

Cholesterol Treatment Trialists' (CTT) Collaboration

Slide deck

CTT Collaboration: Background*

History:

- Founded in 1993 (prior to publication of 4S trial in 1994)
- Original protocol published in 1995

Trial eligibility for inclusion in CTT:

- Randomized
- Principal effects of treatment is modification of blood lipids
- Unconfounded (i.e. treatment arms differ only by lipid intervention)
- Recruited at least 1000 participants
- Scheduled study treatment duration of at least 2 years

*American Journal of Cardiology 1995; 75: 1130-4

CTT Collaboration: Analyses*

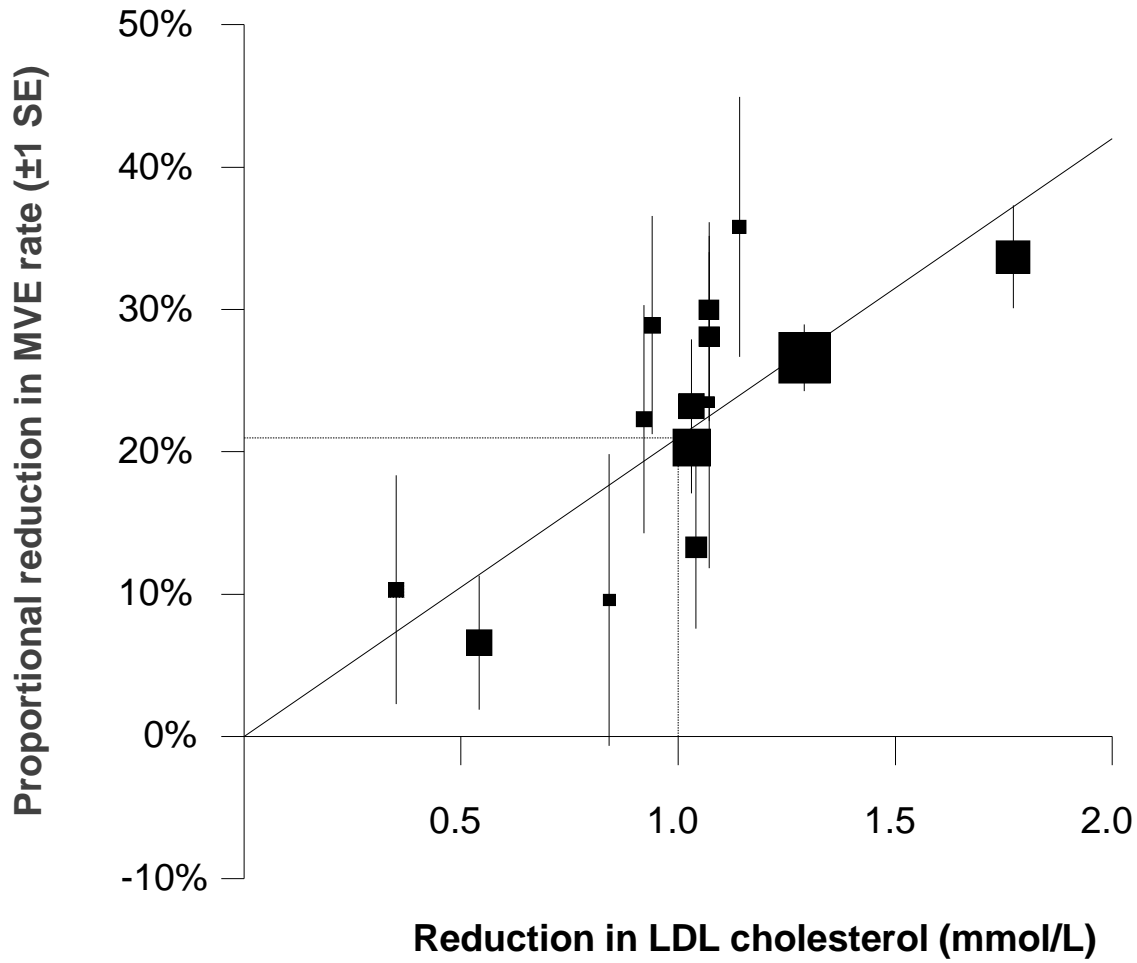
- Based on individual participant data (as opposed to tabular data)
- Intention-to-treat analyses
- Main results standardised per mmol/L LDL-cholesterol reduction

*American Journal of Cardiology 1995; 75: 1130-4

CTT Lancet 2005: included 14 trials of statin vs control

Study	Treatment comparison	N	Target population	Entry lipid criteria
4S	S20-40 vs. placebo	4444	Angina or previous MI	Total cholesterol 5.5-8.0 mmol/L
WOSCOPS	P40 vs. placebo	6595	Primary prevention	LDL-C \geq 4.0 mmol/L
CARE	P40 vs. placebo	4159	Previous MI	Total cholesterol <6.2 mmol/L; LDL-C 3.0 to 4.5 mmol/L
Post-CABG	L40-80 vs. L2.5-5	1351	Previous coronary bypass surgery	LDL-C 3.4-4.5 mmol/L
AFCAPS/TexCAPS	L20-40 vs. placebo	6605	Primary prevention	Total cholesterol 4.65-6.82 mmol/L; LDL-C 3.36-4.91 mmol/L
LIPID	P40 vs. placebo	9014	Previous MI or hospitalization for unstable angina	Total cholesterol 4.0-7.0 mmol/L
GISSI-P	P20 vs. no treatment	4271	Recent MI	Total cholesterol \geq 5.2 mmol/L
LIPS	F80 vs. placebo	1677	Previous PCI	Total cholesterol 3.5-7.0 mmol/L
HPS	S40 vs. placebo	20,536	CHD, other occlusive arterial disease or DM	Non-fasting total cholesterol \geq 3.5 mmol/L
PROSPER	P40 vs. placebo	5804	History of or risk factors for vascular disease	Total cholesterol 4.0-9.0 mmol/L
ALLHAT-LLT	P40 vs. usual care	10,355	Hypertension + at least 1 additional CHD risk factor	Fasting LDL-C 3.1-4.9 mmol/L (no known CHD); 2.6 to 3.3 mmol/L (known CHD)
ASCOT-LLA	A10 vs. placebo	10,305	Hypertension + CVD risk factors	Non-fasting total cholesterol \leq 6.5 mmol/L
ALERT	F40 vs. placebo	2102	Renal transplant patients	Total cholesterol 4.0-9.0 mmol/L.
CARDS	A10 vs. placebo	2838	Type 2 DM with no previous history of CVD	LDL-C \leq 4.14 mmol/L

Relation between the proportional reduction in MAJOR VASCULAR EVENTS and mean absolute LDL-C reduction in 14 statin trials



CTT Lancet 2010*: additional trials of statin vs control

Study	Treatment comparison	N	Target population	Entry lipid criteria
MEGA	P 10-20 + diet vs. diet	8214	Primary prevention	Total cholesterol 5.69-6.98 mmol/L
JUPITER	R 20 vs. placebo	17 802	Primary prevention in people with CRP ≥ 2 mg/L	LDL-C < 3.4 mmol/L
4D	A 20 vs. placebo	1255	Type 2 DM on haemodialysis	LDL-C 2.1-4.9 mmol/L
AURORA	R 10 vs. placebo	2776	Haemodialysis	None
ALLIANCE	A 10-80 (until LDL < 2.1 mmol/L) vs. usual care	2442	Known CHD	LDL-C 2.8-5.2 mmol/L if on lipid lowering drugs; LDL-C 3.4-6.5 mmol/L if not
ASPEN	A 10 vs. placebo	2410	Type 2 DM	LDL-C ≤ 3.6 mmol/L in those with previous MI or intervention; LDL-C ≤ 4.1 mmol/L if not
GISSI-HF	R 10 vs. placebo	4574	Chronic heart failure	None

