Summary

Background—The clinical outcome in diabetic patients undergoing percutaneous coronary intervention (PCI) is inferior to that in non-diabetic patients. Several aspects of diabetic coronary artery disease appear to be responsible for this observation. In comparison with stainless steel stent, cobalt chromium stent has a higher radial strength and radio-opacity for similar electronegativity, this allow for the production of thinner struts with a similar radiological visibility.

Therefore we studied and compared six-months prognosis of cobalt chromium stent versus stainless steel Bare metal stents in diabetic patients undergoing PCI.

Methods and Results—Our study included seventy diabetic patients with Ischemic heart disease amendable to percutaneous stenting with stents ≥ 3 mm in diameter and ≤ 25 mm length. They were randomly assigned to cobalt chromium stents (Group I) or stainless steel stents (Group II). PCI was done with intial success and we excluded patients with unsuccessful PCI or complications during intervention, using stainless steel stent and chromium stent in the same lesion, left main stem lesions, osteal and bifurcational lesions.

Our primary end point was Major adverse cardiac events (death, Myocardial infarction, unstable angina, emergency CABG or target lesion revascularization); over period of 6 months and our secondary end point was in-stent restenosis assessed by coronary angiography at 6 months in the follow up period.

Total MACE in group (I) was 9 patients, coronary angiography was done for those patients after the cardiac event, that showed 7 patients with ISR and 2 of them showed patent stents. Patients without MACE whom undergone follow up coronary angiography after 6 months, revealed 6 patients suffered ISR out of 23 patients.

While total MACE in group (II) was 5 patients, coronary angiography for those patients showed 4 patients with ISR and 1 of them showed patent stent. Patients without MACE whom undergone follow up coronary angiography after 6 months revealed 10 patients suffered ISR out of 28 patients.

So as a result for all patients included in our study, 13 patients from group (I) suffered ISR in the period of 6 months follow up period, they represented 40% of the group, while 14 patient in group (II) with a percentage of 42.4% of the group suffered ISR at 6 months. There was no statistically significant difference between the two groups as regard the incidence of ISR at follow up. ($P>0.05$).

Conclusions—We concluded that no significant statistical difference was found between the two stents (cobalt-chromium alloy bare metal stent versus conventional bare metal stainless steel stent) in diabetic patients regarding (initial procedural success, in-hospital complications, the incidence of ISR at follow up, event-free survival at follow up).

Abizaid A, Costa MA, Centemero M, et al. Clinical and economic impact of diabetes mellitus on percutaneous and surgical treatment of multivessel coronary disease patients: insights from the Arterial Revascularization Therapy Study (ARTS) trial. Circulation **2001**;104:533-538.

Abizaid A, **Kornowski R, Mintz GS et al.** The influence of diabetes mellitus on acute and late clinical outcomes following coronary stent implantation. *J Am Coll Cardiol.* **1998**; 32:584– 589.

Agrawal S, Ho S, Liu M, et al. Predictors of thrombotic complications after placement of the flexible coil stent. Am J Cardiol **1994**;73:1216-9.

Albert W .Chan and David J. Moliterno. Restenosis**:** The Clinical Issues. Eric J. Topol. Textbook of Interventional Cardiology, 4th edition, Saunders, Elsevier Science. Chapter 21:415-454, **Nov. 2012.**

Aliağaoğlu C, Turan H, Erden I, Albayrak H, Ozhan H, Başar C, Gürlevik Z, Alçelik A. Relation of Nickel Allergy with in-Stent Restenosis in Patients Treated with Cobalt Chromium Stents. Ann Dermatol. **2012** Nov;24(4):426-9. Epub 2012 Nov 8.

Angela Koh, Lok Man Choi, Lay Wai Khin,et al. The use of bare-metals stents in primary percutaneous coronary intervention for acute myocardial infarction: is there a difference in clinical outcome between cobalt chromium versus stainless steel stents? J. Am. Coll. Cardiol. **2010**;55;A188.E1756.

Anita C. Thomas, Targeted Treatments for Restenosis and Vein Graft Disease, ISRN Vascular Medicine, Volume **2012**, Article ID 710765, 23 pages, doi:10.5402/2012/710765.

