H., Weissman, N. J., Pichard, A. D., Satler, L. F., Kent, K. M., and Leon, M. B. Serial intravascular ultrasound analysis of edge recurrence after intracoronary gamma radiation treatment of native artery in-stent restenosis lesions. American Journal of Cardiology.87(10):1145-9. 5-15-2001.
UI - 11356387
Reject Reason: No direct comparison between techniques

Al, Suwaidi J., Higano, S. T., Holmes, D. R., Jr., Rihal, C. S., and Lerman, A. Measuring maximal percent area stenosis poststent placement with intracoronary Doppler and the continuity equation and correlation with intracoronary ultrasound and angiography. American Journal of Cardiology.84(6):650-4. 9-15-1999.
UI - 10498133
Reject Reason: No outcome of interest

Albertal, M., Van, Langenhove G., Kay, I. P., Costa, M. A., Kozuma, K., and Serruys, P. W. Angiographic and clinical outcome of mild to moderate nonocclusive unstented coronary artery dissection and the influence on coronary flow velocity reserve. The Debate I Study Group. American Journal of Cardiology.86(4):375-8. 8-15-2000.
UI - 10946027
Reject Reason: No comparator of interest

Albertal, M., Van, Langenhove G., Regar, E., Kay, I. P., Foley, D., Sianos, G., Kozuma, K., Beijsterveldt, T., Carlier, S. G., Belardi, J. A., Boersma, E., Sousa, J. E., De, Bruyne B., Serruys, P. W., and DEBATE II Study Group. Uncomplicated moderate coronary artery dissections after balloon angioplasty: good outcome without stenting. Heart.86(2):193-8. 2001.
UI - 11454840
Reject Reason: No direct comparison between techniques

Albiero, R., Hall, P., Itoh, A., Blengino, S., Nakamura, S., Martini, G., Ferraro, M., and Colombo, A. Results of a consecutive series of patients receiving only antiplatelet therapy after optimized stent implantation. Comparison of aspirin alone versus combined ticlopidine and aspirin therapy. Circulation.95(5):1145-56. 3-4-1997.
UI - 9054843
Reject Reason: No direct comparison between techniques

Alfonso, F., Macaya, C., Goicolea, J., Iniguez, A., Hernandez, R., Banuelos, C., Castillo, J. A., and Zarco, P. Angiographic changes induced by intracoronary ultrasound imaging before and after coronary angioplasty. American Heart Journal.125(3):877-80. 1993.
UI - 8438718
Reject Reason: Case report

Alfonso, F., Suarez, A., Angiolillo, D. J., Sabate, M., Escaned, J., Moreno, R., Hernandez, R., Banuelos, C., and Macaya, C. Findings of intravascular ultrasound during acute stent thrombosis. Heart.90(12):1455-9. 2004.
UI - 15547028
Reject Reason: No direct comparison between techniques

Alfonso, F., Garcia, P., Fleites, H., Pimentel, G., Sabate, M., Hernandez, R., Escaned, J., Banuelos, C., Perez-Vizcayno, M. J., Moreno, R., and Macaya, C. Repeat stenting for the prevention of the early lumen loss phenomenon in patients with in-stent restenosis. Angiographic and intravascular ultrasound findings of a randomized study. American Heart Journal.149(2):e1-8. 2005.
UI - 15846250
Reject Reason: No direct comparison between techniques

Algowhary, M., Matsumura, A., Hashimoto, Y., and Isobe, M. Poststenting axial redistribution of atherosclerotic plaque into the reference segments and lumen reduction at the stent edge: a volumetric intravascular ultrasound study. International Heart Journal.47(2):159-71. 2006.
UI - 16607044
Reject Reason: No direct comparison between techniques

Altstidl, R., Regenfus, M., Lehmkuhl, H., Dill, H., and Bachmann, K. Evaluation of successful PTCA by transstenotic flow velocity ratios. Angiology.48(9):775-82. 1997.
UI - 9313627
Reject Reason: No direct comparison between techniques

Andreini, D., Pontone, G., Bartorelli, A. L., Trabattoni, D., Mushtaq, S., Bertella, E., Annoni, A., Formenti, A., Cortinovis, S., Montorsi, P., Veglia, F., Ballerini, G., and Pepi, M. Comparison of feasibility and diagnostic accuracy of 64-slice multidetector computed tomographic coronary angiography versus invasive coronary angiography versus intravascular ultrasound for evaluation of in-stent restenosis. American Journal of Cardiology.103(10):1349-58. 5-15-2009.
UI - 19427427
Reject Reason: No direct comparison between techniques

Arakawa, K., Isoda, K., Sugiyabu, Y., Fukuda, M., Nishizawa, K., Shibuya, T., and Nakamura, H. Intimal proliferation after stenting reflected by increased stent-to-vessel cross-sectional area ratio: serial intravascular ultrasound study. Journal of Cardiology.32(6):379-89. 1998.
UI - 9914955
Reject Reason: No direct comparison between techniques

Athanasiadis, A., Haase, K. K., Wullen, B., Treusch, A. W., Mahrholdt, H., Voelker, W., Baumbach, A., Oberhoff, M., and Karsch, K. R.

Lesion morphology assessed by pre-interventional intravascular ultrasound does not predict the incidence of severe coronary artery dissections. European Heart Journal. [6], 870-878. 1919.
UI - 9651710
Reject Reason: No direct comparison between techniques

az-Sandoval, L. J., Bouma, B. E., Tearney, G. J., and Jang, I. K. Optical coherence tomography as a tool for percutaneous coronary interventions. Catheterization & Cardiovascular Interventions.65(4):492-6. 2005.
UI - 15920721
Reject Reason: No direct comparison between techniques

Bach, R. G., Donohue, T. J., Caracciolo, E. A., Wolford, T., Aguirre, F. V., and Kern, M. J. Quantification of collateral blood flow during PTCA by intravascular Doppler. European Heart Journal.16 Suppl J:74-7. 1995.
UI - 8746942
Reject Reason: No direct comparison between techniques

Bachmann, R., Sechtem, U., Voth, E., Schroder, J., Hopp, H. W., and Schicha, H. Dipyridamole scintigraphy and intravascular ultrasound after successful coronary intervention. Journal of Nuclear Medicine.38(4):553-8. 1997.
UI - 9139119
Reject Reason: No outcome of interest

Bae, J. H., Kwon, T. G., Hyun, D. W., Rihal, C. S., and Lerman, A. Predictors of slow flow during primary percutaneous coronary intervention: an intravascular ultrasound-virtual histology study. Heart.94(12):1559-64. 2008.
UI - 18381376
Reject Reason: No outcome of interest

Balian, V., Galli, M., Repetto, S., Luvini, M., Galdangelo, F., Castiglioni, B., Boscarini, M., Petrucci, E., Filippini, G., and Marcassa, C. Intracoronary ST segment evolution during primary coronary stenting predicts infarct zone recovery. Catheterization & Cardiovascular Interventions.64(1):53-60. 2005.
UI - 15619303
Reject Reason: No IVDx technique used

Baptista, J., Di, Mario C., Ozaki, Y., Escaned, J., Gil, R., de, Feyter P., Roelandt, J. R., and Serruys, P. W. Impact of plaque morphology and composition on the mechanisms of lumen enlargement using intracoronary ultrasound and quantitative angiography after balloon angioplasty. American Journal of Cardiology.77(2):115-21. 1-15-1996.
UI - 8546076
Reject Reason: No direct comparison between techniques

Batkoff, B. W. and Linker, D. T. Safety of intracoronary ultrasound: data from a Multicenter European Registry. Catheterization & Cardiovascular Diagnosis.38(3):238-41. 1996.
UI - 8804778
Reject Reason: No comparison of interest

Bech, G. J., Pijls, N. H., De, Bruyne B., Peels, K. H., Michels, H. R., Bonnier, H. J., and Koolen, J. J. Usefulness of fractional flow reserve to predict clinical outcome after balloon angioplasty. Circulation.99(7):883-8. 2-23-1999.
UI - 10027810
Reject Reason: No comparison of interest

Bech, G. J., De, Bruyne B., Pijls, N. H., de Muinck, E. D., Hoorntje, J. C., Escaned, J., Stella, P. R., Boersma, E., Bartunek, J., Koolen, J. J., and Wijns, W. Fractional flow reserve to determine the appropriateness of angioplasty in moderate coronary stenosis: a randomized trial. Circulation.103(24):2928-34. 2001.
UI - 11413082
Reject Reason: No direct comparison between techniques

Bech, G. J., Droste, H., Pijls, N. H., De, Bruyne B., Bonnier, J. J., Michels, H. R., Peels, K. H., and Koolen, J. J. Value of fractional flow reserve in making decisions about bypass surgery for equivocal left main coronary artery disease. Heart.86(5):547-52. 2001.
UI - 11602550
Reject Reason: No direct comparison between techniques

Beleslin, B., Ostojic, M., Djordjevic-Dikic, A., Vukcevic, V., Stojkovic, S., Nedeljkovic, M., Stankovic, G., Orlic, D., Milic, N., Stepanovic, J., Giga, V., and Saponjski, J. The value of fractional and coronary flow reserve in predicting myocardial recovery in patients with previous myocardial infarction. European Heart Journal.29(21):2617-24. 2008.
UI - 18826987
Reject Reason: No direct comparison between techniques

Beleslin, B., Dobric, M., Sobic-Saranovic, D., Giga, V., Stepanovic, J., Djordjevic-Dikic, A., Nedeljkovic, M., Stojkovic, S., Vukcevic, V., Stankovic, G., Orlic, D., Petrasinovic, Z., Pavlovic, S., Obradovic, V., and Ostojic, M. Fractional flow reserve and myocardial viability as assessed by SPECT perfusion scintigraphy in patients with prior myocardial infarction. Journal of Nuclear Cardiology.17(5):817-24. 2010.
UI - 20524100
Reject Reason: No direct comparison between techniques

Bermejo, J., Botas, J., Garcia, E., Elizaga, J., Osende, J., Soriano, J., Abeytua, M., and Delcan, J. L. Mechanisms of residual lumen stenosis after high-pressure stent implantation: a quantitative coronary angiography and intravascular ultrasound study. Circulation.98(2):112-8. 7-14-1998.
UI - 9679716
Reject Reason: No comparison of interest

Bertrand, O. F., De Larochelliere, R., Joyal, M., Bonan, R., Mongrain, R., and Tardif, J. C. Incidence of stent under-deployment as a cause of in-stent restenosis in long stents. The International Journal of Cardiovascular Imaging. [4], 279-284. 1920.
UI - 15529909
Reject Reason: No direct comparison between techniques

Bertrand, O. F., Poirier, P., Rodes-Cabau, J., Rinfret, S., Title, L., Dzavik, V., Natarajan, M., Angel, J., Batalla, N., Almeras, N., Costerousse, O., De Larochelliere, R., Roy, L., Despres, J. P., and VICTORY, trial investigators. A multicentre, randomized, double-blind placebo-controlled trial evaluating rosiglitazone for the prevention of atherosclerosis progression after coronary artery bypass graft surgery in patients with type 2 diabetes. Design and rationale of the VeIn-Coronary aTherOsclerosis and Rosiglitazone after bypass surgerY (VICTORY) trial. Canadian Journal of Cardiology.25(9):509-15. 2009.
UI - 19746240
Reject Reason: Measurement timepoint not of interest

Bertrand, O. F., Rodes-Cabau, J., Larose, E., Rinfret, S., Gaudreault, V., Proulx, G., Barbeau, G., Dery, J. P., Gleeton, O., Manh-Nguyen, C., Noel, B., Roy, L., Costerousse, O., De Larochelliere, R., and EArly Discharge after Transradial Stenting of CoronarY Arteries in Acute Myocardial Infarction (EASY-MI) Study Investigators. Intracoronary compared to intravenous Abciximab and high-dose bolus compared to standard dose in patients with ST-segment elevation myocardial infarction undergoing transradial primary percutaneous coronary intervention: a two-by-two factorial placebo-controlled randomized study. American Journal of Cardiology.105(11):1520-7. 6-1-2010.
UI - 20494655
Reject Reason: No direct comparison between techniques

Blasini, R., Neumann, F. J., Richardt, G., Schmitt, C., Paloncy, R., and Schomig, A. Intravascular ultrasound-guided emergency coronary Palmaz-Schatz stent placement without post-procedural systemic anticoagulation. Heart.76(4):344-9. 1996.
UI - 8983682
Reject Reason: No direct comparison between techniques

Blasini, R., Neumann, F. J., Schmitt, C., Bokenkamp, J., and Schomig, A. Comparison of angiography and intravascular ultrasound for the assessment of lumen size after coronary stent placement: impact of dilation pressures. Catheterization & Cardiovascular Diagnosis.42(2):113-9. 1997.
UI - 9328688
Reject Reason: No direct comparison between techniques

Blessing, E., Hausmann, D., Sturm, M., Wolpers, H. G., Amende, I., and Mugge, A. Intravascular ultrasound and stent implantation: intraobserver and interobserver variability. American Heart Journal.137(2):368-71. 1999.
UI - 9924173
Reject Reason: No direct comparison between techniques

Blessing, E., Hausmann, D., Sturm, M., Wolpers, H. G., Amende, I., and Mugge, A. Incomplete expansion of Palmaz-Schatz stents despite high-pressure implantation technique: impact on target lesion revascularization. Cardiology.91(2):102-8. 1999.
UI - 10449881
Reject Reason: No direct comparison between techniques

Bodanese, L. C., Perin, E. C., and Gottschall, C. A. [Evaluation of post-intracoronary stent implant. Intravascular ultrasound versus quantitative angiography]. [Portuguese]. Arquivos Brasileiros de Cardiologia.64(5):439-46. 1995.
UI - 8526774
Reject Reason: No outcome of interest

Bonello, L., De Labriolle, A., Lemesle, G., Roy, P., Steinberg, D. H., Slottow, T. L., Xue, Z., Torguson, R., Kaneshige, K., Suddath, W. O., Satler, L. F., Kent, K. M., Lindsay, J., Pichard, A. D., and Waksman, R. Comparison of outcomes of drug-eluting stents versus bare-metal stents in nonostial proximal left anterior descending coronary arteries. American Journal of Cardiology.103(4):496-500. 2-15-2009.
UI - 19195509
Reject Reason: No direct comparison between techniques

Boschat, J., Matteodo, K., Gilard, M., Larlet, J. M., Provost, K., Jobic, Y., Guillo, P., Etienne, Y., Mansourati, J., and Blanc, J. J. [Endocoronary ultrasonography and quantitative coronary angiography. Correlations before and after transluminal coronary angioplasty]. [French]. Archives des Maladies du Coeur et des Vaisseaux.90(3):353-60. 1997.
UI - 9232073
Reject Reason: No outcome of interest

Boschat, J., Le, Breton H., Commeau, P., Huret, B., Bedossa, M., Gilard, M., and Stent Without BAlloon Predilatation (SWIBAP) Study Group. Is coronary stent deployment and remodeling affected by predilatation? An intravascular ultrasound randomized study Stenting with or without predilation: an IVUS study. The International Journal of Cardiovascular Imaging.18(6):399-404. 2002.
UI - 12537406
Reject Reason: No comparison of interest

Botas, J., Clark, D. A., Pinto, F., Chenzbraun, A., and Fischell, T. A. Balloon angioplasty results in increased segmental coronary distensibility: a likely mechanism of percutaneous transluminal coronary angioplasty. Journal of the American College of Cardiology.23(5):1043-52. 1994.
UI - 8144766
Reject Reason: Not relevant to KQs

Botman, C. J., Schonberger, J., Koolen, S., Penn, O., Botman, H., Dib, N., Eeckhout, E., and Pijls, N. Does stenosis severity of native vessels influence bypass graft patency? A prospective fractional flow reserve-guided study. Annals of Thoracic Surgery.83(6):2093-7. 2007.
UI - 17532405
Reject Reason: Not relevant to KQs

Bouma, B. E., Tearney, G. J., Yabushita, H., Shishkov, M., Kauffman, C. R., DeJoseph, Gauthier D., MacNeill, B. D., Houser, S. L., Aretz, H. T., Halpern, E. F., and Jang, I. K. Evaluation of intracoronary stenting by intravascular optical coherence tomography. Heart.89(3):317-20. 2003.
UI - 12591841
Reject Reason: No outcome of interest