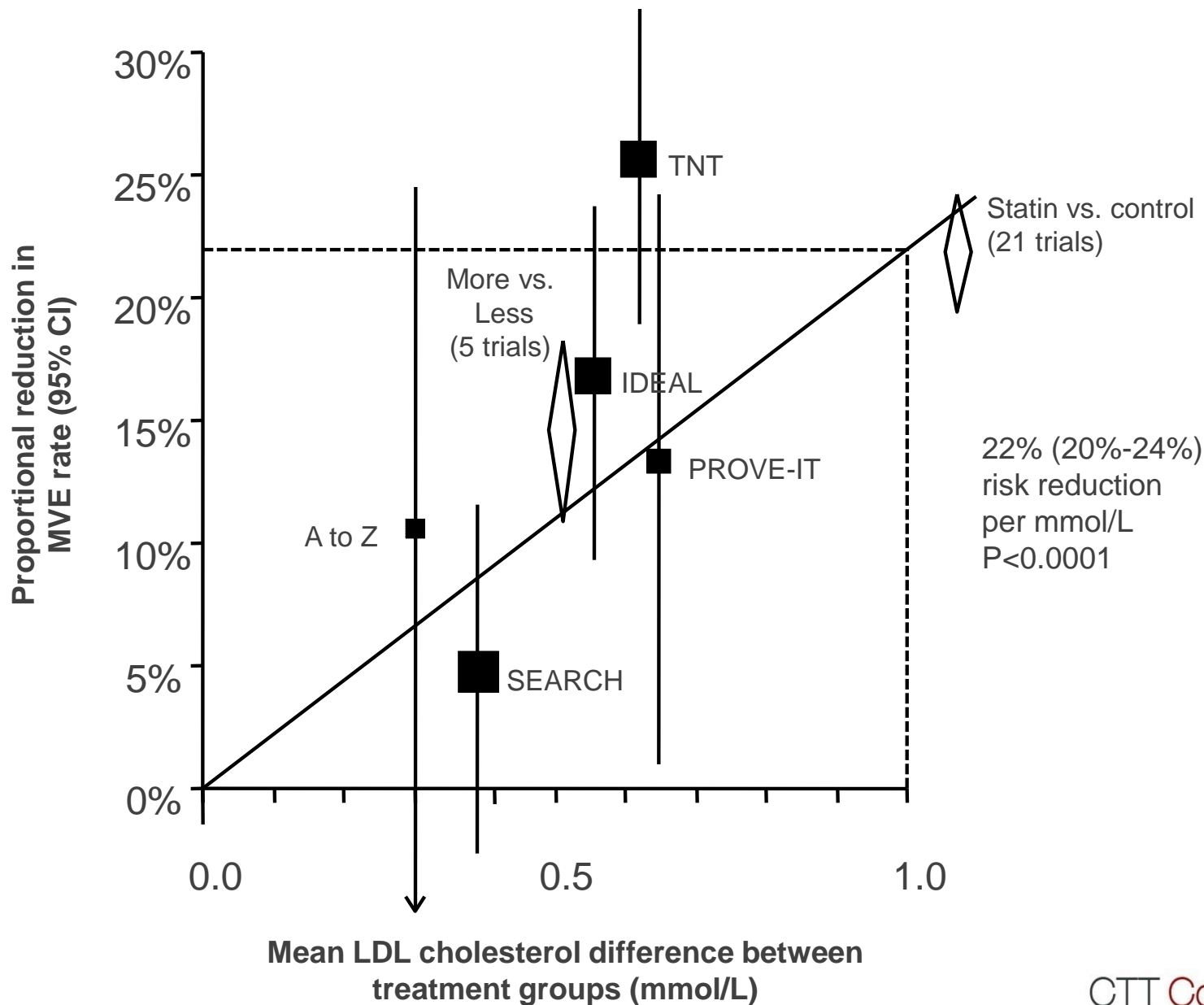
*Lancet 2010; 376: 1670-81

CTT Lancet 2010*: more vs less intensive statin therapy

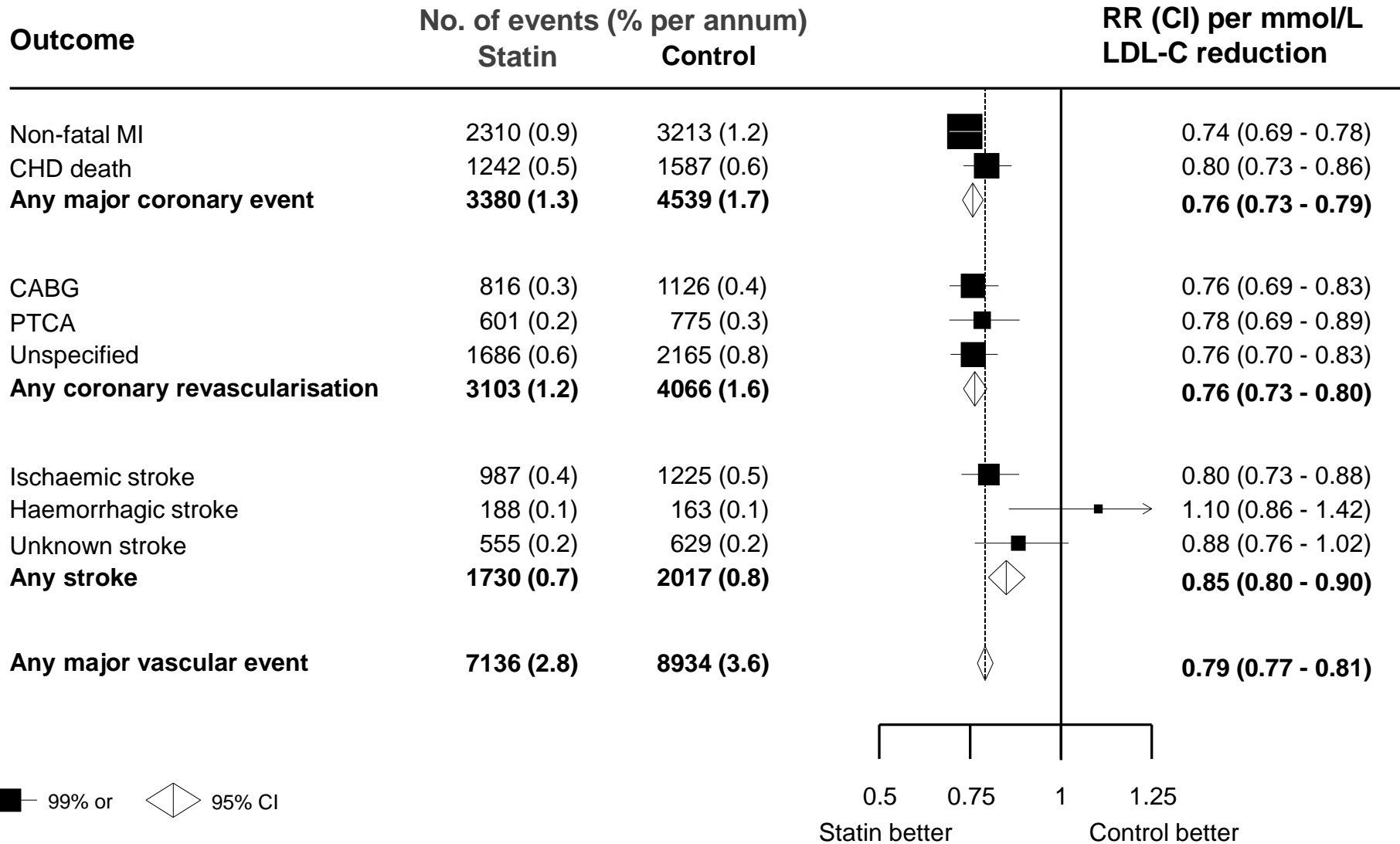
Study	Treatment comparison	N	Target population	Entry lipid criteria
PROVE-IT	A 80 vs. P 40	4162	Recent ACS	Total cholesterol \leq 6.21 mmol/L
A to Z	S 40 then S 80 vs. placebo then S 20	4497	ACS	Total cholesterol \leq 6.48 mmol/L
TNT	A 80 vs. A 10	10,001	Prior CHD	LDL-C $<$ 3.4 mmol/L
IDEAL	A 80 vs. S 20-40	8888	Previous MI	Qualified for statin therapy according to guidelines at the time of recruitment
SEARCH	S 80 vs. S 20	12,064	Previous MI	Total cholesterol \geq 4.5 mmol/L or \geq 3.5 if already on statin

*Lancet 2010; 376: 1670-81

CTT meta analysis: Proportional reduction in MAJOR VASCULAR EVENTS versus absolute LDL-C reduction



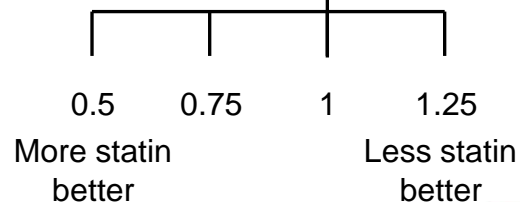
Statin vs control trials: Proportional effects on MAJOR VASCULAR EVENTS per mmol/L LDL-C reduction