Aronson D, Bloomgarden Z, Rayfield EJ. Potential mechanism promoting restnosis in diabetic patients. J Am Coll Cardiol **1996**;27:528-535**.**

Arturo Giordano, Michele Polimeno, Nicola Corcione, Luciano Fattore, Luigi Di Lorenzo, Giuseppe Biondi-Zoccai, Paolo Ferraro and Maria Fiammetta Romano; Synergy

Between Direct Coronary Stenting Technique and Use of the Novel Thin Strut Cobalt Chromium Skylor™ Stent: the Mace in Follow Up Patients Treated with Skylor Stent [MILES Study], Current Cardiology Reviews, **2012**, 8, 6-13.

Babapulle MN, Joseph L, Belisle P, Brophy JM, Eisenberg MJ: a hier- archical Bayestan meta – analysis of randomised clinical trails of drug-eluting stents. Lancet **2004**, 364:558-9.

Baim DS, Cutlip DE, O'Shaughnessy CD, et al. Final results of a randomized trial comparing the NIR stent to the Palmaz-Schatz stent for narrowings in native coronary arteries. *Am J Cardiol* **2001**; 87: 152- 156.

Baim, Donald S. Interventional Techniques > 24 – Coronary stenting. Grossman's Cardiac Catheterization, Angiography, & Intervention, 7th Edition; **2006**; 24: 493-534.

Balcon R, Beyar R, Chierchia S, et al. Recommendations on stent manufacture, implantation and utilization. Study group of the working group on coronary circulation. Eur Heart J **1997**;18:1536–47.

Barragan P, Rieu R, Garitey V, et al. Elastic recoil of coronary stents: a comparative analysis. Catheter Cardiovasc Interv **2000**;50:112–9.

Beijk MA and Piek JJ. XIENCE V everolimus-eluting coronary stent system: A novel second generation drug-eluting stent. *Expert Rev Med Devices* **2007**; 4: 11-21.

Bennett MR, O'Sullivan M et al. Mechanism of angioplasty and stent restenosis: implication for design of rational therapy. Pharmacol. Ther. **2001**; 91:149–66.

Bernardo Stein, MD; William S. Weintraub, MD; Suzanne S.P. Gebhart, MD; Caryn L. Cohen-Bernstein, MN; Ralph Grosswald, BS; Henry A. Liberman, MD; John S. Douglas Jr, MD; Douglas C. Morris, MD; Spencer B. King III, MD. Influence of Diabetes Mellitus on Early and Late Outcome After Percutaneous Transluminal Coronary Angioplasty. Circulation.**1995**; 91: 979-989.

Bhatt DL, Marso SP, Lincoff AM ,et al. Abciximab reduce mortality in diabetics following percutaneous coronary intervention. J AM Coll Cardiol **2000**;35:922-928**.**

Boulmier D, Bedossa M, Commeau P, et al. Direct coronary stenting without balloon predilation of lesions requiring long stentsimmediate and 6-month results of a multicenter prospective registry. *Catheter Cardiovasc Interv* **2003**; 58: 51-58.

Briguori C, Sarais C, Pagnotta P et al. In-stent restenosis in small coronary arteries: impact of strut thickness. *J Am Coll Cardiol* **2002**; 40: 403-409.

Brito FS, Caixeta AM, Perin MA, et al. DIRECT Study Investigators. Comparison of direct stenting versus stenting with predilation for the treatment of selected coronary narrowings. *Am J Cardiol* **2002**; 89 : 115-120.

Cardarelli F. Ferrous metals and their alloys, Materials handbook, Springer London Limited, London **2000**, 20–21.

Carter AJ, Laird JR, Farb A, et al. Morphologic characteristics of lesion formation and time course of smooth muscle cell proliferation in a porcine proliferative restenosis model. J Am Coll Cardiol. **1994**; 24: 1398–1405.

Choi D, Kim SK, Choi SH, et al. Preventative effects of rosiglitazone on restenosis after coronary stent implantation in patients with type 2 diabetes. Diabetes Care **2004**;27(11):2654-2660.

Cook S, Meier B. Have we been misled by the ESC DES firestorm? EuroIntervention. **2008**;3:535–7.

Cutlip DE, Baim DS, Ho KK, et al. Stent thrombosis in the modern era: A pooled analysis of multicenter coronary-stent clinical trials. Circulation **2001**; 103: 1967–1971.