Britten, M. B., Zeiher, A. M., and Schachinger, V. Microvascular dysfunction in angiographically normal or mildly diseased coronary arteries predicts adverse cardiovascular long-term outcome. Coronary Artery Disease.15(5):259-64. 2004.
UI - 15238822
Reject Reason: No direct comparison between techniques

Bruchhauser, J., Sechtem, U., Hopp, H. W., and Erdmann, E. [Intracoronary ultrasound changes the therapeutic approach in ambivalent angiography findings]. [German]. Zeitschrift fur Kardiologie.86(2):138-47. 1997.
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Reject Reason: Not relevant to KQs

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Reject Reason: Measurement timepoint not of interest

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Reject Reason: No direct comparison between techniques

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Reject Reason: Case report

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UI - 16814649
Reject Reason: No direct comparison between techniques

Appendix C: Summary Tables

Appendix C.Table 1. Study Design and Patient Characteristics IVUS-guided PCI versus angiography-guided PCI

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Procedural Outcomes - Dichotomous														
Orford 2004 [15389239] US, Canada, and other Prevention of Restenosis with Tranilast and its outcomes (PRESTO) trial, substudy	A cohort of a RCT Multicenter worldwide	0.75 yr (9 mo)	IVDx	796	59.6 ± 10.2	79	ND	37	24	57	69	LMD 1 LCA 25 LAD 40 Right 34	A 12 B1 28 B2 44 C 16	B post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.
			Angio	8274	60.3 ± 10.5	78	ND	37	23	60	64	LMD 1 LCA 24 LAD 41 Right 34	A 15 B1 30 B2 38 C 17	
Gaster 2003 [12923023]	RCT, 1 center	2.5 yr	IVDx	54	57 (40-73)	100	ND	54	4	20	96	LAD: 30 LCX: 24 RCA: 28	A: 30 B1:24 B2: 28 C: 19	B, small sample size
			Angio	54	57 (33-78)	100	ND	44	11	24	93	LAD: 46 LCX: 26 RCA: 28	A: 24 B1:30 B2: 13 C: 33	

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Kim 2011 [21167352] Korea Korean Bifurcation Registry (COBIS)	Matched cohorts 16 centers	1.9 yr (23 mo) Max: 3 yr	IVDx	487	62 ± 9.6	66.5	60.1 ± 10.8	8.6	31.8	60	34.5	LAD: 83 LCX: 12.9 RCA: 4.1	ND	B, observational study without adjustment
			Angio	487	61.8 ± 10.2	66.9	58.8 ± 11	8	33.3	58.3	34.9	LAD: 82.5 LCX: 12.9 RCA: 4.5	ND	
Roy 2008 [18550555] US	Retrospective matched cohort, 1 center	1 yr	IVDx	884	66 ± 11.6	69.3	47 ± 15	43	35.9	81.8	86.2	LAD: 32.9 LCX: 24.7 RCA: 34.4 Left main coronary artery: 2 SVG: 5.8	A: 4.6 B: 73.1 C: 22.4 In-stent stenosis: 5.4	B, observational study with no adjustment, but with propensity score matching
			Angio	884	65.6 ± 11.8	70	48 ± 13	41.3	34.4	91.6	87.1	LAD: 33 LCX: 23.2 RCA: 34.3 Left main coronary artery: 2.3 SVG: 6.4	A: 5 B: 73.1 C: 21.9 In-stent stenosis: 4.3	
Sakamoto 1999 [10402282] Japan	Prospective cohort, 1 center	0.5 yr (6 mo)	IVDx	17 (18 lesions)	58 ± 7.5	82.4	ND	64.7	35.3	88.2	94.1	LAD: 55.6 LCX: 0 RCA: 44.4 Ostial: 11.1 SVG: 0	ND	B, sample size small, no adjusted analyses

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	17 (19 lesions)	62 ± 7	76.5	ND	70.6	58.8	94.1	88.2	LAD: 63.2 LCX: 5.3 RCA: 31.6 Ostial: 15.8 SVG: 0	ND	
Park 2001 [11583882] Korea	Cohort, 1 center	2 yr	IVDx	77	54.7± 9.9	68	ND	ND	14	18	31	Os 52 Body: 17 Bifur:31	A 14 B1 34 B2 35 C 17	C, The use of IVUS was the operator's decision; selection bias could not be eliminated
			Angio	50	56.7± 10.9	70	ND	ND	18	20	28	Os 38 Body: 12 Bifur:50	A 10 B1 30 B2 40 C 20	
Kawata, 1997 9476578	RCT	ND	IVDx	17	64	82	ND	ND	18	35	ND	LAD 65 Cx 18 RCA 29	A 58 B 37 C 5	C Incomplete Design information. Analyses do not provide any variability measure
			Angio	25	60	48	ND	ND	36	36	ND	LAD 52 Cx 8 RCA 52	A 61 B 36 C 36	
Oemrawsingh 2003 [12515744] The Netherlands TULIP Study	RCT, 1 center	1 yr	IVUS	74	61 ± 10	95.9	0	ND	21.6	36.5	82.4	LAD 39 LCX 10 RCA 51	ND	B Pt not blinded

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	76	63 ± 10	94.7	0	ND	27.6	39.5	81.6	LAD 38 LCX 21 RCA 41	ND	
Mudra 2001 [11560848] Germany OPTICUS	RCT, 26 centers	1 yr	IVDx	273	60.1 ± 10	77	56.5 ± 14	32	17	48	61	LAD: 51 LCX: 18 RCA: 30	A: 2 B1: 22 B2: 63 C: 13	A
			Angio	275	61.5 ± 9.5	78	57.7 ± 14.3	32	17	52	67	LAD: 50 LCX: 14 RCA: 35	A: 3 B1: 20 B2: 62 C: 16	

Procedural Outcomes Continuous

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Faulknier 2004 [15156000] US	Retrospective cohort 1 center	0.5 yr (6 mo)	IVDx	50 (70 lesions)	59.5 ± 11.5	74	ND	38	20	68	78	LAD: 37 RCA: 44 LCA: 11 LMD: 1.4 Vein graft: 6	ND	C, retrospective, unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
			Angio	50 (65 lesions)	63.4 ± 12.1	66	ND	30	28	80	62	LAD: 22 RCA: 35 LCA: 25 LMD: 1.5 Vein graft: 17	ND	

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Orford 2004 [15389239] US, Canada, and other Prevention of Restenosis with Tranilast and its outcomes (PRESTO) trial, substudy	A cohort of a RCT Multicenter worldwide	0.75 yr (9 mo)	IVDx	796	59.6 ± 10.2	79	ND	37	24	57	69	LMD 1 LCA 25 LAD 40 Right 34	A 12 B1 28 B2 44 C 16	B post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.
			Angio	8274	60.3 ± 10.5	78	ND	37	23	60	64	LMD 1 LCA 24 LAD 41 Right 34	A 15 B1 30 B2 38 C 17	
Gaster 2003 [12923023]	RCT, 1 center	2.5 yr	IVDx	54	57 (40-73)	100	ND	54	4	20	96	LAD: 30 LCX: 24 RCA: 28	A: 30 B1:24 B2: 28 C: 19	B, small sample size
			Angio	54	57 (33-78)	100	ND	44	11	24	93	LAD: 46 LCX: 26 RCA: 28	A: 24 B1:30 B2: 13 C: 33	
Gil 2007 [17892989] Poland Direct Stenting versus Optimal Angioplasty trial (DIPOL)	RCT*, 7 centers	0.5 yr (6 mo)	IVDx	83	56 ± 8	71	52 ± 9	44	10	ND	47	LAD: 34pt LCX: 22pt RCA: 27pt	A: 48 pt B1: 22 pt B2: 13 pt C: 0 pt	B, No blinding, no account for multicenter

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	80	54 ± 8	73	48 ± 10	40	11	ND	40	LAD: 37pt LCX: 19pt RCA: 24pt	A: 49 pt B1: 21 pt B2: 10 pt C: 0 pt	
Kim 2011 [21167352] Korea Korean Bifurcation Registry (COBIS)	Matched cohorts 16 centers	1.9 yr (23 mo) Max: 3 yr	IVDx	487	62 ± 9.6	66.5	60.1 ± 10.8	8.6	31.8	60	34.5	LAD: 83 LCX: 12.9 RCA: 4.1	ND	B, observational study without adjustment
			Angio	487	61.8 ± 10.2	66.9	58.8 ± 11	8	33.3	58.3	34.9	LAD: 82.5 LCX: 12.9 RCA: 4.5	ND	
Mueller 2002 [12362285] Switzerland A subset of SIPS	RCT, 1 center	2.3 yr (28 mo)	IVDx	19 (28 lesions)	65 ± 8	63	ND	63	100	63	84	LAD: 29 LCX: 29 RCA: 21 SVG: 0	B2: 32 C: 21	B (pending)
			Angio	24 (29 lesions)	63 ± 7	83	ND	67	100	67	88	LAD: 38 LCX: 41 RCA: 21 SVG: 21	B2: 55 C: 7	
Schiele 1998 [9708456] France RESIST	RCT, multi-center	0.5 yr (6 mo)	IVDx	79	57 ± 10	86	53 ± 13	68	11	30	68	LAD: 48 LCX: 11 RCA:41	A: 6 B1: 51 B2: 34 C: 9	B, patients not blinded, randomization method not reported no allocation concealment

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	76	56 ± 12	93	51 ± 9	63	11	34	68	LAD: 47 LCX: 11 RCA: 42	A: 11 B1: 41 B2:34 C: 14	
Yoshitomi 1999 [10385154] Japan	Cohort with historic controls, 1 center	0.25 yr (3 mo)	IVDx	38	63 ± 10	81.6	ND	53	21	53	26	LAD: 53 LCX:18 RCA: 30	A: 18 B1: 25 B2: 48 C:10	C, observational, with historical controls, with no confounder adjustment, small sample size
			Angio	28	64 ± 7	71.4	ND	68	21	50	25	LAD: 48 LCX: 17 RCA: 34	A: 14 B1: 24 B2: 52 C: 10	
Park 2001 [11583882] Korea	Cohort, 1 center	2 yr	IVDx	77	54.7± 9.9	68	ND	ND	14	18	31	Os 52 Body: 17 Bifur:31	A 14 B1 34 B2 35 C 17	C, The use of IVUS was the operator's decision; selection bias could not be eliminated
			Angio	50	56.7± 10.9	70	ND	ND	18	20	28	Os 38 Body: 12 Bifur:50	A 10 B1 30 B2 40 C 20	
Albiero 1997 [9386168] Italy, Germany	Matched cohorts, 2 centers	0.5 yr (6 mo)	IVDx	158 pt (173 lesions)	58.5 ± 8.9	90.5	ND	46.2	7.6	36.7	46.8	LAD: 61.3 LCX: 9.8 RCA:27.7 Obtuse marginal branch: 1.2	A: 5.2 B1: 45.1 B2: 28.7 C: 11	B, observational, matched design

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	154 pt (173 lesions)	58.1 ± 10	88.3	ND	42.5	6.5	55.6	80.9	LAD: 61.3 LCX: 9.8 RCA: 27.7 Obtuse marginal branch: 1.2	A: 10.4 B1: 33 B2: 43.9 C:12.7	
Blasini 1998 [9716200] Germany	Prospective cohort 1 center	0.5 yr (6 mo)	IVUS	105	58.2 ± 10.5	76.6	ND	35.2	16.2	52.4	38.1	LAD: 39.1 LCX: 17.2 RCA: 38.0 SVG: 5.7	A: 3.8 B1: 9.5 B2: 35.2 C: 48.6	B Observational study without adjustment
			Angio	107	59.9 ± 11.1	78.1	ND	37.4	14	49.5	32.7	LAD: 39.3 LCX: 15.8 RCA: 39.3 SVG: 5.6	A: 3.7 B1: 7.5 B2: 36.5 C: 52.3	
Frey 2000 [11076823] Germany The Strategy for IVUS guided PTCA and Stenting (SIPS) trial	RCT, 1 center	2 yr	IVUS	121	61.2 ± 8.1	82	ND	58	16	64	88	LAD 38 LCX 27 RCA 30 SVG 5	A 11 B1 37 B2 40 C 11	B (pending) Patient not blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated
			Angio	148	60.7± 9.6	76	ND	52	16	56	87	LAD 41 LCX 27 RCA 30 SVG 3	A 15 B1 42 B2 34 C 8	
Jakabcin 2010 [19902491] Czech Republic HOME DES IVUS	RCT 1 center	1.5 yr (18 mo)	IVUS	105	59.4 ± 13	73	ND	37	42	67	63	LAD: 56 RCA: 29 RCX: 11 SVG: 1 Left main: 3	B2: 73 C: 27	B No blinding, no allocation concealment

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	105	60.2 ± 11	71	ND	32	45	71	66	LAD: 54 RCA: 24 RCX: 15 SVG: 3 Left main: 4	B2: 76 C: 24	
Maluenda 2010 [19670305] US	Prospective cohort 1 center	1 yr	IVDx	382	63.6 ± 13.3	66.2	43 ± 13	70.6	35.0	79.6	80.3	LAD: 40.7 LCX: 23.8 RCA: 26.7 SVG: 8 Left main: 0.6	A: 4.1 B: 67.8 C: 28.1	B/C Baseline imbalances not adjusted
			Angio	523	61.1 ± 14.1	68.6	42 ± 11	85.3	24.9	73.6	76.1	LAD: 38.2 LCX: 17.8 RCA: 36.7 SVG: 6.5 Left main: 0.4	A: 5.5 B: 62.2 C: 32.3	
Oemrawsingh 2003 [12515744] The Netherlands TULIP Study	RCT, 1 center	1 yr	IVUS	74	61 ± 10	95.9	0	ND	21.6	36.5	82.4	LAD 39 LCX 10 RCA 51	ND	B Pt not blinded
			Angio	76	63 ± 10	94.7	0	ND	27.6	39.5	81.6	LAD 38 LCX 21 RCA 41	ND	
Fitzgerald 2000 [10920064] US CRUISE	RCT, 45 centers	0.75 yr (9 mo)	IVDx	270	60 ± 11	69	55 ± 10	32	23	52	39	LAD 46 LCX 18 RCA 36	A 8 B1 26 B2 57 C 9	B, No blinding, randomization method not reported
			Angio	229	61 ± 11	72	54 ± 12	41	18	59	33	LAD 43 LCX 24 RCA 33	A 10 B1 21 B2 60 C 9	

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Kawata, 1997 9476578	RCT	ND	IVDx	17	64	82	ND	ND	18	35	ND	LAD 65 Cx 18 RCA 29	A 58 B 37 C 5	C Incomplete Design information. Analyses do not provide any variability measure
			Angio	25	60	48	ND	ND	36	36	ND	LAD 52 Cx 8 RCA 52	A 61 B 36 C 36	
Gerber 2009 19213067 Pravio study	Prospective study matched with an external cohort	30 days	IVDx	ND	ND	ND	ND	ND	9.7 (lesions)	ND	ND	ND	ND	B (only matched design analysis)
			Angio	ND	ND	ND	ND	ND	9.7 (lesions)	ND	ND	ND	ND	
Fujimoto 2008 [18522771] Japan	Cohort, 1 center	0.6 yr (8 mo)	IVDx	132 (139 lesions)	65.3 ± 9.9	90.9	ND	ND	47.7	54.5	69.7	LAD: 33.8 LCX 26.5 RCA: 35.6 Left main trunk: 2.9 SVG: 0	A 0 B1 33.1 B2 32.4 C 13.7	B/C, Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's prospective or retrospective; unclear number of lesions between Table 2 and Table 3.)