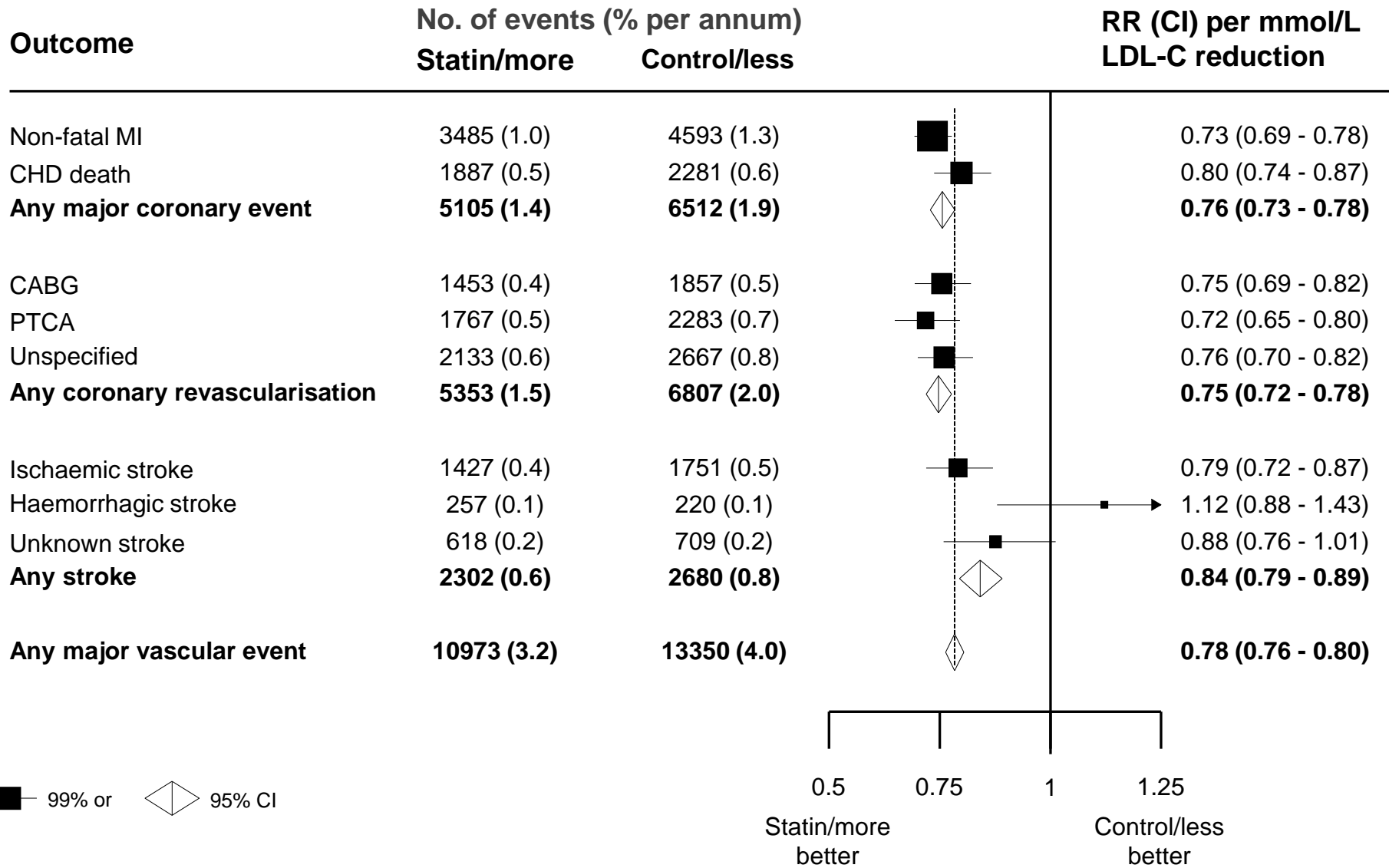
More vs less statin: Proportional effects on MAJOR VASCULAR EVENTS per mmol/L LDL-C reduction

Outcome	No. of events (% per annum)		RR (CI) per mmol/L LDL-C reduction
	More statin	Less statin	
Non-fatal MI	1175 (1.3)	1380 (1.5)	0.71 (0.58 - 0.87)
CHD death	645 (0.7)	694 (0.7)	0.85 (0.63 - 1.15)
Any major coronary event	1725 (1.9)	1973 (2.2)	0.74 (0.65 - 0.85)
CABG	637 (0.7)	731 (0.9)	0.72 (0.55 - 0.95)
PTCA	1166 (1.3)	1508 (1.8)	0.60 (0.50 - 0.71)
Unspecified	447 (0.5)	502 (0.6)	0.78 (0.58 - 1.04)
Any coronary revascularisation	2250 (2.6)	2741 (3.2)	0.66 (0.60 - 0.73)
Ischaemic stroke	440 (0.5)	526 (0.6)	0.69 (0.50 - 0.95)
Haemorrhagic stroke	69 (0.1)	57 (0.1)	1.39 (0.57 - 3.39)
Unknown stroke	63 (0.1)	80 (0.1)	0.63 (0.24 - 1.66)
Any stroke	572 (0.6)	663 (0.7)	0.74 (0.59 - 0.92)
Any major vascular event	3837 (4.5)	4416 (5.3)	0.72 (0.66 - 0.78)

