Nanolipoblockers: Ex Vivo Human Plaque Interaction for Therapeutic Management of Atherosclerosis

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Objectives: Atherosclerosis (AthSc) is escalated by the excessive accumulation of oxidized low density lipoprotein (OxLDL). A new class of nanopolymers, termed nanolipoblockers (NLB), has previously demonstrated inhibition of OxLDL uptake by macrophages. Using an ex vivo human carotid plaque model for targeted intervention with NLB offers potential new mechanisms of AthSc treatment.

Methods: Carotid plaques were sectioned and incubated in culture medium at 37°C. Samples were treated with the NLBs of different polymer chemistries and 5 μg/mL oxLDL to evaluate NLB binding to plaque and to assess inhibition of plaque recruitment of OxLDL, and effect on inflammation. Samples were digested, homogenized, filtered, and fluorescence quantified by flow cytometry and confocal microscopy to identify plaque composition, NLB, and oxLDL uptake.

Results: Plaque cells were identified in the specimen showing high levels of NLB binding, merely within 5 minutes, with an increase in uptake in a chemistry-dependent manner after 24 hours (Fig. 1). NLBs lowered inflammatory markers in the presence of oxLDL. Furthermore, NLBs caused a marked decrease in the uptake of OxLDL in plaque (Fig. 2).

Conclusions: AthSc plaques could be targeted through NLB intervention via a reduction in inflammatory substrates and multicellular OxLDL uptake inhibition. This ex vivo model and the NLBs provide a promising therapeutic strategy for the management of active AthSc.

Risk Score for Unplanned 30-Day Readmissions after Major Vascular Surgery Procedures

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Objectives: Impending changes to hospital reimbursement has focused attention on the significant impact of unplanned hospital readmissions on both patients and providers alike. Vascular surgery patients have high readmission rates and identification of high-risk groups that may be amenable to targeted interventions is an important strategy for readmission prevention. This study aimed to determine predictors of unplanned readmission and develop a risk score for predicting readmissions after vascular surgery.

Methods: The National Surgical Quality Improvement Program database for 2011 was queried for major vascular surgical procedures. The primary end point was unplanned 30-day readmissions. The data was randomly split into two-thirds for development and one-third for validation. Multivariate logistic regression was used to create and validate a point score system to predict unplanned readmissions.

Results: Overall 24,310 patients were included, with 2464 readmissions (10.1%). A point based scoring system was developed based on multivariate logistic regression for factors predictive for readmission (Table). The scoring system developed included procedure type (open abdominal aortic aneurysm = 3 points, peripheral intervention 5 points, amputation = 1 point), graft failure prior to discharge (5 points), veno-thromboembolism prior to discharge (4 points), discharge destination (facility that was home = 3 points, new facility or rehab = 2 points), Black race (1 point), nonelective presentation (1 point), pulmonary (2 points), cardiac (2 points), renal (1 point) comorbidities, chronic steroid use (2 points), hyperalbuminemia (2 points), anemia (2 points), diabetes (1 point), bleeding disorder (1 point), operative time ≥150 minutes (1 point), and bleeding disorder (1 point). The point score was used to stratify patients into three groups: low risk (0-3 points) with a readmission rate of 3.8%, moderate risk (4-7 points) with a readmission rate of 8.6%, and high risk (≥8 points) with a readmission rate of 16.4%. The model had good predictive ability (c-statistic = 0.67).

Conclusions: Using patient, operative, and preadmission events, this novel vascular surgery readmission score accurately identified patients at high risk for 30 day unplanned readmission. This model could help direct discharge and home health care resources to patients at high risk, ultimately reducing readmissions and improving efficiency.