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
			Angio	327 (341 lesions)	66 ± 8.8	89	ND	ND	44.6	57.5	64.5	LAD: 38.1 LCX: 25.4 RCA: 31.2 Left main trunk: 0.9 SVG: 2.1	A 1.5 B1 29.6 B2 34.9 C 34	
Mudra 2001 [11560848] Germany OPTICUS	RCT, 26 centers	1 yr	IVDx	273	60.1 ± 10	77	56.5 ± 14	32	17	48	61	LAD: 51 LCX: 18 RCA: 30	A: 2 B1: 22 B2: 63 C: 13	A
			Angio	275	61.5 ± 9.5	78	57.7 ± 14.3	32	17	52	67	LAD: 50 LCX: 14 RCA: 35	A: 3 B1: 20 B2: 62 C: 16	
Russo 2009 [20031704] US AVID	RCT	1 yr	IVUS	394	62 ± 12	73	53 ± 13	35	15	46	40	LAD: 40 LCX: 15 RCA: 35 SVG: 10 Left main 0.8:	ND	A
			Angio	406	63 ± 11	68	55 ± 13	29	17	45	44	LAD: 37 LCX: 18 RCA: 32 SVG: 12 Left main: 0.5	ND	

ND: no data, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft

*note, this study randomized patients into three groups: direct stenting with angio, direct stenting with IVUs, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 2. Periprocedural continuous outcomes in IVUS-guided PCI versus angiography-guided PCI

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Schiele 1998	MLD	mm	With IVUS	Post procedural	79	0.96	*1.52 (0.05)*	*0.08*	*0.07*	*0.245*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
9708456			Without IVUS		76	1.02	*1.44 (0.05)*				
Yoshitomi 1999	MLD	mm	IVUS	Post procedural	**40**	0.4	2.58 (0.06)	-0.53	0.10	0	High (Observational,with historical controls, with no confounder adjustment, small sample size)
10385154			angio		**29**	0.45	3.11 (0.07)				
Park 2001 11583882	MLD	mm	IVUS	Procedural	77	1.2	3 (0.063)	*0*	*0.101*	*1.000*	High (The use of IVUS was the operator's decision; selection bias could not be eliminated)
			angio		50	1.0	3 (0.079)				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Albiero 1997	MLD	mm	IVUS (early phase)	Post procedural	**76**	0.8	*2.63$ (0.05)*	*0.48$*	*0.068$*	*0$*	Medium (observational, Matched design)
9386168			Angio (early phase)		**76**	0.8	*2.15$ (0.05)*				
Albiero 1997	MLD	mm	IVUS (early phase)	Post procedural	**97**	0.8	*2.3$ (0.04)*	*0.24$*	*0.054$*	*0$*	Medium (observational, Matched design)
9386168			Angio (early phase)		**97**	0.79	*2.06$ (0.04)*				
Jakabcin 2010	MLD	mm	IVUS	Procedural	105	1.1	*1.84 (0.04)*	*-0.06*	*0.05*	*0.203*	Medium (No blinding; underpowe ed)
19902491 HOME DES IVUS			Angio		105	0.97	*1.9 (0.03)*				
Oemrawsingh,	MLD	mm	IVUS	Procedural	73	1.02	*1.99 (0.05)*	*0.18*	*0.07*	*0.006*	Medium (Incomplete Randomizat on scheme and allocation concealment)
2003 12515744 TULIP Study			Angio		71	0.99	*1.81 (0.04)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Kawata 1997	MLD	mm	IVUS	Procedural	**19**	0.8	*1.9 (0.03)*	*0.39*	*0.04*	*<0.001*	High (Incomplete design information. Analyses do not provide any variability measure)
9476578			Angio		**28**	0.69	*1.51 (0.02)*				
Gerber 2009	MLD	mm	IVUS	Procedural	**46.5**	0.67	*2.42 (0.07)*	*0.44*	*0.1*	*<0.001*	Medium (only matched design analysis; matched to an external cohort; unclear if the external cohort was retrospective or prospective)
19213067 Pravio study			Angio		**46.5**	0.69	*1.98 (0.07)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Fujimoto 2008	MLD	mm	IVUS	Post procedural	**97**	0.38	*2.26 (0.03)*	*-0.01*	*0.04*	*0.773*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
18522771			Angio		**271**	0.36	*2.27 (0.02)*				
Fujimoto 2008	MLD	mm	IVUS	Post procedural	**97**	0.38	*2.21 (0.03)*	*-0.01*	*0.03*	*0.769*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
18522771			Angio		**271**	0.36	*2.22 (0.02)*				
Fujimoto 2008	MLD	mm	IVUS	Post procedural	**97**	0.38	*2.21 (0.03)*	*-0.01*	*0.03*	*0.769*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
18522771			Angio		**271**	0.36	*2.22 (0.02)*				
Faulknier, 2004 15156000	MLD	mm	IVUS guided stent	Post procedural	**70**	0.83	*+2.75 (0.01)*	*0.014*	*2.75*	<0.001	High (retrospective, Unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
			Angio guided stent		**50**	0.51	*+2.37 (0.01)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Orford 2004 15389239 PRESTO substudy	MLD	mm	IVUS	Post Procedural QCA	731	0.83	*2.12(0.02)*	*0.13*	*0.024*	*<0.01*	Medium (post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
			Angio		1434	0.78	*1.99(0.01)*				
Gaster 2003 12923023	MLD	mm	IVUS	Post procedural	54	1.1	*1.2 (0.07)*	*0*	*0.1*	*1*	Medium (small sample size)
			Angio		54	1.0	*1.2 (0.07)*				
Gil 2007 17892989	MLD	mm	DS-QCA	Post procedural	80	0.95	2.11(0.05)	*0.26* *-0.19*	*0.073* *0.075*	0.05 between DS-	Medium (No blinding outcome assessor, no account for multicenter)
			DS-IVUS BA-IVUS		83 96	0.97 1.02	2.37(0.05) 1.92(0.06)			IVUS and the other 2 groups (reported) *0* *0.011*	

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Mueller 2002	MLD	mm	IVUS	Procedural	**28**	0.6	*1.84 (0.11)*	*0.24*	*1.15*	*0.109*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
12362285			angio		**29**	0.66	*1.6 (0.11)*				
Kim 2011	MLD, distal MV os	mm	IVUS	Post procedural	487	1.3	*1.4(0.03)*	*0.1*	*0.036*	*0.005*	Medium (Observational study without adjustment)
21167352 COBIS			angio		487	1.3	*1.3(0.03)*				
Kim 2011 21167352 COBIS	MLD, distal MV	mm	IVUS	Post procedural	487	1.6	*1(0.03)*	*0*	*0.04*	*1.000*	Medium (Observational study without adjustment)
			angio		487	1.5	*1(0.03)*				
Kim 2011 21167352 COBIS	MLD, overall MV	mm	IVUS	Post procedural	487	1	*1.5(0.03)*	*0*	*0.034*	*1*	Medium (Observational study without adjustment)
			angio		487	0.9	*1.5(0.02)*				
Kim 2011	MLD, overall	mm	IVUS	Post procedural	487	1.1	*0.4(0.03)*	*0.2*	*0.039*	*0*	Medium (Observational study without adjustment)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
21167352 COBIS			angio		487	1.2	*0.2(0.03)*				
Kim 2011	MLD, SB	mm	IVUS	Post procedural	487	1.5	*0.3(0.03)*	*0.2*	*0.038*	*0*	Medium (Observational study without adjustment)
21167352 COBIS			angio		487	1.6	*0.1(0.03)*				
Kim 2011	MLD, SB os	mm	IVUS	Post procedural	487	1.2	*0.4(0.03)*	*-1*	*0.039*	*<0.001*	Medium (Observational study without adjustment)
21167352 COBIS			angio		487	1.3	*1.4(0.03)*				
Gaster 2003 12923023	MLD, per IVUS	mm	IVUS	Post procedural	54	1.6	*1.7 (0.11)*	*0.3*	*0.150*	*0.046*	Medium (small sample size)
			Angio		54	1.5	*1.4(0.11)*				
Gaster 2003 12923023	MLA, per IVUS	mm^2	IVUS	Post procedural	54	2.7	*6(0.31)*	*1.6*	*0.411*	*0*	Medium (small sample size)
			Angio		54	2.5	*4.4 (0.27)*				
Kim 2011 21167352 COBIS	MLD, proximal MV	mm	IVUS	Post procedural	487	1.6	*1.4(0.03)*	*0.2*	*0.048*	*0*	Medium (Observational study without adjustment)
			angio		487	1.6	*1.2(0.04)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Frey 2000	Lesion MLD	mm	ICUS	Post procedural	121	0.64	1.85 (0.05)	*0.17*	*0.07*	*0.021*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
11076823			Angio		148	0.70	1.68 (0.05)				
Fitzgerald 2000 10920064 CRUISE study	In- lesion MLD (Quantitative angiographic analysis)	mm	IVUS	Procedural	290	1.0	*1.5 (0.03)*	*0.1*	*0.04*	*0.011*	High risk of bias (not randomized, issue of selection bias in centers, no matching or adjusted analyses)
			Angio		253	1.0	*1.4 (0.03)*				
Fitzgerald 2000 10920064 CRUISE study	In –stent MLD (Quantitative angiographic analysis)	mm	IVUS	Procedural	290	1.0	*1.9 (0.02)*	*0.2*	*0.04*	*<0.001*	High risk of bias (not randomized, issue of selection bias in centers, no matching or adjusted analyses)
			Angio		253	1.0	*1.7 (0.03)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Orford 2004 15389239 PRESTO Substudy	Reference diameter	mm	IVUS	Post Procedural QCA	731	3.0	*0.2 (0.02)*	*0.1*	*0.025*	*<0.01*	Medium (Post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
			Angio		1434	2.9	*0.1 (0.02)*				
Gil 2007 17892989	Reference diameter	mm	DS-QCA	Post procedural	80	3.19	0.17(0.07)	*-0.06* *-0.19*	*0.099* *0.087*	*0.544* *0.030*	Medium (No blinding outcome assessor, no account for multicenter)
			DS-IVUS BA-IVUS		83 96	3.21 3.28	0.11(0.07) -0.02 (0.06)				
Oemrawsingh, 2003 12515744 TULIP Study	Reference diameter	mm	IVUS	Procedural	73	2.95	*0.5 (0.07)*	*0.22*	*0.09*	*0.013*	Medium (Incomplete Randomization scheme and allocation concealment)
			Angio		71	2.96	*0.28 (0.06)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Fujimoto 2008	Reference diameter	mm	IVUS	Post procedural	**97**	2.79	0.03 (0.03)	??	0.038	1.000	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
18522771			Angio		**271**	2.78	0.03 (0.02)				
Mueller 2002	Reference diameter	mm	IVUS	procedural	**28**	3.09	*0.06 (0.11)*	*-0.01*	*0.16*	*0.949*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
12362285			angio		**29**	2.82	*0.07 (0.11)*				
Mudra 2001	Reference diameter	mm	IVUS	Post procedural	229	2.97	*0.16 (0.04)*	*0.06*	*0.047*	*0.205*	Low