Cutlip DE, Chauhan MS, Baim DS, et al. Clinical restenosis after coronary stenting: perspectives from multicenter clinical trials. *J Am Coll Cardiol* **2002**; 40: 2082-2089.

Dangas G, Fuster V. Management of restenosis after coronary intervention. Am Heart J **1996**;132:428-436.

David S. lee and Marc S. Penn. Restenosis**. Steven P. Marso and David M.Stern(ed).** Diabetes and Cardiovascular Disease. Integrating Science and Clinical Medicine, Lippincott Williams & Wilkins. Chapter 16:293-314.

David S. lee, Steven P. Marso and David M.Stern(ed). Diabetes and Cardiovascular Disease. Integrating Science and Clinical Medicine, Lippincott Williams & Wilkins. Chapter 16:293-314, **October 2003.**

Dawkins KD, Grube E, Guagliumi G, et al. on behalf of TAXUS VI Study Group. Four-year outcomes in high-risk subgroups (longer lesions, multiple overlapping stents). *Eur Heart J* **2007**; 28 :326.

De Jaegere P, Mudra H, Figulla H et al. Intravascularultrasound-guided optimized stent deployment. Immediate and 6 months clinical and angiographic results form the multicenter ultrasound stenting in coronary arteries study (MUSIC Study). Eur Heart J **1998**; 19: 1214–23.

Dirschinger J, Kastrati A, Neumann FJ et al. Influence of balloon pressure during stent placement in native coronary arteries on early and late angiographic and clinical outcome. *Circulation* **1999**; 100: 918–23.

Donachie M. Biomedical alloys. Advanced Materials and Processes **1998**; 7: 63–65.

Dotter C, Judkins M. Transluminal treatment of arteriosclerotic obstruction: description of a new technique and a preliminary report of its application. Circulation **1964**;30:654-70.

Elezi S, Kastrati A, Neumann FJ, et al. Vessel size and long-term outcome after coronary stent placement. *Circulation.* **1998**; 98: 1875–1880.

Ellis SG, Vandormael MG, Cowley MJ, et al. Coronary morphologic and clinical determinants of procedural outcome with angioplasty for multivessel coronary disease. Implications for patient selection. Multivessel Angioplasty Prognosis Study Group. Circulation **1990**; 82: 1193–1202.

Elsner M, Britten M, Auch-Schwelk W, et al. Distribution of neointimal proliferation in human coronary arteries treated with polytetrafluo-rethylene stent-grafts. *J Am Coll Cardiol* **1999**; 33: 17A.

Farb A, Sangiorgi G, Carter AJ, et al. Pathology of acute and chronic coronary stenting in humans. Circulation. **1999**; 99: 44–52.

Ferguson JJ. NHLI BARI clinical alert on diabetics treated with angioplasty. Circulation **1995**;92:3371.

Fischman DL, Leon MB, Baim DS, et al. A randomized comparison of coronary-stent placement and balloon angioplasty in the treatment of coronary artery disease. *N Engl J Med.* **1994**; 331: 496–501.

Freeman DJ, Norrie J, Sattar N, et al. Pravastatin and the development of diabetes mellitus: Evidence for a protective treatment effect in the West of Scotland Coronary Prevention Study. Circulation **2001**;103:357-362.

Gabriella Visconti, Amelia Focaccio, Davide Tavano, Flavio Airoldi, Carlo Briguori; The CID Chrono™ cobalt–chromium alloy carbofilm-coated coronary stent system, Int J Cardiol (**2010**), doi:10.1016/j.ijcard.2010.01.009.

Gall MA, Rossing P, Skott P, Damsbo P, Vaag A, Bech K, Dejgaard A, Lauritzen M, Lauritzen E, Hougaard P, et al. Prevalence of micro- and macroalbuminuria, arterial hypertension, retinopathy and large vessel disease in European type 2 (non-insulin-dependent) diabetic patients. Diabetologia. **1991**;34:655–661.

Gerckens U, Mu¨ ller R, Cattelaens N, et al. Coronary stent graft JoStent_ versus conventional stent design in complex coronary lesions. *J Am Coll Cardiol* **1999**; 33: 36A.

Gerick JE. The genetic basis of type 2 diabetes mellitus: impaired insulin secretion versus impaired insulin sensitivity. Endocr Rev. **1998**;19:491–503.