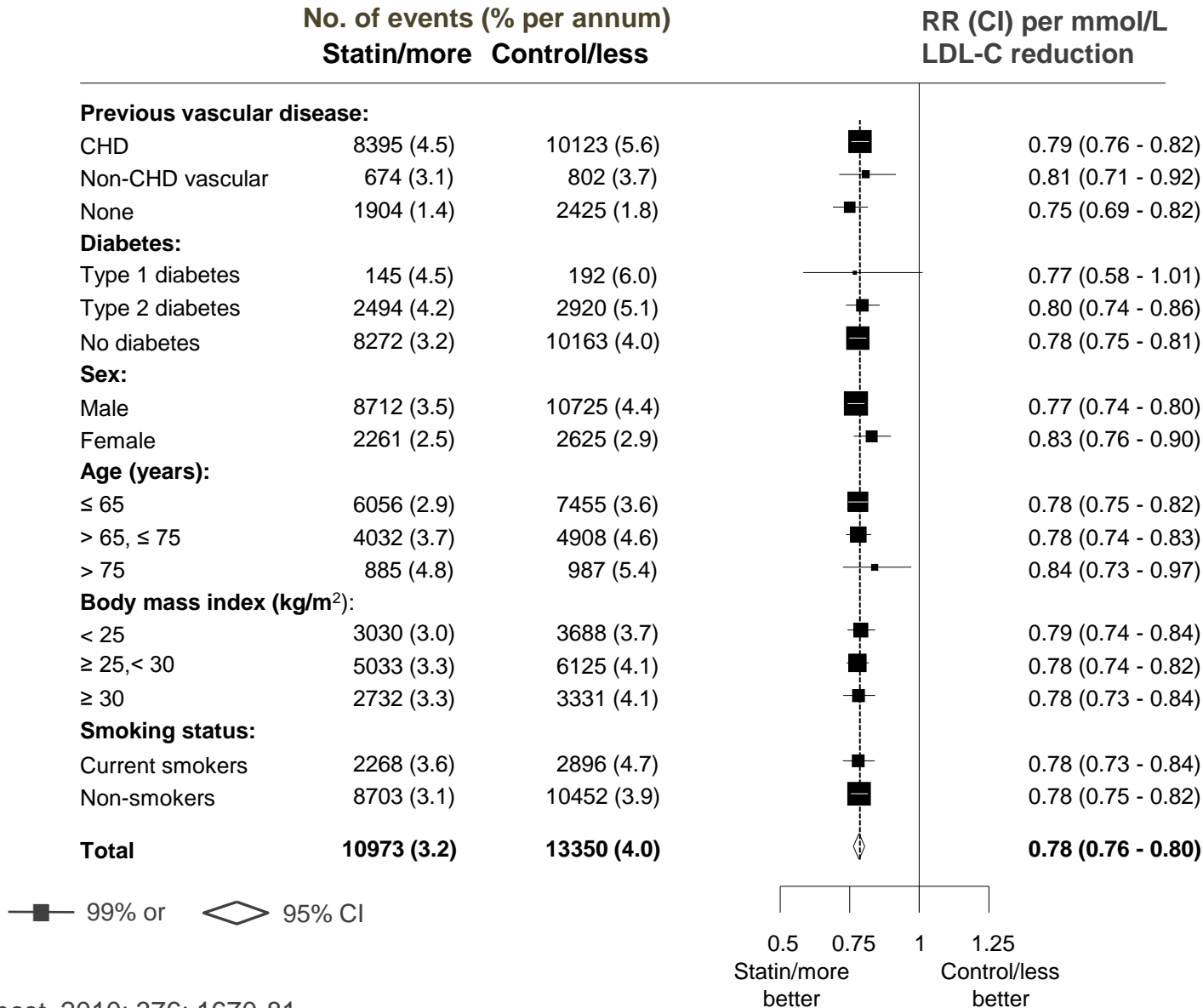
■ 99% or ◊ 95% CI



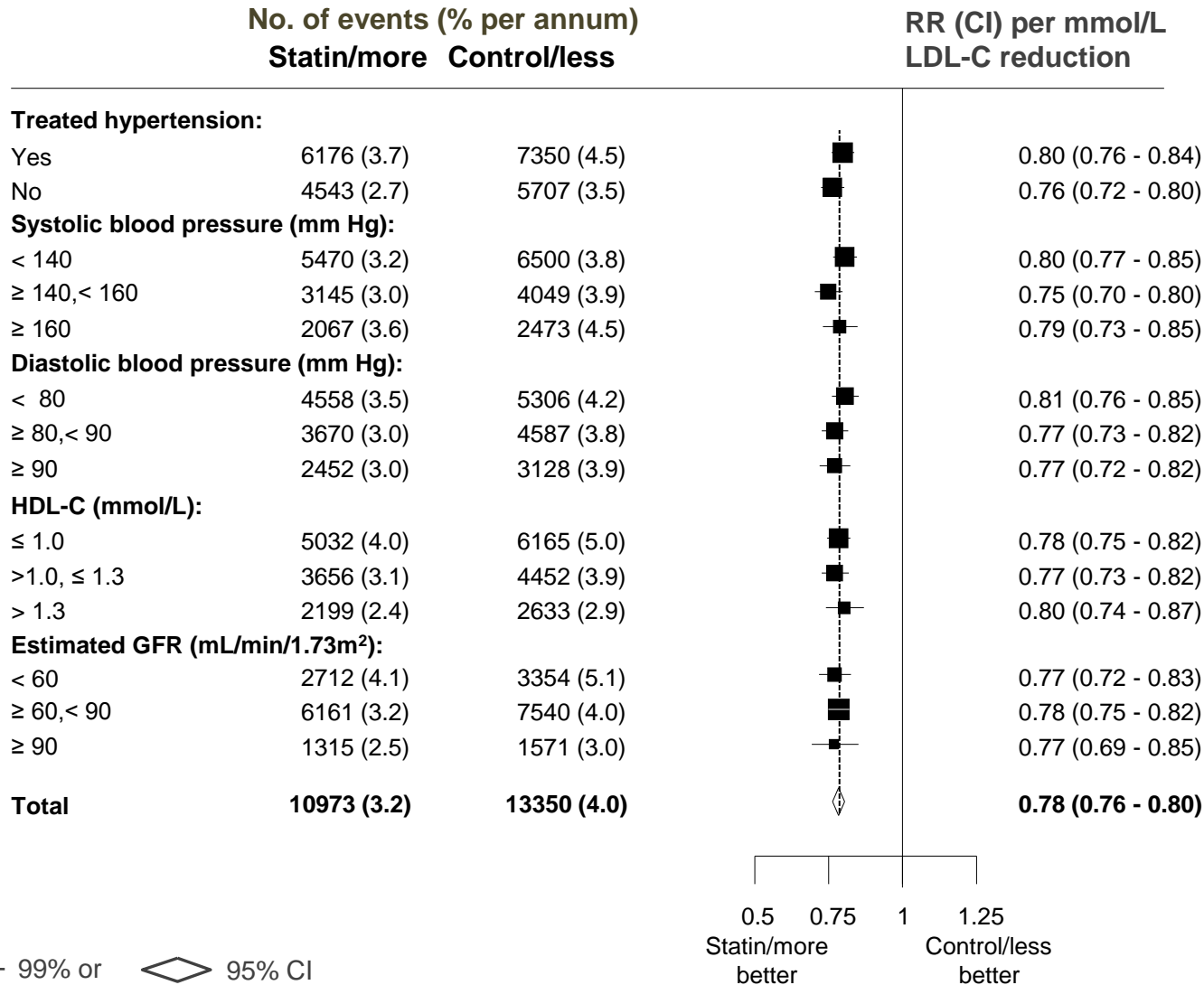
All trials (statin vs control OR more vs less statin): Proportional effects on MAJOR VASCULAR EVENTS per mmol/L reduction in LDL-C



Proportional effects on MAJOR VASCULAR EVENTS per mmol/L LDL-C reduction, by baseline prognostic factors



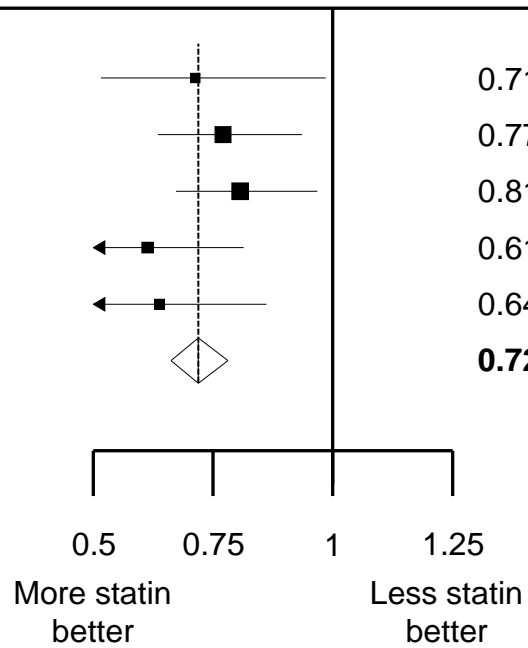
Proportional effects on MAJOR VASCULAR EVENTS per mmol/L LDL-C reduction, by baseline prognostic factors



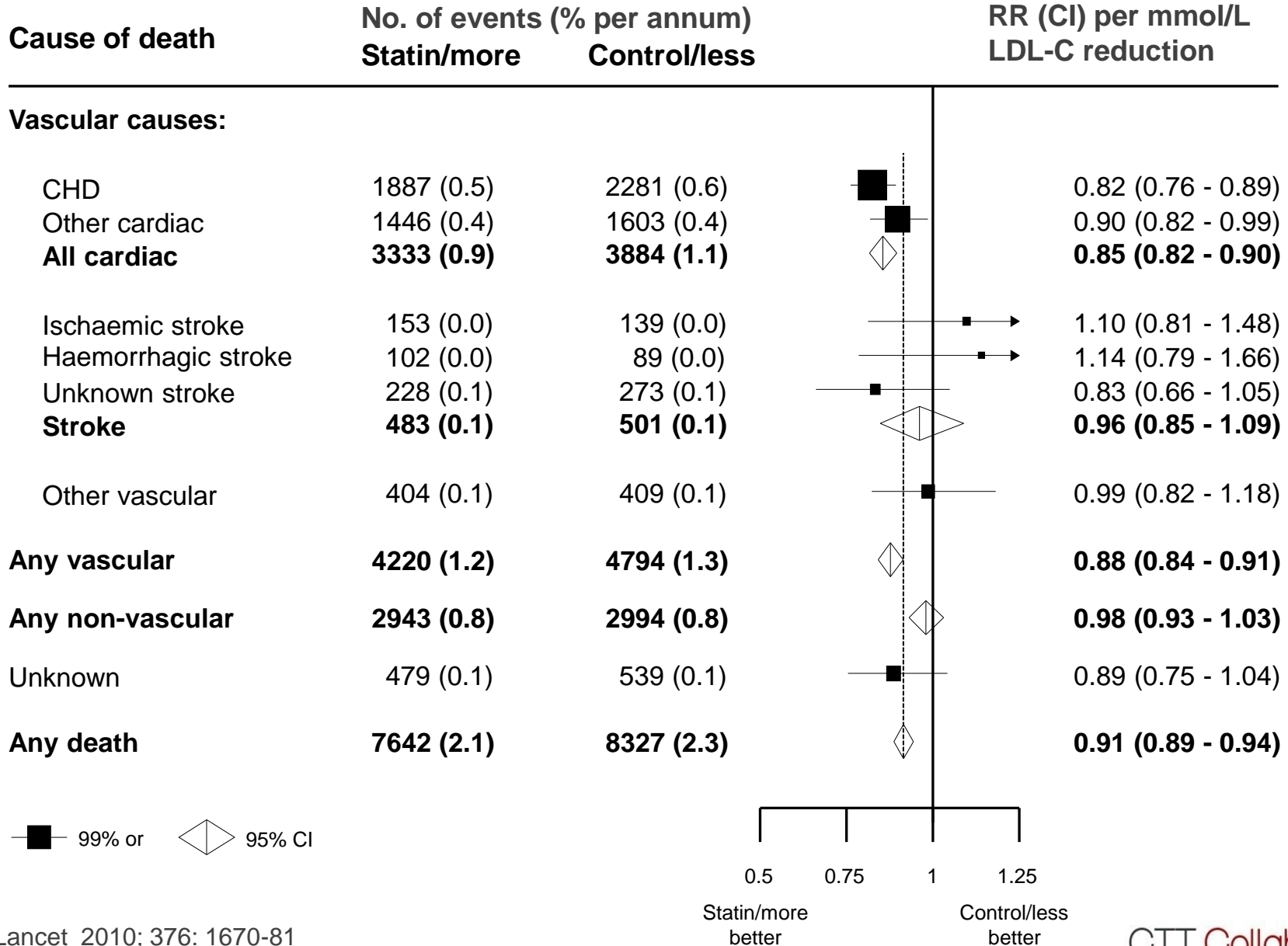
More vs less trials: Proportional effects on MAJOR VASCULAR EVENTS per mmol/L reduction in LDL-C, by baseline LDL-C

Baseline LDL-C (mmol/L)	No. of events (% per annum)			RR (CI) per mmol/L LDL-C reduction
	More statin	Less statin		
< 2.0	704 (4.6)	795 (5.2)		0.71 (0.52 - 0.98)
≥ 2.0, <2.5	1189 (4.2)	1317 (4.8)		0.77 (0.64 - 0.94)
≥ 2.5, <3.0	1065 (4.5)	1203 (5.0)		0.81 (0.67 - 0.97)
≥ 3.0, <3.5	517 (4.5)	633 (5.8)		0.61 (0.46 - 0.81)
≥ 3.0	303 (5.7)	398 (7.8)		0.64 (0.47 - 0.86)
Total	3837 (4.5)	4416 (5.3)		0.72 (0.66 - 0.78)