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
11560848			Angio		228	3.01	*0.1 (0.04)*				
Blasini 1998 9716200	Reference diameter	mm	IVUS	Procedural	105	3.05	*0.1 (0.05)*	*-0.03*	*0.075*	*0.691*	Medium (Observational without adjustment)
			Angio		107	3.11	*0.13 (0.06)*				
Kim 2011 21167352 COBIS	Reference diameter, distal MV	mm	IVUS	Post procedural	487	2.5	*0.1(0.02)*	*0*	*0.032*	*1*	Medium (Observational study without adjustment)
			angio		487	2.5	*0.1(0.02)*				
Kim 2011 21167352 COBIS	Reference diameter, proximal MV	mm	IVUS	Post procedural	487	3.1	*0.2(0.02)*	*0.1*	*0.032*	*0.002*	Medium (Observational study without adjustment)
			angio		487	3.1	*0.1(0.02)*				
Kim 2011 21167352 COBIS	Reference diameter, SB	mm	IVUS	Post procedural	487	2.1	*0.1(0.02)*	*0.1*	*0.026*	*0*	Medium (Observational study without adjustment)
			angio		487	2.1	*0(0.02)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Orford 2004 15389239	Diameter stenosis	%	IVUS	Post Procedural QCA	731	73.3	*-67.1 (0.62)*	*-1.9*	*0.715*	*0.008*	Medium (post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
			Angio		1434	73.4	*-65.2 (0.36)*				
Yoshitomi 1999	Diameter stenosis	%	IVUS	Post procedural	**40**	86.7	-79.9 (1.97)	-5.4	2.88	0.061	High (Observational,with historical controls, with no confounder adjustment, small sample size)
10385154			angio		**29**	82.6	-74.5 (2.10)				
Blasini 1998 9716200	Diameter stenosis	%	IVUS	Procedural .	105	77	*-74 (1.48)*	*-1*	*1.973*	*0.612*	Medium (Observatio al without adjustment)
			Angio		107	76	*-73 (1.31)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Frey 2000 11076823	Diameter stenosis	%	ICUS	Post procedural	121	79.1	-60.3 (1.44)	*-6*	*2.11*	*0.004*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
			Angio		148	76.8	-54.3 (1.54)				
Jakabcin 2010	Diameter stenosis	%	IVUS	Procedural	105	82.3	*-67.7 (0.72)*	*-3.8*	*1.07*	*<0.001*	Medium (No blinding; underpowered)
19902491 HOME DES IVUS			Angio		105	79.2	*-63.9 (0.8)*				
Maluenda 2010	Diameter Stenosis	%	IVUS	Procedural	**663**	85	*-81 (0.64)*	*-2*	*0.95*	*0.035*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
19670305			Angio		**811**	86	*-79 (0.70)*				
Oemrawsingh,	Diameter stenosis	%	IVUS	procedural	73	65	*-53 (1.32)*	*-1*	*1.74*	*0.565*	Medium (Incomplete Randomization scheme and allocation concealment)
2003 12515744 TULIP Study			Angio		71	65	*-52 (1.13)*				
Fujimoto 2008	Diametric stenosis	%	IVUS	Post procedural	**97**	86.4	*-80.2 (0.77)*	*0.5*	*0.87*	*0.564*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
18522771			Angio		**271**	86.9	*-80.7 (0.41)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Fujimoto 2008 18522771	Diametric stenosis	%	IVUS	Post procedural	**97**	86.4	*-77.9 (0.77)*	*0.3*	*0.87*	*0.729*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
			Angio		**271**	86.9	*-78.2 (0.41)*				
Fujimoto 2008	Diametric stenosis	%	IVUS	Post procedural	**97**	86.4	*-77.6 (0.77)*	*0.4*	*0.87*	*0.645*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
18522771			Angio		**271**	86.9	*-78 (0.41)*				
Mudra 2001 11560848	Diameter stenosis	%	IVUS	Post procedural	229	67.6	*-64.8 (0.66)*	*-4.1*	*0.898*	*<0.001*	Low
			Angio		228	66.7	*-60.7 (0.61)*				
Kim 2011	Diameter stenosis, MV	%	IVUS		487	65.4	*-50.3 (0.73)*	*0.2*	*0.992*	*0.84*	Medium (Observational study without adjustment)
21167352 COBIS			angio	Post procedural	487	66.6	*-50.5 (0.67)*				
Kim 2011	Diameter stenosis, SB	%	IVUS	Post procedural	*487*	48.5	*-16.7 (1.05)*	*-10*	*1.474*	*<0.001*	Medium (Observational study without adjustment)
21167352 COBIS			angio		487	43.1	*-6.7 (1.04)*				
Gaster 2003 12923023	Diameter stenosis,per QCA	%	IVUS	Post procedural	54	-33	*-33 (2.01)*	*5*	*3.00*	*0.096*	Medium (small sample size)
			Angio		54	64	*-38 (2.23)*				
Gaster 2003 12923023	Diameter stenosis, per IVUS	%	IVUS	Post procedural	54	51	*-44(2.27)*	*-9*	*3.19*	*0.005*	Medium (small sample size)
			Angio		54	54	*-35 (2.25)*				
Gil 2007 17892989	Percent of Diameter stenosis	mm	DS-QCA	Post procedural	80	70.2	-61.3 (1.10)	*-5* *2.2*	*1.804* *1.770*	*0.006* *0.214*	Medium (No blinding outcome assessor, no account for multicenter)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
			DS-IVUS BA-IVUS		83 96	69.7 68.9	-66.3 (1.43) -59.1 (1.39)				
Faulknier, 2004 15156000	Stenosis	**%**	IVUS guided stent	Post procedural	**70**	79.6	*-78.51 (0.21)*	*1.25*	*0.369*	*0.001*	High (retrospective, Unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
			Angio guided stent		**50**	84.6	*-79.76 (0.30)*				
Gaster 2003 12923023	Area stenosis, per IVUS	%	IVUS	Post procedural	54	68	*-56 (2.59)*	*-21*	*3.361*	*0*	Medium (small sample size)
			Angio		54	68	*-35 (2.14)*				
Gaster 2003 12923023	Cumulated costs	Euro	IVUS	Post procedural	54	163672				*0.01*	Medium (small sample size)
			Angio		54	313706					
Mueller 2002 12362285	% Stenosis	%	IVUS	procedural	**28**	81	*-59 (2.97)*	*-3*	*2.27*	*0.502*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
			angio		**29**	77	*-56 (3.34)*				
Schiele 1998 9708456	% stenosis	%	With IVUS	Post procedural	79	65	*-46 (1.19)*	*-1*	*1.72*	*0.56*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
			Without IVUS		76	64	*-45 (1.24)*				
Schiele 1998 9708456	Proximal Reference diameter	mm	With IVUS	Post procedural	79	2.94	*0.08 (0.06)*	*0.2*	*0.09*	*0.022*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
			Without IVUS		76	3.06	*-0.12 (0.06)*				
Schiele 1998 9708456	Distal Reference diameter	mm	With IVUS	Post procedural	79	2.9	*-0.05 (0.06)*	*0.06*	*0.09*	*0.483*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
			Without IVUS		76	2.88	*-0.11 (0.07)*				
Albiero 1997 9386168	Number of stent per lesion	#	IVUS (early phase)	Post procedural	NA	NA	NA	*0.12 (mean difference)*	*0.034*	*NA*	Medium (observational, Matched design)
			Angio (early phase)		NA	NA	NA				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Albiero 1997 9386168	Ref vessel	mm	IVUS (early phase)	Post procedural	**76**	3.04	*0 (0.04)*	*0.09*	*0.05*	*0.086*	Medium (observational, Matched design)
			Angio (early phase)		**76**	3.1	*-0.09 (0.03)*				
Albiero 1997 9386168	Ref vessel	mm	IVUS (early phase)	Post procedural	**97**	3	*0.03$ (0.04)*	*0.03$*	*0.05$*	*0.551$*	Medium (observational, Matched design)
			Angio (early phase)		**97**	2.96	*0$ (0.04)*				
Albiero 1997 9386168	% diameter stenosis	%	IVUS (early phase)	Post procedural	**76**	73.5	*-86.5 (1.35)*	*-15.1*	*1.82*	*0.01*	Medium (observational, Matched design)
			Angio (early phase)		**76**	73.6	*-71.4 (1.23)*				
Albiero 1997 9386168	% diameter stenosis	%	IVUS (early phase)	Post procedural	**97**	72.9	*-75.4 (1.1)*	*-5.8$*	*1.522*	*0*	Medium (observational, Matched design)
			Angio (early phase)		**97**	73.2	*-69.6 (1.06)*				
Fitzgerald 2000 10920064 CRUISE study	In- lesion Diameter Stenosis (Quantitative angiographic analysis)	%	IVUS	Procedural	290	65.4	*-46.6 (0.76)*	*-0.3*	*1.09*	*0.783*	High (Not randomized, issue of selection bias in centers, no matching or adjusted analyses)
			Angio		253	66.9	*-46.3 (0.79)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Fitzgerald 2000 10920064 CRUISE study	In- lesion Diameter Stenosis (Quantitative angiographic analysis)	%	IVUS	Procedural	290	65.4	*-57.8 (0.69)*	*-0.7*	*1.01*	*0.489*	High risk of bias (not randomized, issue of selection bias in centers, no matching or adjusted analyses)
			Angio		253	66.9	*-57.1 (0.74)*				
Kawata 1997	Percent stenosis	%	IVUS	Procedural	17	71.4	*-66.6 (0.92)*	*-12.1*	*1.38*	*<0.001*	High (Incomplete design information. Analyses do not provide any variability measure)
9476578			Angio		25	76.8	*-54.5 (1.02)*				
Gerber 2009	RVD	mm	IVUS	Procedural	**46.5**	2.64	*0.73 (0.08)*	*0.29*	*0.12*	*0.012*	Medium (only matched design analysis; matched to an external cohort; unclear if the external cohort was retrospective or prospective)
19213067 Pravio study			Angio		**46.5**	2.64	*0.44 (0.08)*				
Mudra 2001 11560848	Minimal Lumen diameter	mm	IVUS	Post procedural	229	0.96	*2.06 (0.03)*	*0.14*	*0.038*	*<0.001*	Low
			Angio		228	0.99	*1.92 (0.03)*				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias (comments)
Blasini 1998 9716200	Minimal Lumen diameter	mm	IVUS	Procedural .	105	0.73	*2.32 (0.05)*	*-0.08*	*0.07*	*0.223*	Medium (Observational without adjustment)
			Angio		107	0.70	*2.4 (0.05)*				
Fitzgerald 2000 10920064 CRUISE study	Reference Segment	mm	IVUS	Procedural	290	3.0	*0.1 (0.03)*	*0.1*	*0.04*	*0.016*	High risk of bias (not randomized, issue of selection bias in centers, no matching or adjusted analyses)
	Diameter (Quantitative Angiographic analysis)		Angio		253	3.0	*0 (0.03)*				
Russo, 2009 20031704 AVID	Stent Minimum diameter	mm	IVUS	Procedural (Post stent)	394	1.11	1.82 (0.03)	*0.04*	*0.035*	*0.260*	Low
			Angio		406	1.09	1.78 (0.02)				
Russo, 2009 20031704 AVID	Stent Minimum diameter	mm	IVUS	Procedural (final)	394	1.11	1.86 (0.03)	*0.08*	*0.036*	*0.025*	Low
			Angio		406	1.09	1.78 (0.02)				

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months,

AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 3. Dichotomous Results (Comparison of intermediate and long term outcomes between IVUS-guided and angiography-guided PCI)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
All cause mortality, from RCTs											
Schiele 1998 [9708456] RESIST	All-cause mortality	IVUS	6 mo	1	71	RR	*1.03*	*0.07*	*16.12*	*0.98*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
		Angio		1	73						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Frey2000 [11076823] SIPS	All-cause mortality	IVUS	2 yr	4	121	RR	*1.22*	*0.31*	*4.79*	*0.77*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		4	148						
Mueller 2002 [12362285] A subset of SIPS	All-cause mortality	IVUS	2 yr	1 (5%)	19	RR	*1.26*	*0.08*	*18.90*	*0.87*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		1 (4%)	24						
Mudra 2001 [11560848] OPTICUS	All-cause mortality	IVUS	12 mo	5	229	RR	5.04	0.59	42.83	0.121	low
		angio		1	228						
Gaster 2003 [12923023]	All-cause mortality	IVUS	5 yr	0%	54	RR	*NA*	*NA*	*NA*	*NS*	Medium (small sample size)
		angio		4%	54						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Oemrawsingh 2003 [12515744] TULIP Study	All-cause mortality	IVUS	6 mo	0	73	RR	*NA*	*NA*	*NA*	NS	Medium (Incomplete Randomization scheme and allocation concealment)
		angio		1	71						
Gil 2007 [17892989] DIPOL	All-cause mortality	IVUS	6 mo	1	83	RR	*0.96*	*0.06*	*15.15*	NS	Medium (No blinding outcome assessor, no account for multicenter)
		Angio		1	80						
Russo 2009 [20031704] AVID &	All-cause mortality	IVUS	1 yr	3.3%	369	RR	*1.74*	*0.70*	*4.33*	*0.24*	low
		angio		1.9%	375						
Jakabcin 2010 [19902491] HOME DES IVUS	All-cause mortality	IVUS	1.5 yr	3%	105	RR	*1.05*	*0.27*	*8.42*	*0.65*	Medium (No blinding; underpowered)
		angio		2%	105						
All-cause mortality, from observational studies											

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Fitzgerald 2000 [10920064] CRUISE	All-cause mortality	IVUS	9 mo	0	270	RR	NA	NA	NA	NS	High (Not randomized, issue of selection bias in centers, no matching or adjusted analyses)
		angio		2	229						
Faulknier 2004 [15156000] US	All-cause mortality	IVUS	6 mo	4%	50	RR	*0.67*	*0.30*	*1.49*	*0.32*	High (retrospective, Unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
		angio		6%	50						
Orford 2004 [15389239] PRESTO	All-cause mortality	IVUS	9 mo	8	796	AdjRR#	0.91	0.42	1.82	0.73	Medium (post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
		angio		99	8274						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Roy 2008 [18550555]	All-cause mortality	IVUS	1 yr	50 (5.7%)	884	RR	*0.81*	*0.56*	*1.16*	*0.24*	Medium (Registry data with propensity score matching)
		angio		62 (7.1%)	884						
Park 2009 [20031713] MAIN-COMPARE registry $	All-cause mortality	IVUS	3 yr	34	756	HR	0.31	0.19	0.51	ND	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		29	219						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	All-cause mortality (for propensity cohort)	IVUS	3 yr	ND	201	HR	0.54	0.28	1.03	0.06	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		ND	201						
Maluenda 2010 [19670305]	All-cause mortality	IVUS	6 mo	24	382	RR	*1.26*	*0.74*	*2.17*	*0.39*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)
		angio		26	523						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Kim 2011 [21167352] COBIS	All-cause mortality	IVUS	3 yr	1.4%	487	HR	0.58	0.21	1.61	0.30	Medium (Observational study without adjustment)
		Angio		1.8%	487						
Cardiac mortality, from observational studies											
Choi 2001 [11431666]	Cardiac mortality	IVUS	6 mo	1	178	RR	*NA*	*NA*	*NA*	0.45	Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)
		angio		0	100						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Fujimoto 2008 [18522771]	Cardiac mortality	IVUS	8 mo	0	**138**	RR	NA	NA	NA	ND	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
		angio		0	**341**						
Roy 2008 [18550555]	Cardiac mortality	IVUS	1 yr	16 (1.9%)	884	RR	*0.67*	*0.36*	*1.25*	*0.20*	Medium (Registry data with propensity score matching)
		angio		24 (2.8%)	884						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	Cardiac mortality	IVUS	3 yr	23	756	RR	*0.32*	*0.18*	*0.56*	*<0.0001*	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		21	219						
Maluenda 2010 [19670305]	Cardiac mortality	IVUS	6 mo	8	382	RR	*1.37*	*0.52*	*3.62*	*0.53*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		8	523						
MI, from RCTs											
Frey2000 [11076823] SIPS	Q wave MI	IVUS	2 yr	1	121	RR	*0.20*	*0.02*	*1.67*	*0.14*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
		angio		6	148						
Mueller 2002 [12362285] A subset of SIPS	Non-fatal MI	IVUS	2 yr	0	19	RR	*NA*	*NA*	*NA*	1	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
		angio		0	24						
Mudra 2001 [11560848] OPTICUS	Q wave MI	IVUS	12 mo	1	229	RR	0.50	0.05	5.52	1	low
		angio		2	228						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Mudra 2001 [11560848] OPTICUS	Non-Q wave MI	IVUS	12 mo	5	229	RR	0.63	0.21	1.90	0.407	low
		angio		8	228						
Gaster 2003 [12923023]	Q wave MI	IVUS	5 yr	2%	54	RR	*NA*	*NA*	*NA*	*NS*	Medium (small sample size)
		angio		0%	54						
Oemrawsingh 2003 [12515744] TULIP Study	MI	IVUS	6 mo	1	73	RR	*0.19*	*0.02*	*1.62*	*0.13*	Medium (Incomplete Randomizat on scheme and allocation concealment)
		angio		5	71						
Gil 2007 [17892989] DIPOL	MI	IVUS	6 mo	1	83	RR	*0.24*	*0.03*	*2.11*	NS	Medium (No blinding outcome assessor, no account for multicenter)
		angio		4	80						
Russo 2009 [20031704] AVID &	MI	IVUS	1 yr	6.8%	369	RR	*1.33*	*0.75*	*2.38*	*0.33*	low
		angio		5.1%	375						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Jakabcin 2010 [19902491] HOME DES IVUS	MI	IVUS	1.5 yr	1%	105	RR	*0.25*	*0.03*	*2.09*	*0.20*	Medium (No blinding; underpowered)
		angio		4%	105						
MI, from observational studies											
Albiero 1997 [9386168]	Q wave MI	IVUS	6 mo	2	158	RR	*NA*	*NA*	*NA*	NA	Medium (observational, Matched design)
		Angio		0	154						
Albiero 1997 [9386168]	Non-Q wave MI	IVUS	6 mo	0	158	RR	*NA*	*NA*	*NA*	NA	Medium (observational, Matched design)
		Angio		0	154						
Fitzgerald 2000 [10920064] CRUISE	MI	IVUS	9 mo	19	270	RR	*1.15*	*0.59*	*2.24*	*0.68*	High (Not randomized, issue of selection bias in centers, no matching or adjusted analyses)
		angio		14	229						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Choi 2001 [11431666]	MI	IVUS	6 mo	3	178	RR	*1.69*	*0.18*	*15.99*	0.65	Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)
		angio		1	100						
Faulknier 2004 [15156000] US	MI	IVUS	6 mo	4%	50	RR	*2.00*	*0.64*	*6.22*	*0.23*	High (retrospective, Unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
		angio		2%	50						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Orford 2004 [15389239] PRESTO	MI	IVUS	9 mo	12	796	AdjRR#	0.97	0.53	1.76	0.92	Medium (post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
		angio		120	8274						
Fujimoto 2008 [18522771]	MI	IVUS	8 mo	0	138	RR	NA	NA	NA	ND	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
		angio		0	341						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Roy 2008 [18550555]	Q wave MI	IVUS	1 yr	18 (2.1%)	884	RR	*0.69*	*0.38*	*1.25*	*0.23*	Medium (Registry data with propensity score matching)
		angio		26 (3.1%)	884						
Park 2009 [20031713] MAIN-COMPARE registry $	MI	IVUS	3 yr	56	756	RR	*0.68*	*0.43*	*1.06*	*0.09*	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		24	219						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	MI (for propensity cohort)	IVUS	3 yr	ND	201	HR	0.76	0.41	1.40	0.38	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		ND	201						
Maluenda 2010 [19670305]	Q-wave MI	IVUS	6 mo	7	382	RR	*0.60*	*0.25*	*1.44*	*0.25*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		16	523						
Maluenda 2010 [19670305]	Non-Q-wave MI	IVUS	6 mo	23	382	RR	*1.02*	*0.60*	*1.71*	*0.95*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)
		angio		31	523						
Kim 2011 [21167352] COBIS	MI	IVUS	3 yr	0.7%	487	HR	0.32	0.09	1.18	0.09	Medium (Observational study without adjustment)
		Angio		1.6%	487						
TVR or TLR, from RCTs											
Schiele 1998 [9708456] RESIST	TVR	IVUS	6 mo	4	71	RR	*0.51*	*0.16*	*1.63*	*0.26*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
		Angio		8	73						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Frey2000 [11076823] SIPS	Clinically driven TLR	IVUS	2 yr	21	121	RR	*0.60*	*0.38*	*0.95*	*0.03*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
		angio		43	148						
Frey2000 [11076823] SIPS	Non-clinically driven TLR	IVUS	2 yr	12	121	RR	*1.63*	*0.71*	*3.74*	*0.25*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
		angio		9	148						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Mueller 2002 [12362285] A subset of SIPS	TVR	IVUS	2 yr	5 (26%)	19	RR	*0.63*	*0.26*	*1.54*	*0.3*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		10 (42%)	24						
Gaster 2001 [11405501]	TVR	IVUS	6 mo	10	54	RR	*0.56*	*0.28*	*1.09*	*0.088*	Medium (small sample size)
		angio		18	54						
Oemrawsingh 2003 [12515744] TULIP Study	TLR	IVUS	6 mo	3	73	RR	*0.29*	*0.08*	*1.02*	*0.05*	Medium (Incomplete Randomization scheme and allocation concealment)
		angio		10	71						
Oemrawsingh 2003 [12515744] TULIP Study	Non TLR	IVUS	6 mo	8	73	RR	*0.97*	*0.38*	*2.45*	*0.95*	Medium (Incomplete Randomization scheme and allocation concealment)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		8	71						
Gil 2007 [17892989] DIPOL	TVR	IVUS	6 mo	1	83	RR	*0.96*	*0.06*	*15.15*	0.05	Medium (No blinding outcome assessor, no account for multicenter)
		angio		1	80						
Gil 2007 [17892989] DIPOL	TLR	IVUS	6 mo	3	83	RR	*0.48*	*0.12*	*1.86*	NS	Medium (No blinding outcome assessor, no account for multicenter)
		angio		6	80						
Gil 2007 [17892989] DIPOL	Non TLR	IVUS	6 mo	0	83	RR	*NA*	*NA*	*NA*	NS	Medium (No blinding outcome assessor, no account for multicenter)
		angio		1	80						
Russo 2009 [20031704] AVID &	TLR	IVUS	1 yr	8.1%	369	RR	*0.68*	*0.43*	*1.05*	*0.08*	low
		angio		12.0%	375						
Jakabcin 2010 [19902491] HOME DES IVUS	TLR	IVUS	1.5 yr	6%	105	RR	*1.00*	*0.34*	*2.92*	*1.00*	Medium (No blinding; underpowered)
		angio		6%	105						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
TVR or TLR, from observational studies											
Albiero 1997 [9386168]	Total repeat revascularization	IVUS	6 mo	11	158	RR	*0.60*	*0.29*	*1.22*	0.17	Medium (observational, Matched design)
		Angio		18	154					*0.16*	
Sakamoto 1999 [10402282] Japan	TLR	IVUS	6 mo	2	17	RR	*0.20*	*0.05*	*0.78*	*0.02*	Medium (sample size small; no adjusted analyses)
		angio		10	17						
Fitzgerald 2000 [10920064] CRUISE	TVR	IVUS	9 mo	23	270	RR	*0.56*	*0.34*	*0.92*	*0.021*	High (Not randomized, issue of selection bias in centers, no matching or adjusted analyses)
		angio		35	229						
Choi 2001 [11431666]	TVR (PTCA or CABG)	IVUS	6 mo	19	178	RR	*0.59*	*0.33*	*1.08*	*0.09*	Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		18	100						
Faulknier 2004 [15156000] US	TVR	IVUS	6 mo	14.3%	50	RR	*3.11*	*1.65*	*5.84*		High (retrospective, Unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
		angio		4.6%	50					*<0.0001*	
Orford 2004 [15389239] PRESTO	TVR	IVUS	9 mo	110	796	AdjRR#	1.11	0.91	1.35	0.32	Medium (post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
		angio		1010	8274						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Fujimoto 2008 [18522771]	TLR	IVUS	8 mo	3.8%	**138**	RR	*1.06*	*0.39*	*2.88*	*0.92*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
		angio		3.6%	**341**						
Roy 2008 [18550555]	TVR	IVUS	1 yr	73 (8.5%)	884	RR	*0.95*	*0.70*	*1.29*	0.73	Medium (Registry data with propensity score matching)
		angio		77 (9.1%)	884						
Roy 2008 [18550555]	TLR	IVUS	1 yr	43 (5.1%)	884	RR	*0.70*	*0.48*	*1.03*	0.07	Medium (Registry data with propensity score matching)
		angio		61 (7.2%)	884						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	TVR	IVUS	3 yr	86	756	HR	1.28	0.78	2.10	ND	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		19	219						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	TVR (for propensity cohort)	IVUS	3 yr	ND	201	HR	1.33	0.72	2.48	0.37	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		ND	201						
Maluenda 2010 [19670305]	TVR	IVUS	6 mo	44	382	RR	*1.08*	*0.74*	*1.56*	*0.70*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		56	523						
Maluenda 2010 [19670305]	TLR	IVUS	6 mo	27	382	RR	*0.92*	*0.58*	*1.48*	*0.74*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)
		angio		40	523						
Kim 2011 [21167352] COBIS	TLR	IVUS	3 yr	7.4%	487	HR	0.91	0.52	1.62	0.76	Medium (Observational study without adjustment)
		Angio		6.7%	487						
CABG, from RCTs											
Mudra 2001 [11560848] OPTICUS	CABG	IVUS	12 mo	10	229	RR	1.26	0.50	3.14	0.621	low
		angio		8	228						
Gaster 2003 [12923023]	CABG	IVUS	5 yr	11%	54	RR	*0.65*	*0.25*	*1.69*	*0.37*	Medium (small sample size)
		angio		17%	54						
Russo 2009 [20031704] AVID &	CABG	IVUS	1 yr	2.7%	369	RR	*1.00*	*0.42*	*2.37*	*1.00*	low
		angio		2.7%	375						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
CABG, from observational studies											
Albiero 1997 [9386168]	CABG	IVUS	6 mo	3	158	RR	*NA*	*NA*	*NA*	NA	Medium (observational, Matched design)
		Angio		0	154						
Choi 2001 [11431666]	CABG	IVUS	6 mo	5	178	RR	*0.47*	*0.15*	*1.50*	*0.20*	Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)
		angio		6	100						
Repeat PCI, from RCTs											
Mudra 2001 [11560848] OPTICUS	Repeat PCI	IVUS	12 mo	31	229	RR	1.04	0.64	1.67	0.868	low
		angio		30	228						
Gaster 2003 [12923023]	Repeat PCI	IVUS	5 yr	31%	54	RR	*0.51*	*0.32*	*0.80*	*0.003*	Medium (small sample size)
		angio		61%	54						
Repeat PCI, from observational studies											

