Background: Stent fracture (SF) after DES implantation has recently become an important concern because of its potential association with in-stent restenosis and stent thrombosis. However, the incidence and clinical relevance to SF after second generation DES (zotarolimus-eluting stent: ZES, everolimus-eluting stent: EES, and biolimus-eluting stent: BES) remain unclear, so the aim of study is to reveal clinical impact of SF after second generation DES deployment. Methods: A total of 1734 patients with 2185 lesions undergoing second generation DES implantation and follow-up angiography within 12 months were performed from April 2009 to September 2012 in a single center. We divided into SF group and non-SF group and assessed the rates of SF and major adverse cardiac events (MACE), defined as death, myocardial infarction, stent thrombosis, and target lesion revascularization (TLR), retrospectively. Results: We had obtained 1826 lesions follow-up angiography. (83.6%) The mean clinical follow up period was 788±15 days. There were no significant differences in patient background and lesion characteristics except HD. (SF group: 30.4% versus non-SF group: 4.2%; p<0.001) However, there was no significant difference in the calcification lesion between the two group. (NS.) SF was observed in 26 of 1823 lesions (1.4%). The rate of TLR and late stent thrombosis were significantly higher in the SF group than in the non-SF group (33.3% versus 5.4%; p<0.001 and 3.1% versus 0.1%; p=0.02). MACE was significantly higher in the SF group than in the non-SF group (44.4% versus 10.9%; p<0.001). Conclusions: SF after second generation DES implantation occurs in 1.4% of lesions and is associated with higher rate of TLR, MACE, and late stent thrombosis.

TCT-652 Incidence and Predictors of Late Catch-Up Phenomenon After Drug-Euting Stent Implantation
Masanobu Ohyu1, Kazuhide Kodaita2, Seiji Habara3, Takeshi Tada4, Hiroshi Tanaka5, Yasuaki Fuku6, Tsuyoshi Goto7, Kazuaki Mitsudo8
1Kurashiki Central Hospital, Okayama, Japan

Background: We aimed to evaluate the incidence and predictors of late catch-up phenomenon after first and second generation drug-eluting stent (DES) implantations. Methods: From 2002 to 2012, 10996 lesions received DES implantation: first generation, 6242 sirolimus-eluting stents (SES); second generation, 3391 everolimus-eluting stents (EES) and 1363 biolimus-eluting stents (BES). Mid-term angiographic follow-up was scheduled at 8 months and late-term at 20 months. We analyzed 6849 lesions (SES, 3871; EES, 2153; and BES, 825) after late-term follow-up, which were free from in-stent restenosis (ISR) and target lesion revascularization at mid-term follow-up. ISR was defined as restenosis >50% and late catch-up phenomenon as the first ISR over one year after DES implantation. The follow-up duration was two years. Results: The late catch-up phenomenon rate was not significantly different between EES and SES (5.8% vs. 7.1%, p=0.06) but significantly lower in BES than in SES (4.4% vs. 7.1%, p=0.004). The predictors of late catch-up phenomenon (p<0.10, univariate analysis) were hypertension, diabetes, hemodialysis, ostial lesion in the right coronary artery or in the left circumflex artery, ISR lesion, reference diameter < 2.5 mm, percent diameter stenosis before (>75%) or after (>25%) DES implantation, angiulated lesion, lesion length >50 mm, chronic total occlusion lesion, left main stent, and DES types, from which 10 variables in the final multivariable regression model obtained by the forward stepwise method are shown in the table. Conclusions: BES implantation is a negative predictor of late catch-up phenomenon.

TCT-653 Association Between Native Coronary Artery Disease Progression And Instant Neoatherosclerosis: A Long-term Angiographic And Optical Coherence Tomography Cohort Study
Masanori Taniwaki1, Stephen Windecker2, Serge Zazouë, Sandro Baumgartner1, Thomas Zanchin1, Peter Jarr1, Bernhard Meier3, Lorenz Raber4
1Bern University Hospital, Bern, Switzerland