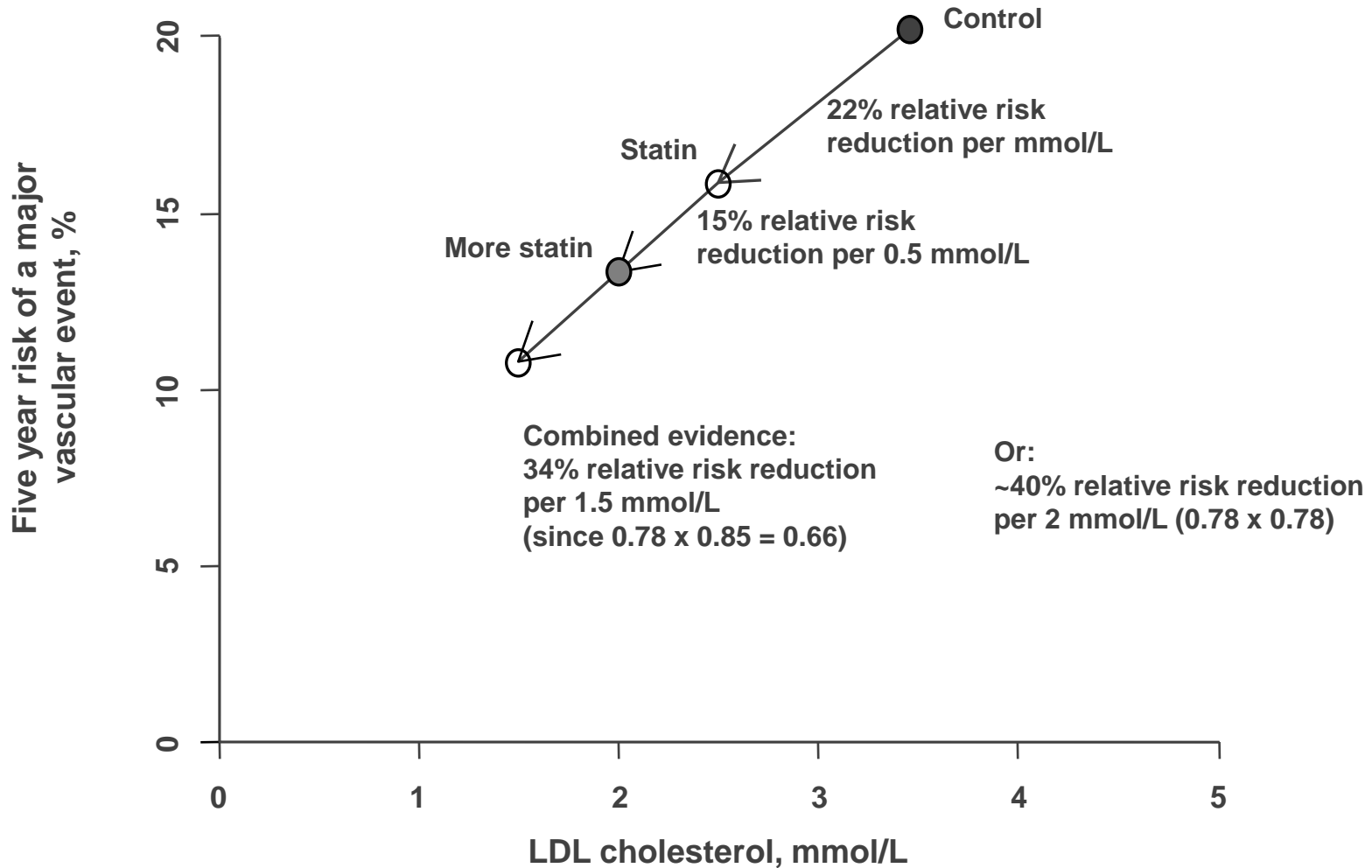
■ 99% or 95% CI ◆ 95% CI



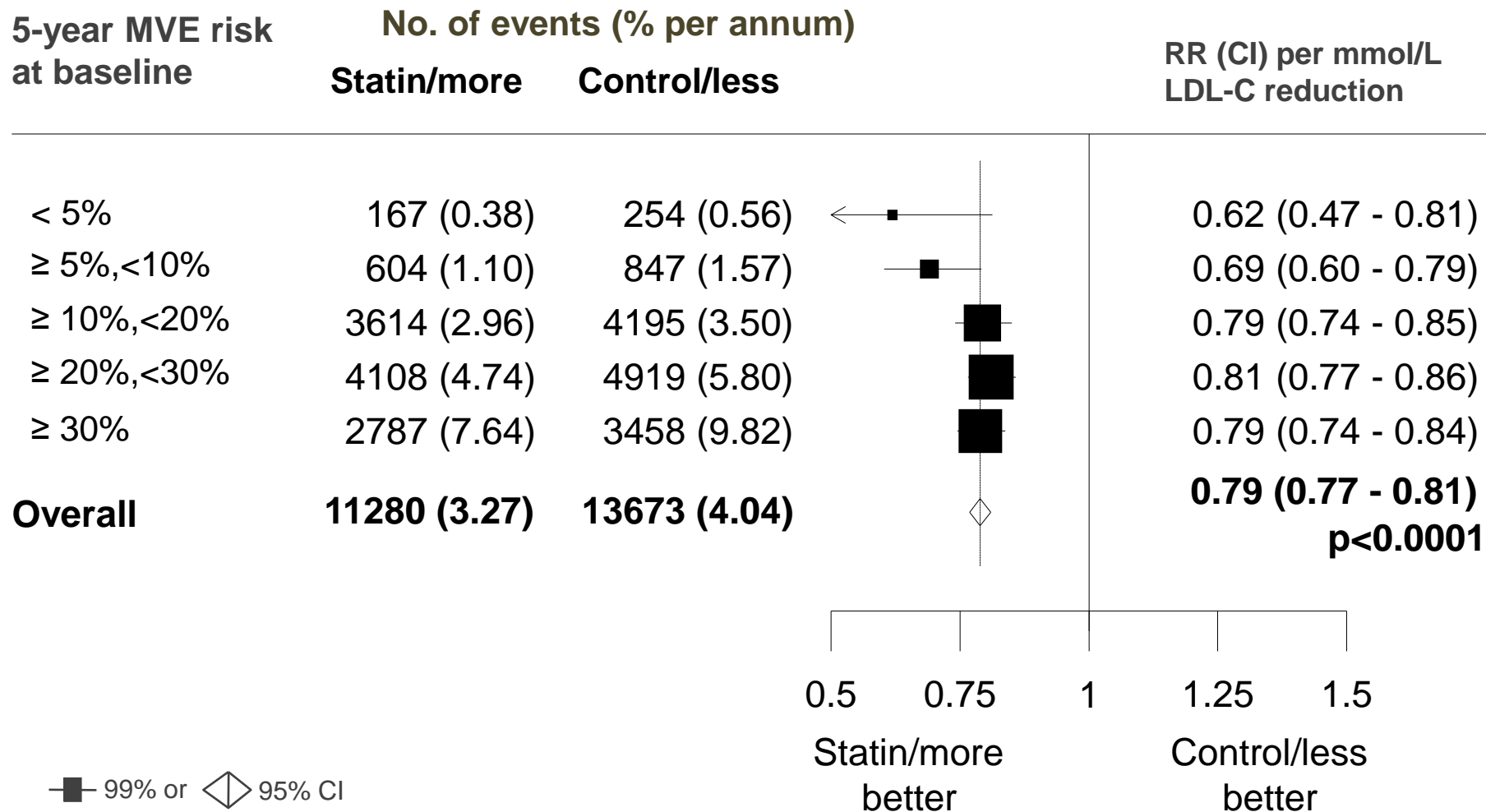
Proportional effects on CAUSE-SPECIFIC MORTALITY per mmol/L LDL-C reduction