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Albiero 1997 [9386168]	Repeat PCI	IVUS	6 mo	8	158	RR	*0.43*	*0.19*	*0.97*	0.05 *0.04*	Medium (observational, Matched design)
		Angio		18	154						
Choi 2001 [11431666]	Repeat PTCA	IVUS	6 mo	14	178	RR	*0.66*	*0.32*	*1.36*	*0.26*	Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)
		angio		12	100						
MACE or composite outcomes, from RCTs											

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Frey2000 [11076823] SIPS	MACE (mortality, MI, repeat PCI, CABG)	IVUS	2 yr	37	121	RR	*0.82*	*0.59*	*1.16*	*0.26*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		55	148						
Mueller 2002 [12362285] A subset of SIPS	Composite (mortality, non fatal MI, TVR)	IVUS	2 yr	6 (32%)	19	RR	*0.69*	*0.31*	*1.52*	*0.357*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		11 (46%)	24						
Mudra 2001 [11560848] OPTICUS	Composite (mortality, MI, CABG, repeat PCI)	IVUS	12 mo	52	229	RR	1.07	0.75	1.52	0.710	low
		angio		49	228						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Gaster 2003 [12923023]	Freedom from MACE (mortality, Q wave MI, repeat PCI, CABG)	IVUS	5 yr	78%	54	RR	*1.32*	*1.02*	*1.72*	*0.04*	Medium (small sample size)
		angio		59%	54						
Oemrawsingh 2003 [12515744] TULIP Study	Composite (mortality, MI, or TLR)	IVUS	6 mo	4	73	RR	*0.28*	*0.10*	*0.80*	*0.02*	Medium (Incomplete Randomizat on scheme and allocation concealment)
		angio		14	71						
Agostoni 2005 [15721110] $	MACE (mortality, nonfatal MI, TVR)	IVUS	1.2 yr	2	24	RR	*0.4*	*0.09*	*1.78*	*0.23*	High (The use of IVUS was the operator's decision; selection bias could not be eliminated.)
		angio		7	34						
Gil 2007 [17892989] DIPOL	MACE (mortality, MI, RCR)	IVUS	6 mo	6	83	RR	*0.44*	*0.18*	*1.11*	0.05	Medium (No blinding outcome assessor, no account for multicenter)
		angio		13	80						
Russo 2009 [20031704] AVID &	MACE	IVUS	1 yr	18.4%	369	RR	*0.98*	*0.73*	*1.33*	*0.92*	low
		angio		18.7%	375						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Jakabcin 2010 [19902491] HOME DES IVUS	MACE (mortality, MI, TLR)	IVUS	1.5 yr	11%	105	RR	*0.92*	*0.43*	*1.94*	*0.82*	Medium (No blinding; underpowered)
		angio		12%	105						
MACE or composite outcomes, from observational studies											
Choi 2001 [11431666]	MACE (repeat PTCA, CABG, MI, cardiac mortality)	IVUS	6 mo	20	178	RR	*0.62*	*0.35*	*1.12*	*0.12*	Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)
		angio		18	100						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Choi 2001 [11431666]	cardiac death, MI, repeat revascularization, and abrupt stent closure	In multivariatea analysis adjusted for gender, maximum balloon size, TIMI flow, last balloon size, and CABG, IVUS use was a negative predictor of cardiac death, MI, repeat revascularization, and abrupt stent closure (RR: 0.49, 95% CI 0.25-0.98, P=0.04)									Medium (Selection of confounder adjusted in multivariate model was purely statistics-based, multivariate analysis was done in only 1 outcome, retrospective design)
Faulknier 2004 [15156000] US	MACE (not defined)	IVUS	6 mo	21.4%	50	RR	*1.98*	*1.41*	*2.78*	*<0.0001*	High (Retrospective, unclear selection of 50 of 173 IVUS guided PCI, matching by random number generator)
		angio		10.8%	50						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Orford 2004 [15389239] PRESTO	Composite (mortality, MI, or TVR)	IVUS	9 mo	121	796	AdjRR#	1.10	0.91	1.33	0.34	Medium (Post-hoc analyses of RCT, some issues with original design of trial with initial exclusion of patients who refuse angiographic follow-up, issue of selection bias in trial design.)
		angio		1122	8274						
Roy 2008 [18550555]	MACE (mortality, Q wave MI, TVR)	IVUS	1 yr	128 (14.5%)	884	RR	*0.90*	*0.71*	*1.11*	*0.33*	Medium (Registry data with propensity score matching)
		angio		143 (16.2%)	884						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	Mortality or MI	IVUS	3 yr	23	756	HR	0.47	0.33	0.67	ND	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		21	219						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	Mortality or MI(for propensity cohort)	IVUS	3 yr	ND	201	HR	0.66	0.42	1.04	0.07	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		ND	201						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Park 2009 [20031713] MAIN-COMPARE registry $	Mortality or MI or TVR (for propensity cohort)	IVUS	3 yr	ND	201	HR	0.80	0.54	1.19	0.28	Medium (Unbalanced arms limiting what propensity matching could achieve. In the propensity match patients, 102 (51%) undergoing IVUS and 116 (58%) undergoing angio were lost to followup at 3 yrs; IVUS use was at the discretion of the operator; residual confounding could not be entirely eliminated by propensity score)
		angio		ND	201						
Maluenda 2010 [19670305]	MACE (mortality, Q wave MI, TLR)	IVUS	6 mo	55	382	RR	*1.02*	*0.74*	*1.41*	*0.92*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		74	523						
Kim 2011 [21167352] COBIS	MACE (mortality, MI, TLR)	IVUS	3 yr	10.9%	487	HR	0.73	0.44	1.19	0.20	Medium (Observational study without adjustment)
		Angio		12.1%	487						
Kim 2011 [21167352] COBIS	Death or MI	IVUS	3 yr	3.8%	487	HR	0.44	0.12	0.96	0.04	Medium (Observational study without adjustment)
		Angio		7.8%	487						
Restenosis, from RCTs											
Schiele 1998 [9708456] RESIST	Restenosis	IVUS	6 mo	16	71	RR	*0.78*	*0.45*	*1.37*	0.25 *0.40*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
		Angio		21	73						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Frey2000 [11076823] SIPS	Restenosis	IVUS	6 mo	29%	121	RR	*0.83*	*0.58*	*1.18*	*0.30*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		35%	148						
Mueller 2002 [12362285] A subset of SIPS	Restenosis	IVUS	6 mo	53%	19	RR	*1.02*	*0.58*	*1.81*	*0.94*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
		angio		52%	24						
Gaster 2001 [11405501]	Restenosis (QCA diameter ≥50%)	IVUS	6 mo	8	54	RR	*0.62*	*0.28*	*1.36*	*0.232*	Medium (small sample size)
		angio		13	54						
Gaster 2001 [11405501]	Recurrence (Angina + QCA diameter ≥50% + CFR <2.5)	IVUS	6 mo	5	54	RR	*0.5*	*0.18*	*1.37*	*0.176*	Medium (small sample size)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		10	54						
Gaster 2001 [11405501]	Recurrence (Angina + QCA diameter ≥50% + FFR <0.75)	IVUS	6 mo	2	54	RR	*0.29*	*0.06*	*1.31*	*0.108*	Medium (small sample size)
		angio		7	54						
Mudra 2001 [11560848] OPTICUS	Restenosis	IVUS	6 mo	56	229	RR	*1.07*	*0.77*	*1.49*	0.68	low
		angio		52	228						
Gil 2007 [17892989] DIPOL	Restenosis	IVUS	6 mo	9.6%	83	RR	*0.36*	*0.17*	*0.77*	*0.008*	Medium (No blinding outcome assessor, no account for multicenter)
		angio		26.6%	80						
Restenosis, from observational studies											
Albiero 1997 [9386168]	Restenosis	IVUS	6 mo	10	**173**	RR	*0.67*	*0.31*	*1.44*	*0.30*	Medium (observational, Matched design)
		Angio		15	**173**						
Blasini 1998 [9716200]	Restenosis	IVUS	6 mo	20.9	105	RR	*0.71*	*0.44*	*1.16*	0.18	Medium (Observational without adjustment)
		angio		29.9	107						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Sakamoto 1999 [10402282] Japan	Angiographic stenosis	IVUS	6 mo	3	17	RR	*0.30*	*0.10*	*0.90*	*0.03*	Medium (sample size small; no adjusted analyses)
		angio		10	17						
Yoshitomi 1999 [10385154]	Restenosis	IVUS	3 mo	14%	38	RR	*0.45*	*0.17*	*1.18*	0.10 *0.11*	High (Observational,with historical controls, with no confounder adjustment, small sample size)
		Angio		31%	28						
Park 2001 [11583882]	Restenosis	IVUS	6 mo	11	59	RR	*0.96*	*0.42*	*2.17*	0.91	High (The use of IVUS was the operator's decision; selection bias could not be eliminated)
		angio		8	41						
Ozaki 2007 [17186970] REDUCE III	Restenosis (≥50% diameter stenosis at followup by QCA)	IVUS guided CBA with stent	7 mo	8	122	RR	*0.34*	*0.16*	*0.75*	0.007	Medium (Because of prospective nature of study. issues: unclear sampling, not adjusted for multiple comparisons, data from subgroup analysis of original randomized group)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio guided CBA with stent		19	106						
Ozaki 2007 [17186970] REDUCE III	Restenosis (≥50% diameter stenosis at followup by QCA and subsequent TLR)	IVUS guided BA with stent	7 mo	25	126	RR	*1.03*	*0.61*	*1.77*	0.90	Medium (Because of prospective nature of study. issues: unclear sampling, not adjusted for multiple comparisons, data from subgroup analysis of original randomized group)
		angio guided BA with stent		19	99						
Stent thrombosis, from RCTs											
Gil 2007 [17892989] DIPOL	Stent thrombosis	IVUS	6 mo	0	83	RR	NA	NA	NA	NS	Medium (No blinding outcome assessor, no account for multicenter)
		angio		0	80						
Russo 2009 [20031704] AVID &	Stent thrombosis	IVUS	1 yr	1.4%	369	RR	*1.27*	*0.35*	*4.61*	*0.71*	low
		angio		1.1%	375						
Jakabcin 2010 [19902491] HOME DES IVUS	Stent thrombosis	IVUS	1.5 yr	4%	105	RR	*0.67*	*0.20*	*2.22*	*0.51*	Medium (No blinding; underpowered)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
		angio		6%	105						
Stent thrombosis, from observational studies											
Albiero 1997 [9386168]	Stent thrombosis	IVUS	6 mo	0	158	RR	*NA*	*NA*	*NA*	NA	Medium (observational, Matched design)
		Angio		0	154						
Fujimoto 2008 [18522771]	Acute or late thrombosis	IVUS	8 mo	0	**138**	RR	NA	NA	NA	ND	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective**)**
		angio		0	**341**						
Roy 2008 [18550555]	Probable stent thrombosis	IVUS	1 yr	35 (4%)	884	RR	*0.69*	*0.45*	*1.04*	*0.08*	Medium (Registry data with propensity score matching)
		angio		51 (5.8%)	884						
Roy 2008 [18550555]	Definite stent thrombosis	IVUS	1 yr	6 (0.7%)	884	RR	*0.33*	*0.13*	*0.84*	*0.02*	Medium (Registry data with propensity score matching)
		angio		18 (2%)	884						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Roy 2008 [18550555]	Late definite stent thrombosis	IVUS	1 yr	2 (0.2%)	884	RR	*0.33*	*0.07*	*1.65*	*0.18*	Medium (Registry data with propensity score matching)
		angio		6 (0.7%)	884						
Maluenda 2010 [19670305]	Definite stent thrombosis	IVUS	6 mo	0	382	RR	*NA*	*NA*	*NA*	*0.08*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)
		angio		5	523						
Maluenda 2010 [19670305]	Definite and probable stent thrombosis	IVUS	6 mo	8	382	RR	*1.00*	*0.40*	*2.45*	*0.99*	High (Baseline characteristics were different between groups. Multivariate analysis was done, but the confounder adjusted were based on statistics, not based on the baseline imbalances.)
		angio		11	523						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Kim 2011 [21167352] COBIS	Stent thrombosis	IVUS	3 yr	0.2%	487	HR	0.33	0.04	3.21	0.34	Medium (Observational study without adjustment)
		Angio		0.6%	487						
Other outcomes											
Maluenda 2010 [19670305]	Non cardiac death	IVUS	6 mo	16	382	RR	*1.22*	*0.63*	*2.36*	*0.56*	High (Baseline characteristics were different between groups. Multivariate analysis did not account for baseline imbalances.)
		angio		18	523						
Albiero 1997 [9386168]	Acute vascular complications	IVUS	6 mo	1	158	RR	*1.95*	*0.18*	*21.86*	0.51	Medium (observational, Matched design)
		Angio		2	154					*0.58*	
Fujimoto 2008 [18522771]	Primary success rate (final stenosis <50% of the vessel diameter)	IVUS	8 mo	100%	**138**	RR	*1*	*1*	*1.01*	0.36	High (Little info on IVUS, recruitment and inclusion/exclusion criteria; unclear if it's retrospective**)**
		angio		99.4%	**341**						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI LCI	95% CI UCI	P Btw	Risk of bias
Fujimoto 2008 [18522771]	Cerebrovascular event	IVUS	8 mo	0	**138**	RR	NA	NA	NA	ND	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective**)**
		angio		0	**341**						