Background: The association between native coronary artery disease progression in non-target lesion (TL) segments and the process of in-stent neoatherosclerosis (NA) five years after DES implantation is unknown. Methods: The SIRTAX-LATE OCT population was analyzed for evidence of in-stent NA as assessed by OCT five years after DES (sirolimus-eluting stent (SES) and paclitaxel-eluting stent (PES)) implantation. NA was defined as the presence of fibrocalcific plaques or fibroatheromas within the neointima of previously implanted DES with longitudinal extension >1.5mm. Native coronary artery disease progression in non-TL segments was evaluated by serial quantitative coronary angiography (QCA) in all arterial segments with diameter of at least 1.5mm and length of at least 10mm. The minimal lumen diameter (MLD) was serially assessed within matched segments at baseline and five year angiographic follow-up, or prior to any non-TL revascularization. The change in MLD between baseline and follow-up was calculated as endpoint related to angiographic disease progression. The clinical endpoint was any non-TL revascularization assessed throughout 5 years by an independent clinical event committee. Results: A total of 88 patients with 88 lesions were available for OCT analysis 5 years after DES implantation. In-stent neoatherosclerosis was observed in 14% of all stented segments with the majority of patients having fibroatheromas (12.5%) followed by fibrocalcific plaques (5.6%). A total of 716 untreated native coronary artery segments (8.1:1.7 segments/patient) were serially evaluated by QCA. The change in MLD between baseline and five year angiographic follow-up was significantly higher in patients with OCT evidence of NA (0.25mm, 95%CI 0.15-0.35) as compared with patients without evidence of NA (0.13mm, 95%CI 0.09-0.17, p=0.002). Consistent with the angiographic findings, any revascularization in non-TL segments occurred more frequently in patients with evidence of NA (79%) as compared with patients without evidence of NA (47%) (p=0.002). Conclusions: Patients with angiographic and clinical evidence of native coronary artery disease progression in non-TL segments are more likely to develop in-stent neoatherosclerosis.

TCT-654 Effects of Bioabsorbable Versus Durable Polymer Drug-Euting Stent on Neoatherosclerosis : Optical Coherence Tomography Analysis
Cheol woong Yu1, Jae Young Choi2, Hyung Joon Jo3, Jae Hyung Park4, Soon Jun Hong5, Do-Sun Lim6
1Korea University Anam Hospital, Seoul, Korea, Republic of

Background: Neoatherosclerosis after drug eluting stent (DES) implantation is known to be related with increased risk of late restenosis and stent thrombosis. Studies have suggested that inflammation by polymer may be one of several mechanisms, but there have been a few data about bioabsorbable polymer DES (BP-DES) versus durable polymer DES (DP-DES). Methods of the study was to investigate the prevalence of neoatherosclerosis and relevant clinical outcomes between BP-DES and DP-DES by Optical Coherence Tomography (OCT) analysis. Results: A total of 292 patients undergoing OCT analysis after DES implantation were enrolled, who were divided into 2 groups according to stent type [BP-DES (n=107) and DP-DES (n=185)]. OCT analysis was performed within 2 years after stent implantation. Neoatherosclerosis was defined as presence of more or of 1 of as followings; plaque rupture, thrombus, neovascularization, plaque erosion, microvessel, macrophage and thin of thick fibrous cap atheroma. The primary end point was the incidence of neoatherosclerosis, and the secondary end point was the occurrence of MACE (major advanced cardiac events; death, myocardial infarction, target lesion revascularization, or stent thrombosis). Results: Demographic, clinical, lesional and procedural characteristics were not significantly different between the two groups. The incidence of neoatherosclerosis was lower in the BP-DES group than in the DP-DES group (16.8% vs. 30.8%, p=0.008). The rate of MACEs did not show significant difference between two groups (9.3% vs. 14.7%, p=0.208). The Incidence of neoatherosclerosis was not significantly different at 1 year but was lower in BP-DES group than in the DP-DES group between 1 and 2 years (13.9% vs. 29.8%, p=0.007). Conclusions: In this 2 year follow-up study, patients undergoing BP-DES implantation had lower rates of neoatherosclerosis than patient with DP-DES, but it did not translate into better clinical outcomes.

TCT-655 Contribution of In-Stent Neoatherosclerosis to Late Stent Failure Following Bare Metal and 1st- and 2nd-Generation Drug-Euting Stent Placement: An Autopsy Study
Fumiyuki Otsuka1, Kenichi Sakakura2, Kazuyuki Yahagi3, OSCAR D. SANCHEZ4, Robert Katay5, Elena Ladich6, David R. Fowler7, Frank D. Kolodgie2, Barry R. Davis1, Michael Anger1, Renato A. Mancini1
1CVPath Institute, Inc., Gaithersburg, MD, United States, 2Office of the Chief Medical Examiner, Baltimore, MD

Background: In-stent neoatherosclerosis has emerged as an important contributing factor for late stent failure including very late stent thrombosis (VLST) and restenosis. Clinical imaging modalities, however, have limited capability of evaluating the presence and characteristics of neoatherosclerosis. The aim of the current pathologic study was to investigate the prevalence of neoatherosclerosis in lesions with late stent...
failure following bare metal (BMS) and 1st- and 2nd-generation (gen) drug-eluting stent (DES) placements.

Methods: All available material from our autopsy stent registry with duration of implant >30 days to include a total of 384 cases (mean age=61±13 years, 287 male) with 614 stented lesions in native coronary arteries (BMS=266 [median, 832 days], 1st-gen DES=285 [383 days], and 2nd-gen DES=63 lesions [210 days]) were pathologically evaluated for the involvement of neoatherosclerosis in stent thrombosis and restenosis.