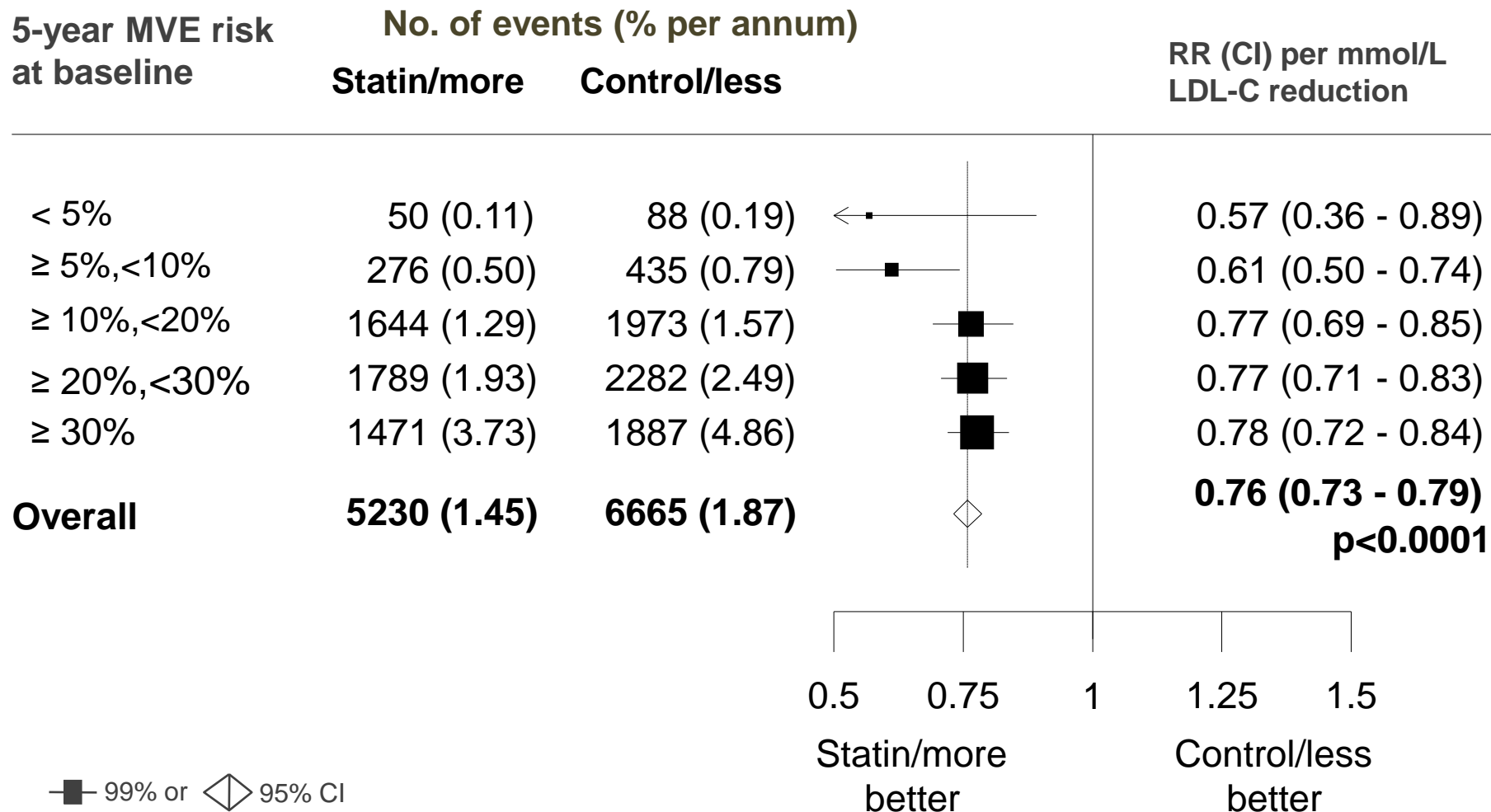
Expected reduction in MAJOR VASCULAR EVENT risk from lowering LDL-C with STATIN therapy



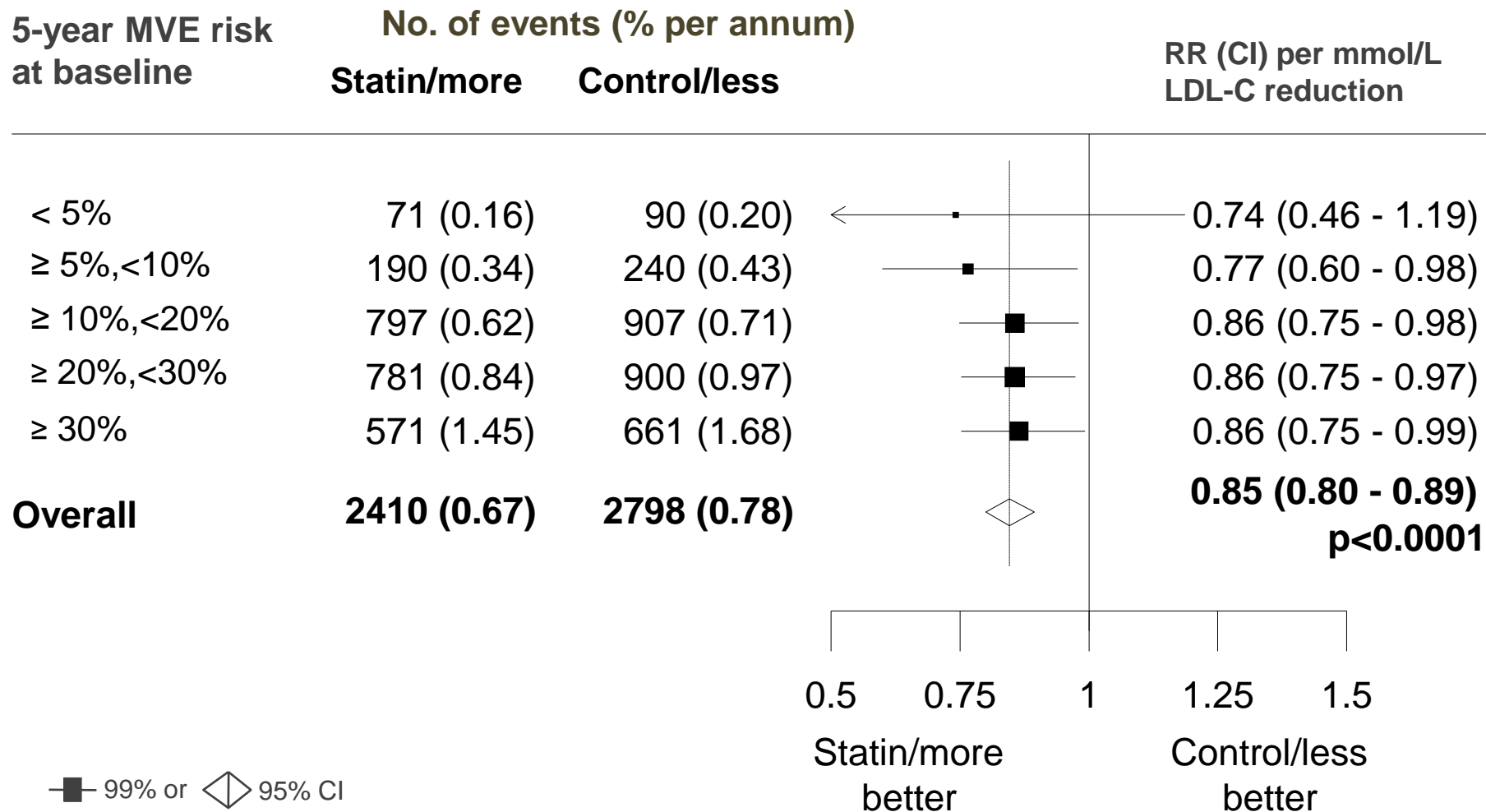
Effects on MAJOR VASCULAR EVENTS per mmol/L reduction in LDL-C at different levels of risk



