# INPLASY

## The effect of hyperlipemia on restenosis after percutaneous transluminal angioplasty or stenting: A meta-analysis of randomized controlled trials

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## ADMINISTRATIVE INFORMATION

## INTRODUCTION

**Review question / Objective** Is there a definite relationship between hyperlipemia and restenosis after PTA or stent implantation?

**Rationale** Coronary vascular disease (CVD) is caused by myocardial ischemia and atherosclerosis. Stenosis and obstruction of the vascular lumen usually lead to myocardial ischemia, hypoxia and infarction. The incidence rate and mortality rate of CVD are very high. Percutaneous coronary intervention (PCI) was introduced as an alternative means of coronary recanalization for patients undergoing coronary artery bypass graft (CABG) surgery in 1979. Since then, PCI has become widely accepted as an effective and safe treatment for single- or multivessel coronary atherosclerotic disease. PCI has gradually become the main treatment for CVD. However, the major shortcoming of PCI is the increased risk of restenosis of the lesioned vessels, resulting in angina recurrence, targeted lesion revascularization (TLR) and even death.

Restenosis is a complex complication for which the causative mechanisms have not yet been fully identified. Angiographic restenosis is defined as a vascular lumen diameter occlusion greater than 50% within 3–6 months after PCI. Clinical restenosis is characterized by recurrent angina pectoris requiring TLR. The occurrence of postoperative restenosis seriously affects the patient's life due to increased healthcare costs. High blood lipid levels are believed to accelerate restenosis after percutaneous transluminal angioplasty (PTA) or stent implantation. However, no clinical evidence has been provided.

According to their density and composition, lipoproteins can be divided into chylomicrons (CM), very low-density lipoprotein (VLDL), low-density lipoprotein (LDL) and high-density lipoprotein (HDL). In addition to these four lipoproteins, total cholesterol and triglycerides are also important indicators for clinical detection. The main carriers of plasma cholesterol are LDL and

HDL, which form low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C). Boullier A found that usual tested plasma lipids, Lp(a), LpAI and in vivo markers of LDL oxidation (LDL-AB and LDL-IC) were not risk factors for restenosis after percutaneous transluminal coronary angioplasty (PTCA). However, some studies have found that lowering the LDL level is an effective means to prevent restenosis in patients with hypercholesterolemia after PTCA.

In summary, the relationship between hyperlipemia and restenosis is still unclear. Therefore, we conducted a meta-analysis of the current literature to verify the correlation between hyperlipemia and postoperative restenosis in patients undergoing endovascular intervention.

**Condition being studied** This meta-analysis was conducted to determine the effect of hyperlipemia on restenosis in patients undergoing endovascular treatment, such as percutaneous transluminal angiography (PTA) or stenting.

## METHODS

**Search strategy** Search strategy
Pubmed: ((((hyperlipemia) OR (hyperlipidemia)) OR (hypercholesteremia)) OR (hypercholesterolemia)) OR (hypertriglyceridemia) AND (percutaneous transluminal angioplasty) OR (stent) with 68 results
#1 ((((hyperlipemia) OR (hyperlipidemia)) OR (hypercholesteremia)) OR (hypercholesterolemia)) OR (hypertriglyceridemia)(result : 5,598)
#2(percutaneous transluminal angioplasty) OR (stent) (result : 7,825)
#3 #1 and #2 (result :68)
Embase: ('percutaneous transluminal angioplasty'/exp or' stent'/exp) AND 'hyperlipidemia'/exp AND 'randomized controlled trial'/exp with 173 results.
Cochrane was Mesh descriptor: [Angioplasty, Balloon, Coronary] explode all trees OR Mesh descriptor: [Stents] explode all trees AND Mesh descriptor: [Hyperlipidemias] explode all trees AND Randomized controlled trial with 12 results.