Gerstein HC, Yusuf S, Holman R, Bosch J, Pogue J, The DREAM Trial Investigators. Rationale, design and recruitment characteristics of a large, simple international trial of diabetes prevention: the DREAM trial. Diabetologia **2004**;47(9):1519-1527.

Gibbons RJ, Balady GJ, Beasley JW, et al. ACC/AHA guidelines for exercise testing: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing). Circulation **1997**;96:345-354.

Gitlin N, Julie NL, Spurr CL, Lim KN, Juarbe HM. Two cases of severe clinical and histologic hepatotoxicity associated with troglitazone. Ann Intern Med. **1998**;129:36–38.

Goldberg SL, Loussararian A, De Gregorio J, et al. Predictors of diffuse and aggressive intra-stent restenosis. *J Am Coll Cardiol* **2001**; 37: 1019-1025.

Gonzalo N, Macaya C. Absorbable stent: focus on clinical applications and benefits. Vasc Health Risk Manag. 2012;8:125-32. doi: 10.2147/VHRM.S22551. Epub **2012** Feb 29. Review.

Grigorios G. Tsigkas, Vasileios Karantalis, George Hahalis, Dimitrios Alexopoulos. Stent Restenosis, Pathophysiology and Treatment. Hellenic J Cardiol **2011**; 52: 149-157.

Gruberg L, Waksman R, Ajani AE, Kim HS, White RL, Pinnow EE, et al. The effect of intracoronary radiation for the treatment of recurrent in-stent restenosis in patients with diabetes mellitus. J Am Coll Cardiol **2002**; 39: 1930-1936.

Grundy SM, Benjamin IJ, Burke GL, et al. Diabetes and cardiovascular disease: a statement for healthcare professionals from the American Heart Association. Circulation **1999**;100:1134-1146.

Grundy SM; D Agostino Sr RB, Moska L, et al, Cardiovascular risk assessment based on US Cohort studies **2001**,Circulation 104:491-496.

Grüntzig A, Senning Å, Siegenthaler W. Nonoperative dilatation of coronary-artery stenosis: percutaneous transluminal coronary angioplasty. N Engl J Med **1979**;301:61-8.

Haffner SM, Lehto S, Ronnemaa T, Pyorala K, Laakso M. Mortality from Coronary Heart Disease in Subjects with Type 2 Diabetes and in Nondiabetic Subjects with and without Prior Myocardial Infarction. N Engl J Med. **1998**;339:229–34.

Hammoud T, Tanguay JF, Bourassa MG. Management of coronary artery disease: therapeutic options in patients with diabetes. J Am Coll Cardiol **2000**; 36(2) :355-365.

Haude M, Erbel R, Issa H, et al. Subacute thrombotic complications after intracoronary implantation of Palmaz-Schatz stents. Am Heart J. **1993**; 126:15–22.

Haudrechy P, Foussereau J, Mantout B, et al. Nickel release from 304 and 316 stainless steels in synthetic sweat. Comparison with nickel and nickel-plated metals. Consequences on allergic contact dermatitis, Corros Sci **1993**;35(1–4):329–36.

Hayase M, Oshima A, Zidar JP et al. Comparison of ultrasound vs angiographic guidance for stenting in the CRUISE study. *Circulation* **1997**; 96: I-222.

Hee Hwa Ho, MD, Fahim Haider Jafary, MD, Kwok Kong Loh, MRCP, Julian Ko Beng Tan, MRCP, Yau Wei Ooi, MRCP, Paul Jau Lueng Ong, MD; Deliverability of Integrity Coronary Stents in Severely Tortuous Coronary Arteries: A Preliminary Experience. J Invasive Cardiol. **2012** Dec;24(12):650-4.

Hoffmann R and Mintz GS. Coronary in-stent restenosis—predictors, treatment and prevention (*European Heart Journal* **(2000)** 21, 1739–1749.

Hoffmann R, Mintz GS, Dussaillant GR, et al. Patterns and mechanisms of in-stent restenosis: A serial intravascular ultrasound study. *Circulation* **1996**; 94: 1247–1254.

Hoffmann R, Mintz GS, Mehran R et al. Tissue Proliferation Within and Surrounding Palmaz-Schatz Stents is Dependent on the Aggressiveness of Stent Implantation. A Serial Intravascular Ultrasound Study. *Am J Cardiol* **1999**; 83: 1170–1174.