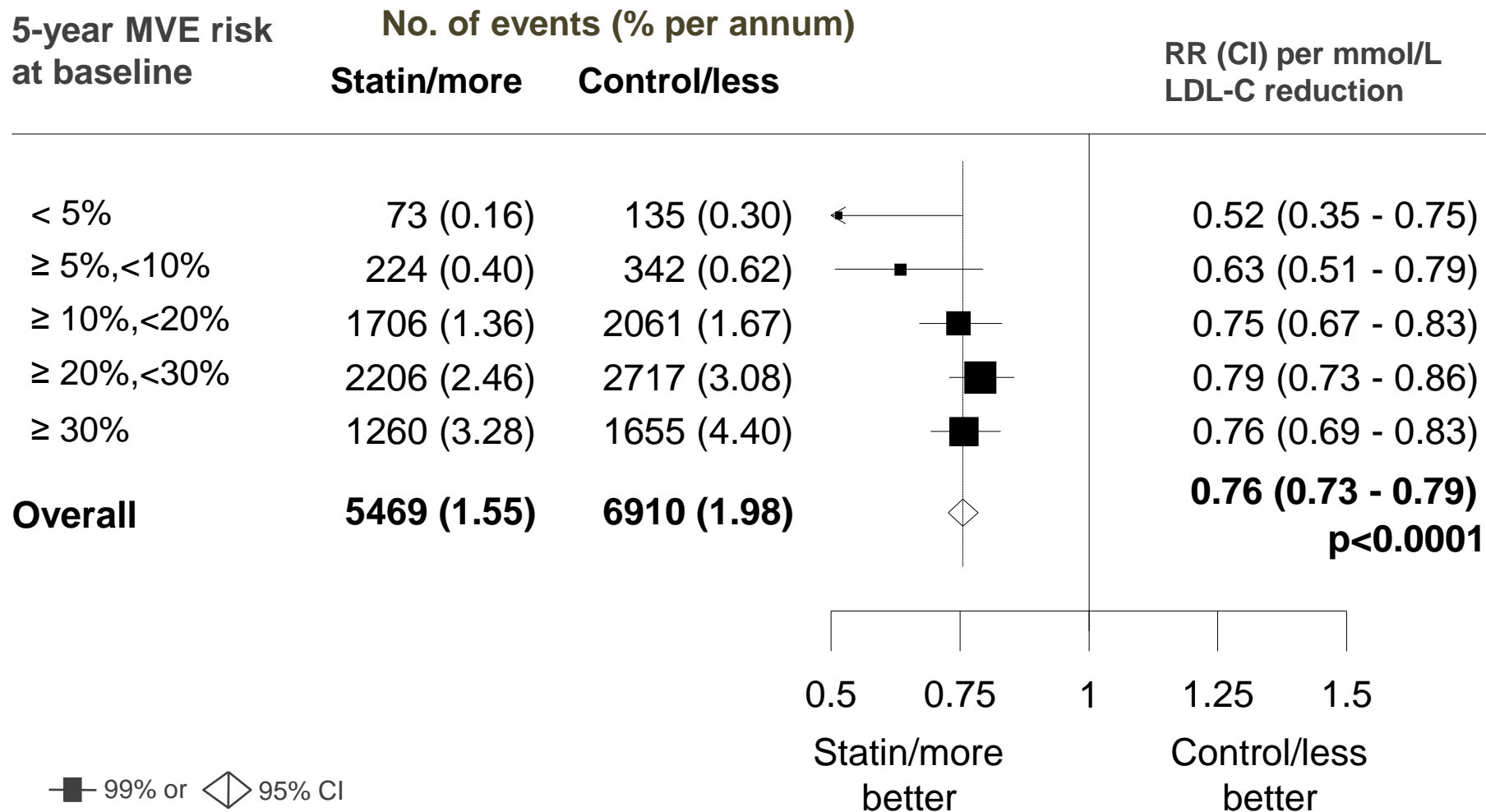
Effects on MAJOR CORONARY EVENTS per mmol/L reduction in LDL-C at different levels of risk



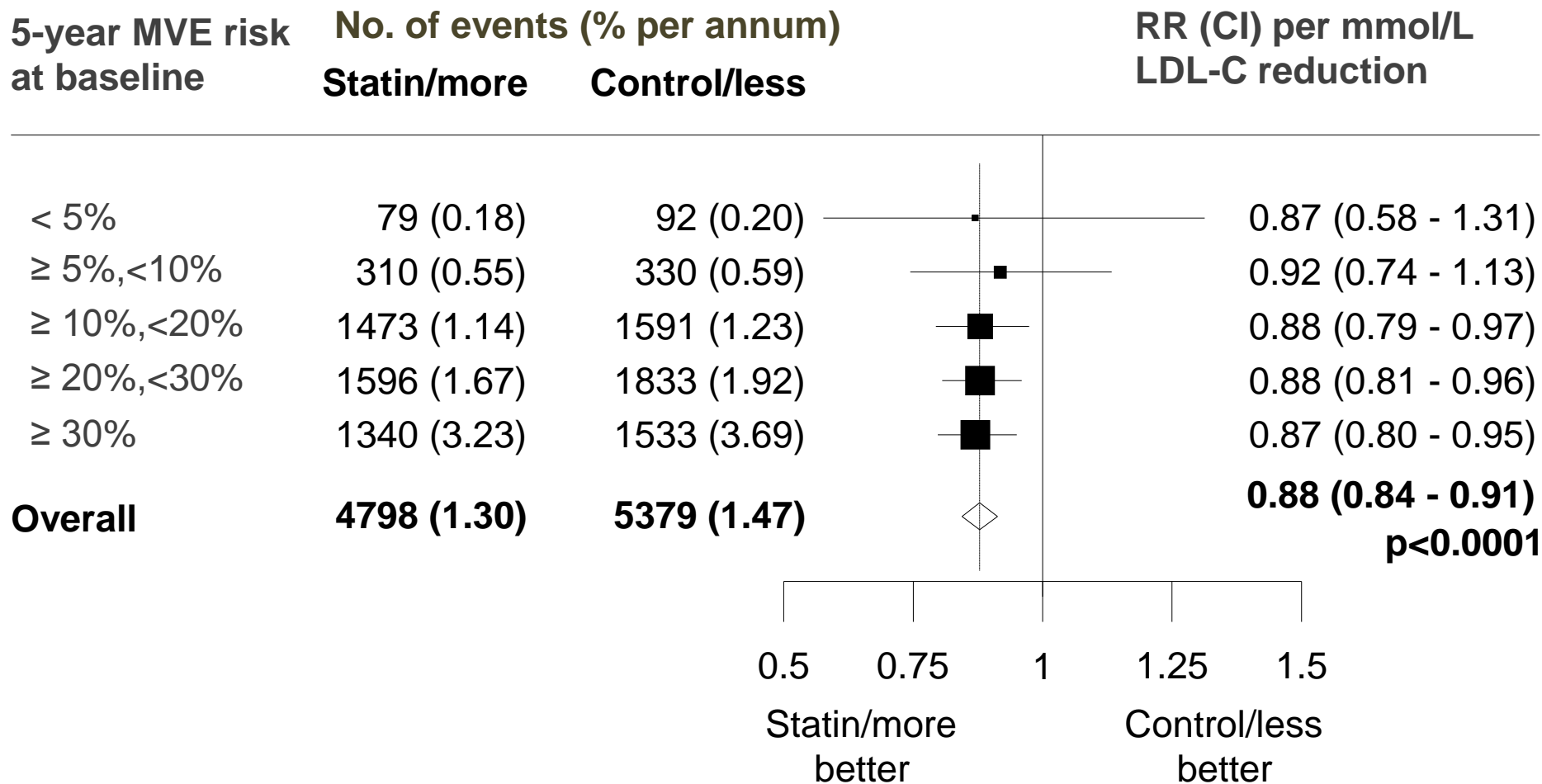
Effects on ANY STROKE per mmol/L reduction in LDL-C at different levels of risk



Effects on ANY CORONARY REVASCULARISATION per mmol/L reduction in LDL-C at different levels of risk

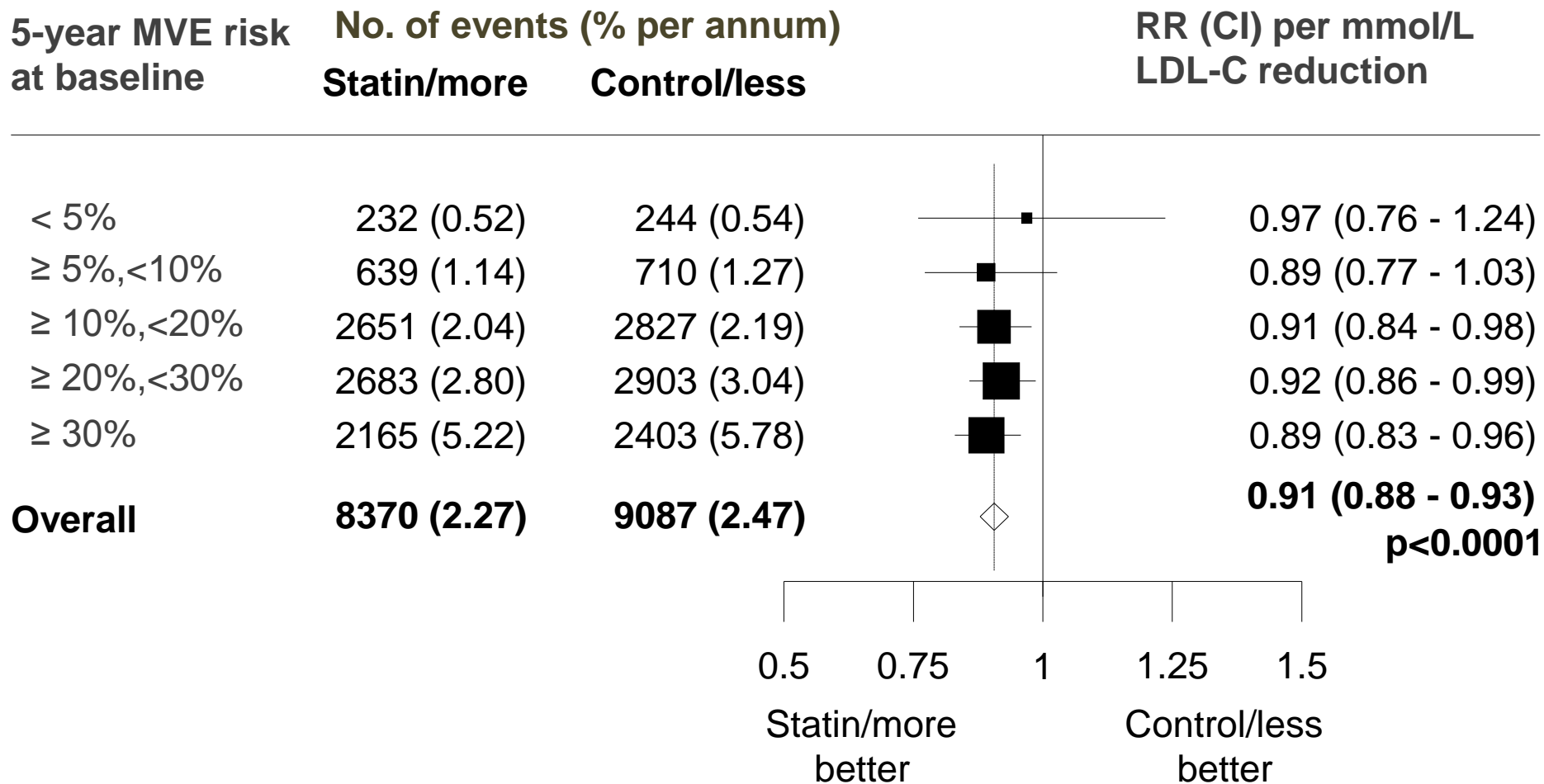


Effects on VASCULAR MORTALITY per mmol/L LDL-C reduction at different levels of risk