**Participant or population** (1) RCTs involving patients with or without hyperlipemia; (2) studies involving patients with lesions confined to the coronary arteries or femoral popliteal artery; (3) studies involving patients who underwent endovascular treatment via percutaneous transluminal angiography (PTA) or stenting; and (4) studies had to include an outcome of restenosis by angiographic follow-up of the target lesion site or clinically driven target lesion revascularization studies including an outcome of angiographic

follow-up of the lesion site or target lesion revascularization (TLR).

**Intervention** All patients have undergone endovascular treatment, and there are differences in their blood lipid levels or corresponding adjustments to their blood lipid levels.

**Comparator** Whether to take oral lipid-lowering medication or other lipid-lowering treatments.

**Study designs to be included** (1) The studies involved must be randomized controlled studies ( RCTs) and RCTs of patients with or without hyperlipemia; (2) lesions confined to the coronary arteries or femoral popliteal artery; (3) endovascular treatment via percutaneous transluminal angiography (PTA) or stenting; and (4) studies including an angiographic follow-up outcome of the lesion site.

**Eligibility criteria** (1) restenosis related studies without analyzing patients' blood lipid levels; (12) the proportion of patients lost to follow-up was higher than 20%; and (23) restenosis following the secondary operation.

**Information sources** Pubmed 、embase、cochrane contact with authors.

**Main outcome(s)** Our major endpoint was restenosis (angiographic binary restenosis, ABR, defined as diameter stenosis >50% in the in-segment area, including the stent area as well as 5 mm margins proximal and distal to the stent) . Meanwhile, clinically driven TLR (target lesion revascularization) was also included, defined as any procedure performed to restore luminal patency after there has been late luminal loss of the target lesion (confirmed by angiography).

**Additional outcome(s)** We then conducted a sensitivity analysis, evaluated the quality of the literature, and conducted a subgroup analysis of operation methods, end points, sex ratio and blood lipid control measures. We also conducted meta-regression analyses on the use of lipid-lowering agents and stent types, which are factors that may affect the occurrence of restenosis after operation. Considering the possible influence of interventional methods and physicians' proficiency, we also conducted meta-regression analyses based on follow-up time and publication time (Table 2). Among the included studies, we performed a subgroup analysis of lipid control status to explore whether blood lipid control was associated with the occurrence of postoperative restenosis. Conclusively, there was no significant

difference between the results of the subgroup analysis and the meta-regression analysis.

**Data management** The X2 test and I2 test were used to analyze the heterogeneity among the included studies. $P > 0.1$ and $I2 \leq 25\%$ suggest that there is no obvious heterogeneity. While $25\% < I2 \leq 55\%$ suggests that there is mild or moderate heterogeneity (random fixed effect model); $I2 > 75\%$ indicates obvious heterogeneity, which is analyzed by randomfixed effect model. The risk ratio (RR) was used as the effect quantity to evaluate the difference in the incidence of restenosis between groups, and 95% CL was calculated. $P \leq 0.05$ was statistically significant.

**Quality assessment / Risk of bias analysis** The Cochrane risk of bias assessment too.

**Strategy of data synthesis** The $?^2$ test and $I^2$ test were used to analyze the heterogeneity among the included studies. P 0.1 and $I^2$ ? 25% suggest that there is no obvious heterogeneity. While 25% $I^2$ ? 55% suggests that there is mild or moderate heterogeneity (random effect model); $I^2$ 75% indicates obvious heterogeneity, which is analyzed by random effect model. The risk ratio (RR) was used as the effect quantity to evaluate the difference in the incidence of restenosis between groups, and 95% CL was calculated. P ? 0.05 was statistically significant.

**Subgroup analysis** We also conducted meta-regression analyses based on follow-up time and publication time (Table 2). Among the included studies, we performed a subgroup analysis of lipid control status to explore whether blood lipid control was associated with the occurrence of postoperative restenosis. Conclusively, there was no significant difference between the results of the subgroup analysis and the meta-regression analysis.

**Sensitivity analysis** No heterogeneity.

**Language restriction** No.

**Country(ies) involved** China.

**Keywords** hyperlipidmia；restenosis.

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