Hope investigators. Effects of an angiotensin converting enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. N Engl J Med **2000**;342:145-153.

Hopkins PN, Hunt SC, Wu LL, Williams GH, Williams RR. Hypertension, dyslipidemia, and insulin resistance: links in a chain or spokes on a wheel? Curr Opin Lipidol. **1996**;7:241–253.

Hsueh WA, Jackson S , Law RE, Control of vascular cell proliferation and migration by PPAR-gamma: a new approach to the macrovuscular complications of diabetes. Diabetes care **2001**;24:392-397.

Hulley S, Grady D, Bush T, Furberg C, Herrington D, Riggs B, Vittinghoff E, Heart and Estrogen/Progestin Replacement Study (HERS) research group. Randomized trial of estrogen plus progestin for secondary prevention of coronary heart disease in postmenopausal women. JAMA. **1998**;280:605–613.

Iijima R, Ikari Y, Amiya E, et al. The impact of metallic allergy on stent implantation: metal allergy and recurrence of in-stent restenosis. Int J Cardiol **2005**;104(3):319–25.

Ijsselmuiden AJ, Serruys PW, Scholte A, et al. Direct coronary stent implantation does not reduce the incidence of in-stent restenosis or major adverse cardiac events six month results of a randomized trial. *Eur Heart J* **2003**; 24: 421-429.

Imai Y, Clemmons DR Roles of phosphatidylinositol 3-kinase and mitogen-activated protein kinase pathways in stimulation of vascular smooth muscle cell migration and deoxyribonucleic acid synthesis by insulin-like growth factor-I. Endocrinology **1999**;140:4228-4235.

Jacoby RM, Nesto RW. Acute myocardial infarction in the diabetic patient: pathophysiology, clinical course and prognosis. J Am Coll Cardiol. **1992**;20:736–744.

Juhan-Vague I, Alessi Mc. PAI-I, obesity, insulin resistance and risk of cardiovascular events. Throm Heamost **1997**;78:656-660**.**

Kaiser C, Brunner-La Rocca HP, Buser PT, et al. Incremental cost-effectiveness of drug-eluting stents compared with a third-generation bare-metal stent in a real-world setting: randomised Basel Stent Kosten Effektivitats Trial (BASKET). *Lancet* **2005**; 366:921–929.

Kapur A, Malik IS, Bagger JP, et al. The Coronary Artery Revascularisation in Diabetes (CARDia) trial: background, aims, and design. Am Heart J **2005**;149(1):13-19.

Karrillon GJ, Morice MC, Benveniste E, Bunouf P, Aubry P, Cattan S, et al. Intracoronary stent implantation without ultrasound guidance and with replacement of conventional anticoagulation by antiplatelet therapy. 30–day clinical outcome of the French Multicenter Registry. Circulation **1996**; 94: 1519–1527.

Kasiske BL, Kalil RS, Ma JZ, Liao M, Keane WF. Effect of antihypertensive therapy on the kidney in patients with diabetes: a meta-regression analysis. Ann Intern Med. **1993**;118:129–138.

Kastrati A, Dirschinger J, Boekstegers P, *et al.* Influence of stent design on 1-year outcome after coronary stent placement: a randomized comparison of five stent types in 1,147 unselected patients. *Catheter Cardiovasc Interv* **2000**; 50: 290–297.

Kastrati A, Mehili J, Dirschinger J, Dotzer F, Schülen H, Neuman FJ, et al. Intracoronary stenting and angiographic results – strut thickness effect on restenosis outcome (ISAR-STERO) trial. Circulation. **2001**;103:2816–21.

Kastrati A, Mehilli J, Dirschinger J, et al. Restenosis after coronary placement of various stent types. *Am J Cardiol* **2001**; 87: 34-39.

Kastrati A, Schömig A, Dirschinger J, et al. Increased risk of restenosis after placement of gold-coated stents: results of a randomized trial comparing gold-coated with uncoated

steel stents in patients with coronary artery disease. *Circulation.* **2000**; 101: 2478–2483.

Kastrati A, Schomig A, Elezi S *et al*. Predictive factors of restenosis after coronary stent placement. *J Am Coll Cardiol* **1997**; 30: 1428–36.