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 4 Continuous Outcomes (Comparison of intermediate and long term outcomes between IVUS-guided and angiography-guided PCI)

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
Minimum lumen diameter, from RCTs											
Schiele	Minimum lumen diameter	mm	IVUS	6 mo	79	0.96	*0.74 (0.07)*	*0.16*	*0.09*	*0.09*	Medium (There were protocol violations; 4 ineligible Patients were enrolled)
1998 [9708456] France RESIST			Angio		76	1.02	*0.58 (0.07)*				
Frey	Minimum lumen diameter	mm	IVUS	6 mo	121	0.64	*1.07 (0.07)*	*0.21*	*0.10*	*0.03*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
2000 [11076823] SIPS			Angio		148	0.70	*0.86 (0.07)*				
Mueller	Minimum lumen diameter	mm	IVUS	6 mo	**28**	0.6	*0.67 (0.17)*	*0.22*	*0.22*	*0.32*	Medium (Outcome assessor not

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
											fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
2002 [12362285] A subset of SIPS			Angio		**29**	0.66	*0.45 (0.15)*				
Mudra	Minimum lumen diameter	mm	IVUS	6 mo	229	0.96	*0.99 (0.04)*	*0.07*	*0.05*	*0.17*	low
2001 [11560848] OPTICUS			Angio		228	0.99	*0.92 (0.03)*				
Oemrawsingh	Minimum lumen diameter	mm	IVUS	6 mo	73	1.02	*0.80 (0.06)*	*0.28*	*0.09*	*0.003*	Medium (Incomplete Randomization on scheme and allocation concealment)
2003 [12515744] TULIP Study			Angio		71	0.99	*0.52 (0.07)*				
Minimum lumen diameter, from observational studies											
Albiero	Minimum	mm	IVUS (early	6 mo	**76**	*0.8*	*1.61*	*0.56*	*0.10*	*<0.0001*	Medium

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
1997 [9386168] Italy, Germany	lumen diameter		phase)				*(0.08)*				(observational, Matched design)
			Angio (early phase)		**76**	*0.8*	*1.05 (0.07)*				
Albiero 1997 [9386168] Italy, Germany	Minimum lumen diameter	mm	IVUS (late phase)	6 mo	**97**	*0.8*	*1.26 (0.08)*	*0.2*	*0.11*	*0.06*	Medium (observational, Matched design)
			Angio (late phase)		**97**	*0.79*	*1.06 (0.07)*				
Blasini	Minimum lumen diameter	mm	IVUS	6 mo	105	0.73	*1.3 (0.07)*	*0.07*	*0.10*	*0.48*	Medium (Observational without adjustment)
1998 [9716200]			Angio		107	0.70	*1.23 (0.07)*				
Sakamoto	Minimum lumen diameter	mm	IVUS	6 mo	**18**	2.76	*-0.68 (0.13)*	*0.1*	*0.19*	*0.59*	Medium (sample size small; no adjusted analyses)
1999 [10402282] Japan			Angio		**19**	2.51	*-0.78 (0.13)*				
Yoshitomi	Minimum lumen diameter	mm	IVUS	3 mo	**40**	0.4	*1.77 (0.10)*	*-5.4*	*0.17*	*0.003*	High (Observational,with historical controls, with no confounder adjustment, small sample size)
1999			Angio		**29**	0.45	*1.25*				

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
[10385154] Japan							*(0.14)*				
Park	Minimum lumen diameter	mm	IVUS	6 mo	77	1.2	*1.5 (0.10)*	*-0.2*	*0.16*	*0.20*	High (The use of IVUS was the operator's decision; selection bias could not be eliminated.)
2001 [11583882]			Angio		50	1.0	*1.7 (0.12)*				
Fujimoto 2008 [18522771]	Minimum lumen diameter, proximal	mm	IVUS	8 mo	**97**	0.38	*2.11 (0.03)*	*0*	*0.04*	*1*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclsion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
Japan			Angio		**271**	0.36	*2.11 (0.02)*				
Fujimoto 2008 [18522771]	Minimum lumen diameter, in stent	mm	IVUS	8 mo	**97**	0.38	*1.99 (0.04)*	*-0.04*	*0.04*	*0.34*	High (Little info on how IVUS was done; little info about recruitment and

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
											inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
Japan			Angio		**271**	0.36	*2.03 (0.02)*				
Fujimoto 2008 [18522771]	Minimum lumen diameter, distal	mm	IVUS	8 mo	**97**	0.38	*2.04 (0.03)*	*0*	*0.04*	*1*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
Japan			Angio		**271**	0.36	*2.04 (0.02)*				
Diameter stenosis,											

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
from RCTs											
Schiele [9708456] France RESIST	Diameter stenosis	%	IVUS	6 mo	79	65	*-27 (2.06)*	*-5*	*2.77*	*0.07*	Medium (There were Protocol violations; 4 ineligible patients were enrolled)
			Angio		76	64	*-22 (1.85)*				
Frey 2000 [11076823] SIPS	Diameter stenosis	%	IVUS	6 mo	121	29.1	*-34.6 (2.11)*	*-4*	*2.93*	*0.17*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization may have been violated)
			Angio		148	76.8	*-30.6 (2.03)*				
Mueller	Diameter stenosis	%	IVUS	6 mo	**28**	81	*-20 (4.97)*	*-1*	*7.16*	*0.89*	Medium (Outcome assessor not fully blinded, no allocation concealment, “add on patients were rare” so randomization

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
											may have been violated)
2002 [12362285] A subset of SIPS			Angio		**29**	77	*-19 (5.16)*				
Mudra	Diameter stenosis	%	IVUS	6 mo	229	2.97	*0.01 (0.03)*	*0.01*	*0.05*	*0.83*	low
2001 [11560848] OPTICUS			Angio		228	3.01	*0 (0.03)*				
Oemrawsingh	Diameter stenosis	%	IVUS	6 mo	73	65	*-50 (1.48)*	*-5*	*1.87*	*0.007*	Medium (Incomplete Randomization on scheme and allocation concealment)
2003 [12515744] TULIP Study			Angio		71	65	*-45 (1.14)*				
Diameter stenosis, from observatio nal studies											
Albiero 1997 [9386168] Italy, Germany	Diameter stenosis	%	IVUS (early phase)	6 mo	**76**	*73.5*	*-53.4 (2.20)*	*-15.4*	*3.18*	*<0.0001*	Medium (observational, Matched design)
			Angio (early phase)		**76**	*73.6*	*-38 (2.30)*				
Albiero	Diameter	%	IVUS (late	6 mo	**97**	*72.9*	*-42.5*	*-5.4*	*3.35*	*0.11*	Medium

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
1997 [9386168] Italy, Germany	stenosis		phase)				*(2.46)*				(observational, Matched design)
			Angio (late phase)		**97**	*73.2*	*-37.1 (2.64)*				
Blasini	Diameter stenosis	%	IVUS	6 mo	105	77	*-45 (1.95)*	*-6*	*2.80*	*0.03*	Medium (Observational without adjustment)
1998 [9716200]			Angio		107	76	*-39 (2.01)*				
Sakamoto	Diameter stenosis	%	IVUS	6 mo	**18**	17.6	*15.7 (3.36)*	*-3.5*	*5.22*	*0.50*	Medium (sample size small; no adjusted analyses)
1999 [10402282] Japan			Angio		**19**	19.1	*19.2 (3.99)*				
Yoshitomi	Diameter stenosis	%	IVUS	3 mo	**40**	86.7	*-54 (2.07)*	*-11.1*	*4.97*	*0.03*	High (Observational, with historical controls, with no confounder adjustment, small sample size)
1999 [10385154] Japan			Angio		**29**	82.6	*-42.9 (3.91)*				
Fujimoto 2008 [18522771]	Diameter stenosis,	%	IVUS	8 mo	**97**	86.4	*-74.4 (0.77)*	*0*	*0.88*	*1*	High (Little info on how IVUS was done; little info about recruitment

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
											and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
Japan	proximal		Angio		**271**	86.9	*-74.4 (0.43)*				
Fujimoto 2008 [18522771]	Diameter stenosis, in stent	%	IVUS	8 mo	**97**	86.4	*-70.4 (1.09)*	*1.1*	*1.28*	*0.39*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
Japan			Angio		**271**	86.9	*-71.5 (0.66)*				
Fujimoto 2008 [18522771] Japan	Diameter stenosis, distal	%	IVUS	8 mo	**97**	86.4	*-71.9 (0.87)*	*0.2*	*1.00*	*0.84*	High (Little info on how IVUS was done; little info about

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
											recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions between Table 2 and Table 3.)
			Angio		**271**	86.9	*-72.1 (0.50)*				
Reference diameter, from RCTs											
Frey	Reference diameter	mm	IVUS	6 mo	121	3.01	*0.02 (0.06)*	*0.13*	*0.09*	*0.13*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
2000 [11076823] SIPS			Angio		148	3.00	*-0.11 (0.06)*				
Mueller	Reference diameter	mm	IVUS	6 mo	**28**	3.09	*0.03 (0.12)*	*0.14*	*0.16*	*0.39*	Medium (Outcome assessor not fully blinded, no allocation

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
											concealment, “add on patients were rare” so randomization may have been violated)
2002 [12362285] A subset of SIPS			Angio		**29**	2.82	*-0.11 (0.11)*				
Mudra 2001 [11560848] OPTICUS	Reference diameter	mm	IVUS	6 mo	229	67.6	*-32.8 (1.18)*	*-2.9*	*1.63*	*0.08*	low
			Angio		228	66.7	*-29.9 (1.12)*				
Oemrawsingh 2003 [12515744] TULIP Study	Reference diameter	mm	IVUS	6 mo	73	2.95	*-0.11 (0.06)*	*0.11*	*0.09*	*0.21*	Medium (Incomplete Randomization on scheme and allocation concealment)
			Angio		71	2.96	*-0.22 (0.06)*				
Reference diameter, from observatio nal studies											
Albiero 1997 [9386168] Italy, Germany	Reference vessel	mm	IVUS (early phase)	6 mo	**76**	*3.04*	*-0.02 (0.04)*	*0.22*	*0.06*	*<0.0001*	Medium (observational, Matched design)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
			Angio (early phase)		**76**	*3.1*	*-0.24 (0.04)*				
Albiero 1997 [9386168] Italy, Germany	Reference vessel	mm	IVUS (late phase)	6 mo	**97**	*3*	*-0.05 (0.04)*	*0.05*	*0.05*	*0.35*	Medium (observational, Matched design)
			Angio (late phase)		**97**	*2.96*	*-0.1 (0.04)*				
Blasini 1998 [9716200]	Reference diameter	mm	IVUS	6 mo	105	3.05	*-0.05 (0.05)*	*0.03*	*0.08*	*0.71*	Medium (Observational without adjustment)
			Angio		107	3.11	*-0.08 (0.06)*				
Sakamoto 1999 [10402282] Japan	Reference diameter	mm	IVUS	6 mo	**18**	3.36	*-0.24 (0.13)*	*0.06*	*0.167*	*0.72*	Medium (sample size small; no adjusted analyses)
			Angio		**19**	3.10	*-0.30 (0.10)*				
Fujimoto 2008 [18522771]	Reference diameter	mm	IVUS	8 mo	**97**	2.79	*0.03 (0.03)*	*-0.01*	*0.04*	*0.79*	High (Little info on how IVUS was done; little info about recruitment and inclusion/exclusion criteria; unclear if it's retrospective; unclear number of lesions

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
											between Table 2 and Table 3.)
Japan			Angio		**271**	2.78	*0.04 (0.02)*				
Late loss, from RCTs											
Frey	Late loss	mm	IVUS	6 mo	121	NA	At fu: 0.84 (0.91)	Mean diff: *0.01*	*0.08*	*0.90*	Medium (Outcome assessor not fully blinded, no allocation concealment, "add on patients were rare" so randomization may have been violated)
2000 [11076823] SIPS			Angio		148	NA	At fu: 0.82 (0.93)				
Mudra	Late loss	mm	IVUS	6 mo	273	NA	At fu: 1.07 (0.62)	*Mean diff:*	*0.04*	*0.05*	low
2001 [11560848] OPTICUS			Angio		275	NA	At fu: 1 (0.58)	*0.07*			
Oemrawsingh 2003 [12515744] TULIP Study	Late loss	mm	IVUS	6 mo	73	NA	At fu: 1.20 (0.51)	Mean diff: *-0.13*	*0.06*	*0.04*	Medium (Incomplete Randomization on scheme and allocation concealment)

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
			Angio		71	NA	At fu: 1.33 (0.55)				
Late loss, from observational study											
Sakamoto	Late loss	mm	IVUS	6 mo	**18**	NA	At fu: 0.36 (0.21)	Mean diff:	*0.14*	*0.19*	Medium (sample size small; no adjusted analyses)
1999 [10402282] Japan			Angio		**19**	NA	At fu: 0.54 (0.68)	*-0.18*			

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*****Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C.Table 5. Study Design and Patient Characteristics (KQ2 FFR-guided PCI versus angiography-guided PCI)