Results: The prevalence of VLST (>1 year) was greater in 1st-gen DES (19%) as compared with BMS (3%) and 2nd-gen DES (0%), where in-stent plaque rupture from neoatherosclerosis accounted for 83% of VLST in BMS (5 of 6) and 15% of VLST in 1st-gen DES (5 of 35). The involvement of neoatherosclerosis in VLST increased with time; for duration of implants >3 years, all VLST in BMS (5 of 5) and 33% of VLST in 1st-gen DES (4 of 12) were attributed to in-stent rupture. VLST from in-stent rupture occurred earlier in 1st-gen DES (1434±579 days) vs BMS (2376±545 days). Of the 10 lesions with in-stent rupture, only 4 (BMS=3, 1st-gen DES=1) had in-stent restenosis. In BMS, restenosis with underlying neoatherosclerosis was observed only >3 years, and neoatherosclerosis accounted for 38% of BMS restenosis >3 years. In contrast, both 1st- and 2nd-gen DES showed restenosis with neoatherosclerosis even <1 year. While only limited cases were available for 2nd-gen DES >1 year, 1st-gen DES showed increased involvement of neoatherosclerosis in restenosis over time, accounting for 31% of restenosis between 1 and 3 years and 78% of restenosis >3 years.

Conclusions: Substantial involvement of neoatherosclerosis in late stent failure is observed in both BMS and DES, which increases over time.

TCT-657
Effect of the Absorb Bioresorbable Vascular Scaffold (BVS) on Features of Neoatherosclerosis in Familial Hypercholesterolemic Swine at 1-Year Follow-Up Assessed by In Vivo Imaging

Masahiko Shibuya1, Yaping Cheng1, Qing Wang1, LAURA E. Perkins1, Alexander Sheedy2, Jenn McGregor3, Carlos A. Gongora1, James J. Benham1, Byron Lambert2, Dan Cox2, Greg L. Kuhl2, Gert-Jan Hermans1
1Cardiovascular Research Foundation, Orangeburg, NY, 2Abbott Vascular, Santa Clara, CA, 3Abbott Vascular, Mattaponi, VA

Background: One of the hypothesized long-term clinical benefits of Absorb BVS (Abbott Vascular, Santa Clara, CA) is plaque regression and stabilization (reduction in necrotic and lipid composition). This could also potentially mitigates in-stent neoatherosclerosis, a late adverse effect that may be responsible for recurrent acute coronary episodes. We present interim 1-year imaging evaluation (from an ongoing 4-year longitudinal study) of neointimal characteristics after coronary placement of Absorb BVS in an atherosclerotic familial hypercholesterolemic (FH) swine model.

Methods: After 1 week of hypercholesterolemic diet, coronary arteries were balloon-injured. After next 20 weeks on diet, injured segments were implanted with BVS (n=23) and everolimus-eluting metallic stents (EES, n=11). Angiography, IVUS and OCT were performed again at 1 year. OCT analysis included previously published qualitative neointimal tissue assessment according to its pattern of backscatter and optical intensity (homogeneous, heterogeneous or layered).

Results: At 1-year, all the scaffolds/stents were well apposed, widely patent and fully covered with neointima. The scaffold thickness remained unchanged from baseline. The percentage of OCT cross-sections with homogeneous pattern (previously linked to more fibrotic and less inflammatory histopathologic appearance) was significantly higher in BVS than EES (60% vs. 38%, p < 0.05). The prevalence of VHVT accounted for 83% of BMS restenosis (5 of 6) and 15% of VLST in 1st-gen DES (5 of 35). The involvement of neoatherosclerosis in VLST increased with time; for duration of implants >3 years, all VLST in BMS (5 of 5) and 33% of VLST in 1st-gen DES (4 of 12) were attributed to in-stent rupture. VLST from in-stent rupture occurred earlier in 1st-gen DES (1434±579 days) vs BMS (2376±545 days). Of the 10 lesions with in-stent rupture, only 4 (BMS=3, 1st-gen DES=1) had in-stent restenosis. In BMS, restenosis with underlying neoatherosclerosis was observed only >3 years, and neoatherosclerosis accounted for 38% of BMS restenosis >3 years. In contrast, both 1st- and 2nd-gen DES showed restenosis with neoatherosclerosis even <1 year. While only limited cases were available for 2nd-gen DES >1 year, 1st-gen DES showed increased involvement of neoatherosclerosis in restenosis over time, accounting for 31% of restenosis between 1 and 3 years and 78% of restenosis >3 years.

Conclusions: The treatment effect on late catch-up phenomenon compared between BES and EES implantations could depend on specific lesion characteristics.