Kastrati A, **Schomig A, Elezi S, et al.** Intralesion dependence of the risk of restenosis in patients with coronary stent placement in multiple lesions. Circulation **1998**; 97: 2396–2401.

Kastrati A, Schomig A, Seyfarth M *et al*. PIA polymorphism of platelet glycoprotein IIIa and risk of restenosis after coronary stent placement. Circulation **1999**; 99: 1005–10.

Kereiakes DJ, Cox DA, Hermiller JB, et al. Guidant Multi-Link Vision Stent Registry Investigators Usefulness of a cobalt chromium coronary stent alloy. *Am J Cardiol* **2003**; 92: 463-466.

Kereiakes DJ, Linnemeier TJ, Baim DS, et al. Usefulness of stent length in predicting instent restenosis (The MULTI-LINK stent trials). *Am J Cardiol* **2000**; 86: 336-341.

Kereiakes DJ, Midei M, Hermiller J, et al. Procedural and late outcomes following MULTI-LINK Duet coronary stent deployment. *Am J Cardiol* **1999**; 84: 1385- 1390.

Kesavan S, Strange JW, Johnson TW, Flohr-Roese S, Baumbach A. First-in-man evaluation of the MOMO cobalt-chromium carbon coated stent. EuroIntervention. **2013** Jan 22;8(9):1012-8.

Kevin E. Kip, David P. Faxon, Jesse W. Currier, et al., for the investigator of NHLBI PTCA Registry. Coronary angioplasty in diabetic patients. The Ntional Heart, Lung, and Blood Institute Percutaneous Transluminal Coronary Angioplasty Registry. Circulation **1996**;94:1818-1825).

Kim JA, Montagnani M, Koh KK, Quon MJ. Reciprocal relationships between insulin resistance and endothelial dysfunction: molecular and pathophysiological mechanisms. Circulation **2006**;113(15):1888-1904.

Kimura T, Kaburagi S, Tamura T, et al. Remodeling responses of human coronary arteries undergoing coronary angioplasty and atherectomy. *Circulation.* **1997**; 96: 475–483.

Kipshidze NN, Tsapenko MV, Leon MB, Stone GW, Moses JW. Update on drug-eluting coronary stents. Expert Rev Cardiovasc Ther **2005**;3(5):953-968.

Kiyotake Ishikawa, MD, Yutaka Aoyama, MD, Haruo Hirayama, MD, PhD; Management of Drug-Eluting Stent Restenosis. J Invasive Cardiol. **2012** Apr;24(4):178-82.

Komatsu R, Ueda M, Naruko T, et al. Neointimal tissue response at sites of coronary stenting in humans: macroscopic, histological, and immunohistochemical analyses. Circulation 1998;98:224–33. Serruys PW, Emanuelsson H, van der Giessen W et al. Heparin-coated Palmaz-Schatz stents in human coronary arteries. Early outcome of the Benestent-II Pilot study. Circulation**1996**; 93: 412–22.

Koster R, Vieluf D, Kiehn M, et al. Nickel and molybdenum contact allergies in patients with coronary in-stent restenosis. Lancet **2000**;356:1895-7.

Kuchulakanti PK, Chu WW, Torguson R, et al. Sirolimus-eluting stents versus Paclitaxel-eluting stents in the treatment of coronary artery disease in patients with diabetes mellitus. Am J Cardiol **2006**;98(2):187-192.

Lamarche B, Tchernof A, Moorjani S, Cantin B, Dagenais GR, Lupien PJ, Despres JP. Small, dense low-density lipoprotein particles as a predictor of the risk of ischemic heart disease in men: prospective results from the Quebec Cardiovascular Study. Circulation. **1997**;95:69–75.

Lang RM, Bierig M, Devereux RB, Flachskampf FA, Foster E, Pellikka PA et al. Recommendations for chamber quantification. Eur J Echocardiogr **2006**;7: 79 – 108.

Lansky A, Roubin G, O'Shaughnessy C, et al. Randomized comparison of GR-II stent and Palmaz-Schatz stent for elective treatment of coronary stenoses. Circulation **2000**;102:1364-9.