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Intervention Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Tonino 2009 Fearon, 2010 Pijls 2010	**RCT, Multi-center**	2	FFR PCI	509	65	75.4	57.2	36.7	24.2	61	71.9	ND	ND	Low
US, Europe **FAME Trial**			Angio PCI	496	64	72.6	57.1	36.3	25.2	65.9	73	ND	ND	
Wongprapaut, 2005	**Prospective NRCS, Single center**	1.5	FFR PCI	57	58	75	52	ND	43	78	66	ND	ND	Medium Unadjusted analyses
US			Angio PCI	80	62	79	50	ND	34	70	60	ND	ND	
Muramatsu, 2002	**Prospective with historical control**		FFR PCI	77	62	79	ND	ND	13	ND	23	LAD 62 Multivessel 48	ND	High Historical control and unadjusted analyses
Japan	**Single center**		Angio PCI	77	64	73	ND	ND	19	ND	24	LAD 40 Multivessel 49	ND	
Botman, 2004 [15390344] The	Prospective Non-Randomized	Two	All had FFR	CABG group 87	63 (37–81)	70	62 (8)	ND	24	29	72	1 vessel 0 2 vessel 46 3 vessel 54	ND	B, non-randomized comparison

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Intervention Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Quality Comments
Netherlands	trial Single Center			PCI group 63	65 (44–79)	70	62 (7)	ND	24	29	63	1 vessel 0 2 vessel 44 3 vessel 56	ND	
				Total 150	64 (37–81)	70	62 (7)	ND	24	29	69	1 vessel 0 2 vessel 45 3 vessel 55	ND	

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 6. Dichotomous Results (FFR-guided PCI versus Angiography-guided PCI)

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
Tonino 2009	MACE (death, MI,	FFR-guided	1yr	67	509	RR	0.72	0.54	0.96	0.02	Low

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
Fearon, 2010 [19144937 21126973] FAME trial	repeat revascularization)	PCI									
		Angiography-guided PCI		91	496						
Tonino 2009 Fearon, 2010 [19144937 21126973] FAME trial	Death	FFR-guided PCI	1yr	9	509	RR	0.58	0.26	1.32	0.19	Low
		Angiography-guided PCI		15	496						
Tonino 2009 Fearon, 2010 [19144937 21126973] FAME trial	MI	FFR-guided PCI	1yr	29	509	RR	0.66	0.42	1.04	0.07	Low
		Angiography-guided PCI		43	496						
Tonino 2009 Fearon, 2010 [19144937 21126973] FAME trial	Repeat revascularization	FFR-guided PCI	1yr	33	509	RR	0.68	0.45	1.05	0.08	Low
		Angiography-guided PCI		47	496						
Tonino 2009 Fearon, 2010 [19144937 21126973] FAME trial	Death or MI	FFR-guided PCI	1yr	37	509	RR	0.66	0.44	0.98	0.04	Low
		Angiography-guided PCI		55	496						
Tonino 2009 Fearon, 2010	Patients free from angina	FFR-guided PCI	1yr	399	491	ND	*1.04*	*0.98*	*1.11*	0.20	Low

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
[19144937 21126973] **FAME trial**											
		Angiography-guided PCI		374	480						
Tonino 2009 Fearon, 2010 [19144937 21126973] **FAME trial**	Patients without event and free from angina	FFR-guided PCI	1yr	360	493	*RR*	*1.08*	*0.99*	*1.17*	0.07	Low
		Angiography-guided PCI		326	482						
Pijls 2010 [20537493] FAME trial	all-cause mortality	FFR-guided PCI	2yr	13	509	RR	0.67	0.33	1.34	0.25	Low
		Angiography-guided PCI		19	496						
Pijls 2010 [20537493] FAME trial	MI	FFR-guided PCI	2yr	31	509	RR	0.62	0.40	0.95	0.03	Low
		Angiography-guided PCI		49	496						
Pijls 2010 [20537493] FAME trial	CABG/repeat PCI	FFR-guided PCI	2yr	54	509	RR	0.84	0.59	1.18	0.30	Low
		Angiography-guided PCI		63	496						
Pijls 2010 [20537493] FAME trial	death/MI	FFR-guided PCI	2yr	43	509	RR	0.65	0.45	0.94	0.02	Low
		Angiography-guided PCI		64	496						
Pijls 2010 [20537493] FAME trial	death/MI/CABG /repeat PCI	FFR-guided PCI	2yr	91	509	RR	0.80	0.62	1.02	0.08	Low

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
		Angiography-guided PCI		111	496						
Pijls 2010 [20537493] FAME trial	no event and angina free	FFR-guided PCI	2yr	315	462	RR	*1.05*	*0.96*	*1.15*	0.29	Low
		Angiography-guided PCI		284	438						
Pijls 2010 [20537493] FAME trial	angina free	FFR-guided PCI	2yr	369	462	RR	*1.05*	*0.98*	*1.13*	0.14	Low
		Angiography-guided PCI		332	438						
Wongpraparut 2005 **[16188509]**	Use of glycoprotein IIb/IIIa inhibitors	FFR-guided PCI	Procedural	9	57	RR	*0.51*	*0.26*	*1.00*	0.03	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		25	80						
Wongpraparut 2005 [16188509]	Non Q MI	FFR-guided PCI	In hospital	7	57	RR	*0.55*	*0.24*	*1.22*	*0.14*	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		18	80						
Wongpraparut 2005	Q MI	FFR-guided PCI	In hospital	1	57	RR	*1.40*	*0.09*	*21.98*	*0.81*	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
[16188509]		Angiography-guided PCI		1	80						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
Wongpraparut 2005 [16188509]	Death	FFR-guided PCI	In hospital	0	57						Medium (non-randomiz d study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		0	80						
Wongpraparut 2005 [16188509]	TLR	FFR-guided PCI	In hospital	1	57	RR	*0.70*	*0.07*	*7.55*	*0.77*	Medium (non-randomiz d study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		2	80						
Wongpraparut 2005 [16188509]	Cumulative MACE	FFR-guided PCI	In hospital	8	57	RR	*0.59*	*0.28*	*1.25*	0.13	Medium (non-randomiz d study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		19	80						
Wongpraparut 2005 [16188509]	Non Q MI	FFR-guided PCI	2.5yr	1	53	RR	*0.22*	*0.03*	*1.77*	*0.16*	Medium (non-randomiz d study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		6	70						
Wongpraparut 2005 [16188509]	TLR	FFR-guided PCI	2.5yr	3	53	*RR*	*0.33*	*0.10*	*1.11*	*0.07*	Medium (non-randomiz d study; no matched or adjusted analysis to account for confounding, choice of

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
											intervention or control left to the discretion of the operators)
		Angiography-guided PCI		12	70						
Wongpraparut 2005 [16188509]	CABG	FFR-guided PCI	2.5yr	0	53	*RR*	*0.15*	*0.01*	*2.66*	*0.19*	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		4	70						
Wongpraparut 2005 [16188509]	Death	FFR-guided PCI	2.5yr	3	53	*RR*	*1.32*	*0.28*	*6.29*	*0.73*	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		3	70						
Wongpraparut 2005 [16188509]	Cumulative MACE	FFR-guided PCI	2.5yr	5	53	*RR*	*0.35*	*0.14*	*0.87*	*0.02*	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		19	70						
Wongpraparut 2005 [16188509]	All revascularization	FFR-guided PCI	2.5yr	3	53	*RR*	*0.25*	*0.08*	*0.81*	*0.02*	Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
		Angiography-guided PCI		16	70						

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% LCI	95% UCI	P Btw	Risk of bias (comments)
Muramatsu 2002 [12403892]	Acute reocclusion	FFR-guided PCI	Postprocedural	0	77						High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
		Angiography-guided PCI		0	77						
Muramatsu 2002 [12403892]	Reocclusion	FFR-guided PCI	At discharge	4	77						High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
		Angiography-guided PCI		0	77						
Muramatsu 2002 [12403892]	In-hospital complications	FFR-guided PCI	In-hospital	0	77						High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
		Angiography-guided PCI		0	77						
Muramatsu 2002 [12403892]	Long-term survival	FFR-guided PCI	~2yr	69	77	RR	1.0	0.90	1.11	1.0	High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
		Angiography-guided PCI		69	77						

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.

$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C.Table 7. Continuous Outcomes (FFR-guided PCI versus angiography-guided PCI)

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
Tonino 2009 Fearon, 2010 [19144937 21126973] FAME trial	EQ-5D visual-analogue scale	Score	FFR guided PCI	1y	509	66.5	+8 (0.76)	-1	1.104	NS	Low
			Angiography guided PCI		496	64.7	+9 (0.80)				
Wongpraparut 2005 [16188509]	Reference vessel diameter	mm	FFR guided PCI	Procedural	128	2.63	+0.19 (0.07)	-0.02	0.084	0.81	Medium (non-randomizd study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
			Angiography guided PCI		184	2.53	+0.21 (0.05)				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
Wongpraparut 2005		mm	FFR guided PCI	Procedural							Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
	MLD				128	1.31				0.77	
							+1.28 (0.05)	+0.02	0.068		
[16188509]			Angiography guided PCI		184	1.22	+1.26 (0.04)				
Wongpraparut 2005 [16188509]		%	FFR guided PCI	Procedural							Medium (non-randomized study; no matched or adjusted analysis to account for confounding, choice of intervention or control left to the discretion of the operators)
	Diameter stenosis				128	51				0.58	
							-43 (1.28)	+1	1.792		
			Angiography guided PCI		184	54	-44 (1.26)				

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. Analyzed	Baseline	Change (SE)	Net Difference	SE	P Btw	Risk of bias
Muramatsu 2002 12403892		mm	FFR guided PCI	Procedural							High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
	MLD				77	0.1				<0.001	
							+2.1 (0.05)	-0.3	0.060		
			Angiography guided PCI		78	0.2	+2.4 (0.03)				
Muramatsu 2002 12403892		mm	FFR guided PCI	Post discharge							High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
	MLD				77	0.1				<0.001	
							+1.4 (0.06)	-0.4	0.081		
			Angiography guided PCI		78	0.2	+1.8 (0.05)				
Muramatsu 2002 12403892		%	FFR guided PCI	Procedural							High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
	Diameter stenosis				77	96	-73 (1.16)			<0.001	
								+9	1.827		

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Baseline**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias**
			Angiography guided PCI		78	96	-82 (1.41)				
Muramatsu 2002 12403892		%	FFR guided PCI	Post discharge							High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
	Diameter stenosis				77	96	-51 (1.78)			<0.01	
								+11	2.447		
			Angiography guided PCI		78	96	-62 (1.68)				
Muramatsu 2002 12403892		mm	FFR guided PCI	Followup			+1.9 (0.04)				High (historical control, intervention group prospective sample of consecutive patients; unadjusted analyses)
	MLD				77	0.1				<0.01	
								+0.6	0.073		
			Angiography guided PCI		78	0.2	+1.3 (0.06)				

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NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 8. KQ3 Study Design and Patient Characteristics

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Location treated, %	ACC/AHA Lesion Type, %	Risk of bias Comments
Nasu 2004 14996576 Japan	Retrospective cohort 1	>5 yrs	Overall	91	61	90	ND	66	36	64	76	LAD: 47 LCX: 10 RCA: 37 LM: 7	A/B1: 37 B2/C: 63	High (potential selection bias)
			IVUS after DCA	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			No IVUS after DCA	53	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Seo 1996 8934333 Japan	Retrospective cohort 1	3-6 mo	IVUS after PTCA	83	63	71	ND	28	ND	ND	ND	LAD:54 RCA:33 LCX:13	ND	High (no adj for confounders)
			No IVUS after PTCA	192	ND	ND	ND	ND	ND	ND	ND	ND	ND	

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.

*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix Table 9 KQ3 Categorical and Continuous Outcomes

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. lesions Analyzed**	**Final (SD)**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias(Comments)**
Nasu 2004 14996576 Japan	reference diameter	mm	IVUS after DCA	post	38	3.31 (0.17)	nd	nd	nd	0.69	High (Selection bias, unadjusted analyses) Study was based on patients who had baseline qca (124 of 186 patients), then of these 33 patients did not undergo long-term followup (26%). Although clinical outcomes were included, no data per IVUS versus no IVUS was available.)
			No IVUS after DCA		63	3.36 (0.56)					

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. lesions Analyzed**	**Final (SD)**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias(Comments)**
	MLD	mm	IVUS after DCA	post	38	2.91 (0.35)	nd	nd	nd	0.23	High (Selection bias, unadjusted analyses) Study was based on patients who had baseline qca (124 of 186 patients), then of these 33 patients did not undergo long-term followup (26%). Although clinical outcomes were included, no data per IVUS versus no IVUS was available)
			No IVUS after DCA		63	2.79 (0.50)					
	diameter stenosis	%	IVUS after DCA	post	38	12.6 (8.3)	nd	nd	nd	0.07	High (Selection bias, unadjusted analyses) Study was based on patients who had baseline qca (124 of 186 patients), then of these 33 patients did not undergo long-term followup (26%). Although clinical outcomes were included, no data per IVUS versus no IVUS was available)
			No IVUS after DCA		63	16.5 (10.5)					

Author Year [UI] Study name	Outcome	Units	Intervention group	Timepoint	No. lesions Analyzed	Final (SD)	Change (SE)	Net Difference	SE	P Btw	Risk of bias(Comments)
	reference diameter	mm	IVUS after DCA	4-10 mo	38	3.09 (0.41)	-0.22 (0.06)	0.05	0.10	NS	High (selection bias, unadjusted analyses) Study was based on patients who had baseline qca (124 of 186 patients), then of these 33 patients did not undergo long-term followup (26%). Although clinical outcomes were included, no data per IVUS versus no IVUS was available)
			No IVUS after DCA		63	3.09 (0.65)	-0.27 (0.08)				
	MLD	mm	IVUS after DCA	4-10 mo	38	2.17 (0.51)	-0.74 (0.07)	-0.04	0.10	NS	High (selection bias, unadjusted analyses) Study was based on patients who had baseline qca (124 of 186 patients), then of these 33 patients did not undergo long-term followup (26%). Although clinical outcomes were included, no data per IVUS versus no IVUS was available)
			No IVUS after DCA		63	2.09 (0.49)	-0.70 (0.06)				

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. lesions Analyzed**	**Final (SD)**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Risk of bias(Comments)**
	diameter stenosis	%	IVUS after DCA	4-10 mo	38	29.7 (13.8)	17.1 (1.95)	+0.8	2.4	NS	High (selection bias, unadjusted analyses)
			No IVUS after DCA		63	32.8 (12.1)	16.3 (1.43)				
Categorical											
Seo 1996 8934333 Japan	restenosis	%	IVUS after PTCA	3-6 mo	83 pts	17%				ND	High (Most validity items considered "N" or"ND"; possibility of introduction of major bias(es) that may affect the validity of the results cannot be ruled out.)
			No IVUS after PTCA		192 pts	42%					

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Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 10. KQ 4 Study Design and Patient Characteristics

Author Year [UI] Country Study Name	Study Design, N Center	Followup Duration, yr	Interv Type	N	Age, yr	Male, %	Ejection Fraction, %	Previous MI, %	DM, %	HTN, %	Dyslipidemia, %	Stenoses Location, %	ACC/AHA Lesion Type, %	Risk of bias Comments
Nam 2010 20723852 Korea	retrospective cohort, Single	1	FFR	83	63	66	61	nd	22	42	16	proximal: 48 mid: 52	nd	High (potential selection bias)
			IVUS	94	62	58	59	nd	26	51	15	proximal: 46 mid: 54		

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

NA: not applicable, ND: no data, MI: myocardial infarction, PCI: percutaneous intervention, MACE: major adverse cardiac events, TVR: target vessel revascularization, TLR: target lesion revascularization, IVUS:Intravascular ultrasound, QCA:Quantatative coronary angiography, Angio:angiography, FFR:fractional flow reserve, CFR:coronary flow reserve, RCT:randomized controlled trial, PTCA:percutaneous transluminal coronary angioplasty, CABG:coronary artery bypass graft, TIMI:thrombolysis in myocardial infarction, DCA:directional coronary atherectomy, LAD: left anterior descending, LCX: left circumflex, RCA: right coronary artery, SVG: saphenous vein graft, DS-QCA:direct stenting technique guided with QCA, DS-IVUS:direct stenting guided with IVUS, POBAIVUS:balloon angioplasty with IVUS guidance, POBA-FFR:balloon angioplasty guided with fractional flow reserve, MLD:minimal lumen diameter, MV:main vessel diameter, SB:side branch diameter, os:ostium, RVD:reference vessel diameter, RR:risk ratio, HR:hazard ratio, mo:months, AHA:American Heart Association, ACC:American Cardiology Association, EQ-5D scale:European Quality of Life-5 Dimensions scale, fu: followup, NRCS:nonrandomized comparative study, RD:risk difference

Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 10. KQ 4 Study Design and Patient Characteristics

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Nam 2010 20723852 Korea	retrospective cohort, Single	1	FFR	83	63	66	61	nd	22	42	16	proximal: 48 mid: 52	nd	High (potential selection bias)
			IVUS	94	62	58	59	nd	26	51	15	proximal: 46 mid: 54		

Bold: number of lesion instead of number of patients, Italics: estimated using available data, not data directly extracted from the publication

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Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
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*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 11 KQ4 Continuous Outcomes

Author Year [UI] Study name	Outcome	**Units**	Intervention group	**Timepoint**	**No. Analyzed**	**Final**	**Change (SE)**	**Net Difference**	**SE**	**P Btw**	**Quality**
Nam 2010 20723852 Korea	MLD	mm	FFR	post	28	2.89	nd	nd	nd	0.19	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
			IVUS		86	3.03					
	diameter stenosis	%	FFR	post	28	11	nd	nd	nd	0.45	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
			IVUS		86	11					

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Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 12 KQ4 Dichotomous Results

Author Year [UI] Study Name	Outcome	Technique Group	Timepoint	N Event	N Total	Adjusted or Crude, Matrix	Result	95% CI		P Btw	Quality
								LCI	UCI		
Nam 2010 20723852 Korea	Death	FFR	1 yr	0	83	*Crude RD*	*-0.01*	*-0.0 3*	*0.01*	*NS*	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
		IVUS		1	94						
	MI	FFR	1 yr	0	83	*Crude RD*	*0*			*NS*	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
		IVUS		0	94						
	TVR	FFR	1 yr	3	83	*Crude RD*	*0.01*	*-0.04*	*0.06*	*NS*	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
		IVUS		2	94						
	Stent thrombosis	FFR	1 yr	0	83	*Crude RD*	*0*			*NS*	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
		IVUS		0	94						
	Received PCI	FFR	During	28	83	*Crude RD*	*-0.58*	*-0.7*	*-0.46*	<0.001	High (Choice of therapy at operator's discretion; selection bias could not be eliminated)
		IVUS		86	94						

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Adjusted for age, sex, diabetes, hypercholesterolemia, smoking status, unstable angina, lesion length, number of lesions, dissection grade, totally occluded vessel, ostial stenosis, angulation >45%, left anterior descending artery location, saphenous vein graft location, preprocedure stenosis, and postprocedure stenosis.
$ Note: Stratified analysis for these outcomes were also presented (for KQ5) & Note: Separate analyses for patients with present distal reference diameter ≥2.5mm were also reported.
*Note: This study randomized patients into three groups: direct stenting with angio, direct stenting with IVUS, and balloon angioplasty with IVUS. For the current report, the group with balloon angioplasty is not relevant, and therefore not considered here.

Appendix C Table 13. Definition of MACE or composite outcomes among included studies

Author, year	Outcome name	Definition of outcome
Orford 2004	Composite outcome	Mortality, MI, or TVR
Mudra 2001	Composite outcome	Mortality, MI, CABG, or repeat PCI
Mueller 2002	Composite outcome	Mortality, non fatal MI, or TVR
Oemrawsingh 2003	Composite outcome	Mortality, MI, or TLR
Park 2009	Composite outcome	Mortality or MI or TVR
Kim 2011	MACE	Mortality, MI, or TLR
Gil 2007	MACE	Mortality MI, or RCR
Roy 2008	MACE	Mortality, Q wave MI, or TVR
Faulknier 2004	MACE	Mortality, MI, or TVR
Agostoni 2005	MACE	Mortality, nonfatal MI, or TVR
Frey 2000	MACE	Mortality, MI, repeat PCI, or CABG
Choi 2001	MACE	Mortality, MI, repeat PCI, or CABG
Maluenda 2010	MACE	Mortality, Q wave MI, or TLR
Jakabcin 2010	MACE	Mortality, MI, or TLR
Russo 2009	MACE	Any major adverse cardiac event

Gaster 2003	Freedom from MACE	Freedom from mortality, Q wave MI, repeat PCI, and CABG
Schiele 1998	Composite	Mortality or TVR

Appendix C Table 14. Inclusion and exclusion criteria

STUDY	RECRUITMENT DATE	INCLUSION CRITERIA	EXCLUSION CRITERIA
RCT			
Mudra 2001	1994 - 1998	• Angina or documented ischemia • No contraindication to antiplatelets therapy • Lesion length ≤25 mm to be covered with 1 or 2 stents in an artery with a diameter of ≥2.5 mm.	• Acute angina at rest • Complete akinesia in target artery supplied area • Significant left main lesion, bifurcation lesion, involvement of a side branch ≥2 mm in diameter with ostial stenosis.
Russo 2009	1995 -1999	• Patients over 18 years • Scheduled for elective coronary stent placement	• Dissection not covered by stent • Thrombolysis in myocardial infarction flow grade <3 after stent placement • Chronic total occlusion, stent placement in a sole remaining circulation or left main equivalent • Stent placement within an aneurysmal portion of a vessel such that complete stent vessel wall contact could not be achieved • A bypass graft supplying a native vessel <2.0 mm by visual estimate • Cardiac transplantation • Performance of IVUS during the index procedure before stent placement

STUDY	RECRUITMENT DATE	INCLUSION CRITERIA	EXCLUSION CRITERIA
Schiele 1998	1995 - 1997	• Symptomatic coronary artery disease with demonstrable ischemia • Single-vessel or native multivessel disease with >70% stenosis of the target lesion, who had percutaneous transluminal coronary angioplasty followed by stent implantation for extensive dissection • Single <20-mm long stent deployment • Optimal angiographic result after stent implantation, without dissection or residual stenosis >20% as assessed visually or with on-line quantitative coronary angiography.	• Vessel diameter <3.0 mm by visual estimation or on-line QCA • Coronary lesion >15 mm in length • Previous bypass surgery • Contraindication to antiplatelet therapy (aspirin or ticlopidine) • Treatment of acute or chronic total occusion, • Saphenous vein graft stenosis, recent (<7 days) acute coronary syndromes
Frey 2000	1996 - 1996	• Patients undergoing elective or urgent PTCA or primary stenting in vessels of diameter 2.2 and 4.6 mm.	• Patients undergoing emergency intervention • Patients with planned atherectomy • Those with chronic total occlusion of the target vessel
Oemrawsingh 2003	1998 - 2001	• Patients having de novo, nonostial stenosis ≥20 mm length in a native coronary artery with a reference diameter that permitted implantation of ≥ 3-mm stents without involvement of significant side branches (diameter ≥ 2.0 mm).	• Patients with recent (<2 weeks) myocardial infarction (MI) or total occlusion • Those with contraindications for combined antiplatelet therapy with ticlopidine and acetylsalicylic acid

STUDY	RECRUITMENT DATE	INCLUSION CRITERIA	EXCLUSION CRITERIA
Jakabcin 2011	2004 - 2005	Patients fulfilling following criteria were included • Lesion type B2 and C according to the American Heart Association • Proximal left anterior descending artery • Left main disease • Reference vessel diameter <2.5 mm • Lesion length >20 mm • Instent restenosis • Insulin dependent diabetes mellitus • Acute coronary syndrome	ND
Kawata 1997	ND	• Patients with angina pectoris • Age 44 to 79 years	• Coronary artery diameter <2.0 mm • Chronic total occlusion
Mueller 2002	ND	• Diabetic, consecutive patients	ND
Gaster 2003	ND	• Male • With stable angina pectoris • With de novo lesions in native coronary arteries, needed PCI • Patient of the Odense University Hospital • One or two coronary artery lesions by > 50%.	• AMI < 3 mo before scheduled PCI • Unstable angina within a month before the procedure • Left bundle branch block • Atrial fibrillation • Increased serum creatinine concentration (> 200 mmol/l), • A total occlusion that could not be crossed with a guide wire • No IVUS pullback.
Gill 2007	ND	• Stable angina pectoris • Aged 18-70 years • 1 or 2 de novo vessel disease • Vessel reference diameter >2.75mm • Lesion length up to 25mm.	• Recent myocardial infarction or unstable angina • Large calcifications seen on angiography • Large (>2mm in diameter) side branch in segment to be stented • Chronic total occlusion
Prospective	**Cohort**		

STUDY	RECRUITMENT DATE	INCLUSION CRITERIA	EXCLUSION CRITERIA
Blasini 1998	1994 -1995	• Patients with symptomatic ischemic heart disease in whom coronary stents were successfully placed after PTCA. • Patients with indications for stent placement as coronary artery dissections, complete vessel closure, and residual stenosis of 30% or more of the vessel diameter after PTCA.	• Patients with acute myocardial infarction
Sakamoto 1999	1994 - 1997	Consecutive patients with in-stent restenosis after prior Palmaz-Schatz stent identified by coronary angiography and underwent repeat PTCA. The first 20 consecutive patients were treated by balloon angioplasty without IVUS (22 lesions; quantitative coronary angiography [QCA] group). The subsequent 20 consecutive patients were treated by balloon angioplasty with IVUS (21 lesions; IVUS group).	• Patients with coronary occlusion due to acute or subacute coronary thrombosis with 1 mo after stent implantation • Patients with multiple stent implantation
Fitzgerald 2000	1996 - 1997	• Patients with symptomatic ischemic heart disease. • Patients with new or restenotic lesions of the native coronary circulation. • Planned stent implantation with up to 2 stents deployed per patient.	• Patient requiring revascularization of lesions other than the stented lesion. • Patients in whom use of aspirin, ticlopidine, or cumarin was contraindicated. • Patients with the presence of a left main coronary artery lesion. • Those having MI within the past 7 days. • Patients with occurrence of a stroke/transient ischemic neurological attack within the past 3 months.

STUDY	RECRUITMENT DATE	INCLUSION CRITERIA	EXCLUSION CRITERIA
Gerber 2009	2007 - 2008	• Complex lesions. IVUS guided lesions were matched according to diabetes, vessel type, reference vessel diameter, minimum lumen diameter, and lesion length with a group of angio treated lesions. All IVUS optimized lesions matched 1:1 with angiographic optimized lesions from another institution. Matching was blinded to the final QCA results in both groups.	• No lesions were excluded.
Ozaki 2007	ND	Included patients had: • Unstable or stable angina, • A single target lesion in a native coronary artery with a vessel diameter <4 mm • Planned stent implantation with up to 2 stents and agreement to follow-up angiography.	• Contraindication to anticoagulation and antiplatelet therapy • Graft disease • Left main coronary artery disease.
Orford 2004	ND	Patients undergoing stent implantation who consented for a follow-up angiography initially, followed by any patients without prerequisite for angio or IVUS. Some IVUS patients were enrolled at the discretion of operator.	Initial exclusion who did not undergo followup angiography.
Retrospective	**Cohort**		
Albiero 1997	1993 - 1995	Had angiographic followup with a QCA. Matched IVUS group (in Italy) with angio only group (in germany). For the IVUS group, IVUS cannot be used before stenting. Matching was based on (1) sex, (2) history of diabetes, (3) previous PTCA at the same site, (4) vessel treated, (5) reference diameter ±0.3 mm, (6) baseline MLD ±0.1 mm, and (7) number ±0.5 of stents deployed.	ND
Yoshitomi 1999	1996 - 1997	• Stable angina pectoris or previous MI or acute MI. Two groups were patients of different time periods. Like historical controls.	• Chronic total coronary artery occlusion.
Choi 2001	1997 - 1998	• Patients with symptomatic coronary artery disease who underwent elective and emergency coronary artery stenting of a single native coronary vessel.	• Patients receiving stent implantations of saphenous vein grafts or multiple vessels

STUDY	RECRUITMENT DATE	INCLUSION CRITERIA	EXCLUSION CRITERIA
Faulknier 2004	2001	• Randomly selected cases undergone PCI in a single community hospital center.	ND
Agostoni 2005	2002 - 2003	• Unprotected left main disease for elective drug eluting stent	• Acute MI or cardiogenic shock undergoing emergency PCI or LMCA CABG
Fujimoto 2008	2004 - 2006	• Patients who had sirolimus-eluting stent implantation	ND
Park 2001	ND	• Symptomatic LMCA disease, OR • Documented myocardial ischemia and angiographic ≥50% diameter stenosis.	• Contraindication to antiplatelets or anticoagulation therapy • LVEF <40%.
Registry			
Park 2009	2000 - 2006	• Elective PCI for unprotected LMCA stenosis	• Prior CABG • Concomitant valvular or aortic surgery, presented with cardiogenic shock or MI.
Roy 2008	2003 - 2006	Registry of consecutive patients in Washington Hospital Center had drug-eluting stents (DES) implantation. Sample of patients with IVUS and a sample of propensity score-matched patients with angiographic guidance only were analyzed. Score was matched for clinical and angiographic characteristics.	ND
Maluenda 2011	2003 - 2007	• Patients surviving the hospitalization	• Patients with cardiogenic shock and rescue PCI after intravenous thrombolysis
Kim 2011	2004 - 2006	• Main vessel (MV) diameter ≥2.5 mm and side branch (SB) diameter ≥2.0 mm • Sample of patients with IVUS guidance and a sample of propensity score-matched patients with angiographic guidance were analyzed.	• Cardiogenic shock • ST-segment elevation acute myocardial infarction within the previous 48 hours • Life expectancy <1 yr • Left main bifurcation
Cross-Sectional			
Talley 1996	ND	• Patients going through elective standard balloon angioplasty. Note: group assignment was based on patients' clinical characteristics.	• Multiple vessel coronary angioplasty

Appendix D. Description of Intravascular Diagnostic Techniques

IVDx Techniques	*Device Names*	*Manufacturers*	*FDA Clearance*	*Date of FDA Clearance*
Fractional Flow Reserve (FFR)	PressureWire™ Aeris Wireless FFR Measurement System	St. Jude Medical	Yes	April 24 1998
	PressureWire® Certus with RADIAnalyzer® Xpress monitor	St. Jude Medical	Yes	July 1 2008 (Pressure wire) Oct 9 2009 (RadiAnalyzer Xpress)
	Horizon Cardiology™	McKesson	Yes	Nov 8 2006
	OptoWire	Opsens Inc.	No	
	ComboMap® Pressure and Flow System	Volcano Corporation	Yes	June 2 2004
Coronary Flow Reserve (CFR)	FloWire® Doppler Guide Wire	Volcano Corporation	Yes	Nov 24 2004
Intravascular Ultrasound (IVUS)	Volcano s5i™ Imaging System	Volcano Corporation	Yes	Oct 8 2008
	iCross™ Coronary Imaging Catheter	Boston Scientific	No (Recalled on March 28 2011)	
Intravascular Ultrasound (VH-IVUS) with Virtual Histology	VH® IVUS Imaging System	Volcano Corporation	Yes	Aug 18 2005
	Volcano imaging system with a 20-MHz Eagle Eye Gold IVUS imaging catheter	Volcano Therapeutics Inc, Rancho Cordova, Calif	Yes	Aug 18 2005
Optical Coherent Tomography (OCT)	C7-XR™ OCT Intravascular Imaging System	LightLab Imaging Inc./ St. Jude Medical	Yes	Apr 30 2010

	C7 Dragonfly™ Intravascular Imaging Catheter	St. Jude medical	Yes	Apr 30 2010
Near-Infrared Spectroscopy (NIR)	LipiScan	InfraReDx, Inc	Yes	April 25 2008
	NIR spectrometer model 6500	FOSS NIRSystems, Inc.	No	
Angioscopy	A5000	Applied Medical Resources Corporation	Yes	July 11 1995
Intravascular Magnetic Resonance Imaging (MRI)	Cathamaran™ IVMRI System	TopSpin Medical Inc.	No	
Elastrography	Galaxy IVUS scanners	Boston Scientific	Yes	April 22 1998
	LOGIQ E9 ultrasound platform	GE Healthcare	Yes	August 15 2008
	Atlantis® SR Pro Imaging Catheter	Boston Scientific	Yes	Nov 30 2006
Thermography	Epiphany Coronary Thermography Catheters	Rontis	No	