Legrand V.M., Garcia E.J., Grube E., Khalife K., Bonnier H., Commeau P., Przewlocki T., Macaya C., Witkowski A., Race Car Study Investigators. Clinical and angiographic performance of a new-generation modular stent design for treatment of de novo coronary lesions. Catheter Cardiovasc Interv **2006**; 54 : 276-282.

LI Xiong-jie, Seung-Woon Rha, Sunil-P Wani, WANG Lin, Kanhaiya-L Poddar, Dong-Joo Oh. Vascular brachytherapy revisited for in-stent restenosis in the drug-eluting stent era: current status and future perspective. Chin Med J (Engl). **2009** Sep 20;122(18):2174-9.

Luciano Maurício de Abreu Filho, Antonio Artur da Cruz Forte, Marcos Kiyoshi Sumita, Desidério Favarato, and George César Ximenes Meireles. Influence of metal alloy and the profile of coronary stents in patients with multivessel coronary disease. Clinics (Sao Paulo). **2011** June; 66(6): 985–989.

M. Clinton Miller, Ph.D, Rebecca G. Knapp: Clinical epidemiology and biostatistics, published by Williams & Wilkins, Maryland: 3rd edition **1992 .**

Magee MJ, Dewey TM, Acuff T, et al. Influence of diabetes on mortality and morbidity: off-pump coronary artery bypass grafting versus coronary artery bypass grafting with cardiopulmonary bypass. Ann Thorac Surg **2001**;72:776-780; discussion 780-781.

Mani G, Feldman M, Patel D, et al. Coronary stents: A materials perspective. Biomaterials **2007**;28:1689-710.

Marso SO, Lincoff AM, Ellis SG , et al. Optimizing the percutaneous interventional outcomes for patients with diabetes mellitus:results of the EPISTENT (Evaluation of platelet IIb/IIIa inhibitor for stenting Trial) Diabetic substudy. Circulation **1999**;100:2477-2484**.**

Martin R Bennett, IN-STENT STENOSIS: PATHOLOGY AND IMPLICATIONS FOR THE DEVELOPMENT OF DRUG ELUTING STENTS, Heart. **2003** February; 89(2): 218–224.

Martinez-Elbal L, Ruiz-Nodar JM, Zueco J, et al. Direct coronary stenting versus stenting with balloon pre-dilation: immediate and follow-up results of a multicentre, prospective, randomized study: the DISCO trial. DIrect Stenting of Coronary Arteries. Eur Heart J **2002**; 23: 633-640.

Mavei L, Hsieh WH, Massaro JM, et al. Stent thrombosis in randomized clinical trials of drug eluting stents. *N Engl J Med* 356:1020-1029, **2007**.

Mehran R, Mintz GS, Hong MK, et al. Validation of the in vivo intravascular ultrasound measurement of in-stent neointimal hyperplasia volumes. *J Am Coll Cardiol.* **1998**; 32:794–799.

Mercado N, Wijns W, Serruys PW, et al. One-year outcomes of coronary artery bypass graft surgery versus percutaneous coronary intervention with multiple stenting for multisystem disease: a meta-analysis of individual patient data from randomized clinical trials. J Thorac Cardiovasc Surg **2005**;130(2):512-519.

Mintz GS, Popma JJ, Pichard AD, et al. Arterial remodeling after coronary angioplasty: a serial intravascular ultrasound study. *Circulation.* **1996**; 94: 35-43.

Mohamed AlMaatouq, Improving Health Outcomes in 2011 for People With Type 2 Diabetes. British Journal of Diabetes and Vascular Disease. **2012**;12(2):101-108.

Mohammed K. Ali, K.M. Venkat Narayan & Nikhil Tandon. Diabetes & coronary heart disease: Current perspectives, Indian J Med Res 132, November **2010**, pp 584-597.

Moreno PR ,Fallon JT ,Murica AM, Et al. Tissue characteristics of restenosis after percutaneous transluminal coronary angioplasty in diabetic patient .J Am Coll Cardiol **1999**;34:1045-1049**.**

Moses JW, Leon MB, Popma JJ, Fizgerald PJ, Holmes DR, O'Shaughnessy C, Caputo RP, Kereiakes DJ, Williams DO, Teirstein PS, Jaeger JL, Kuntz RE: Sirolimus eluting stents versus standard stents in patients with stenosis in native coronary artery. N Engl J Med; **2003** 349:1315–1323.