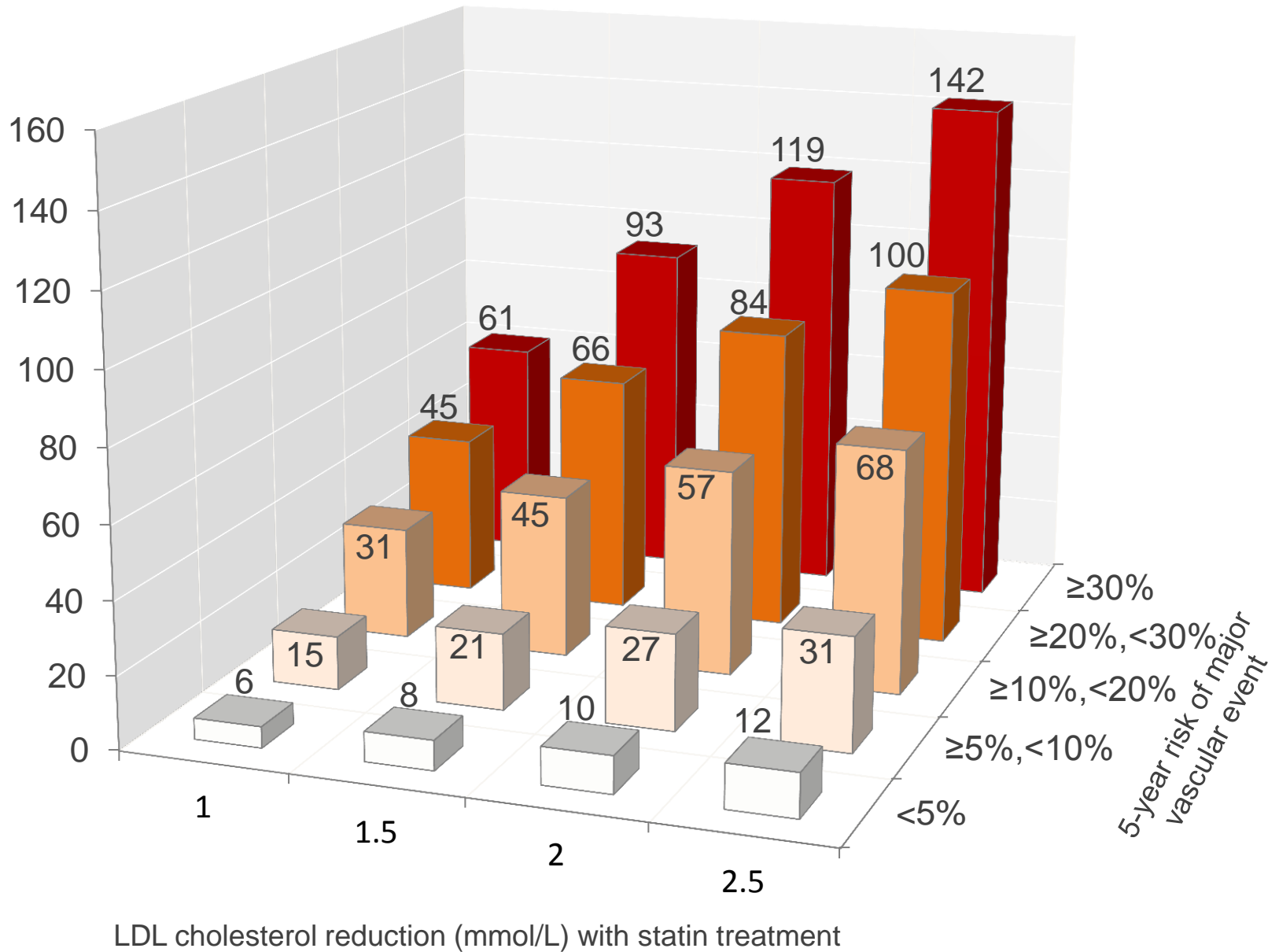
■ 99% or ◊ 95% CI

Effects on ALL CAUSE MORTALITY per mmol/L LDL-C reduction at different levels of risk

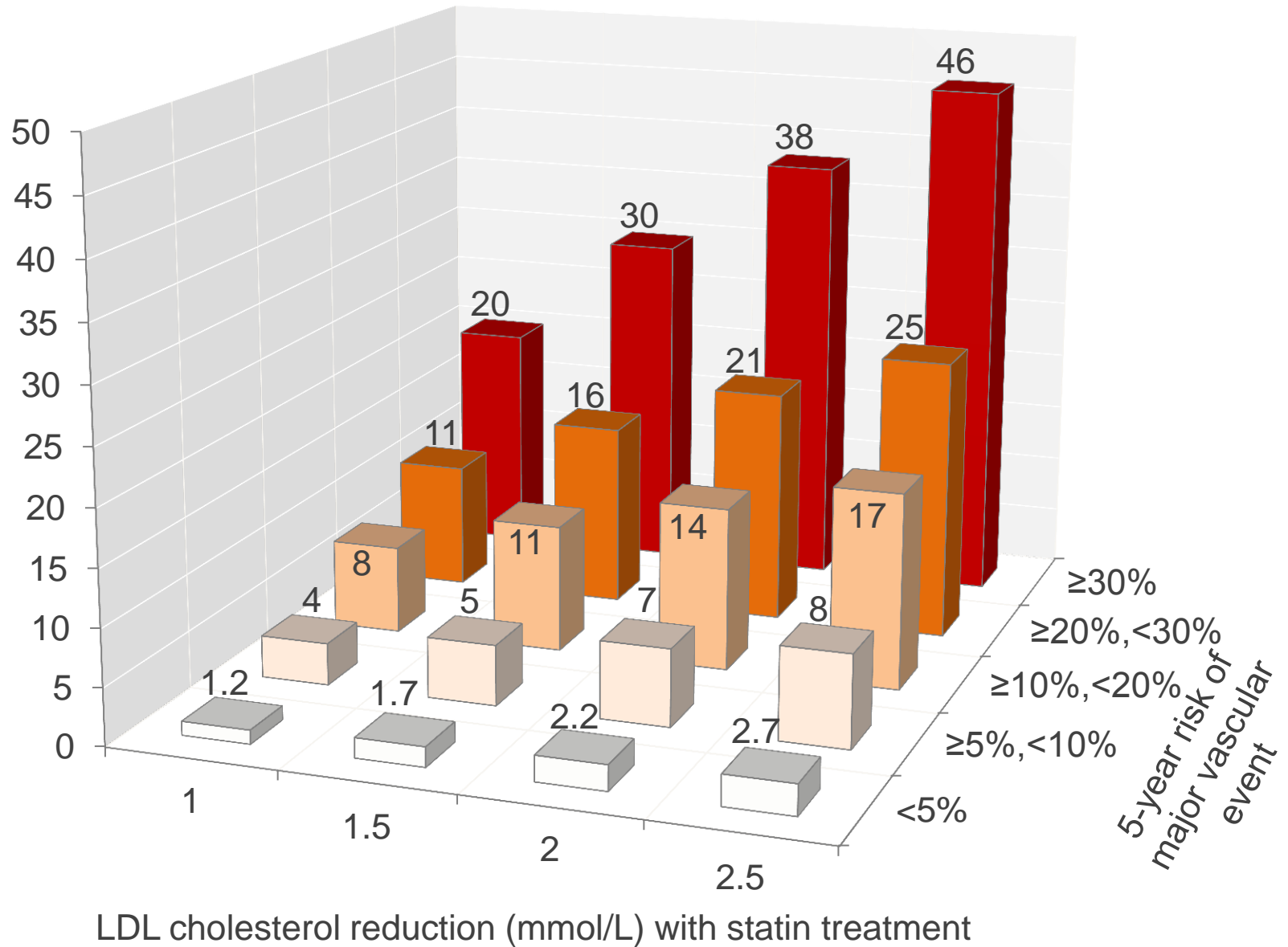


■ 99% or ◊ 95% CI

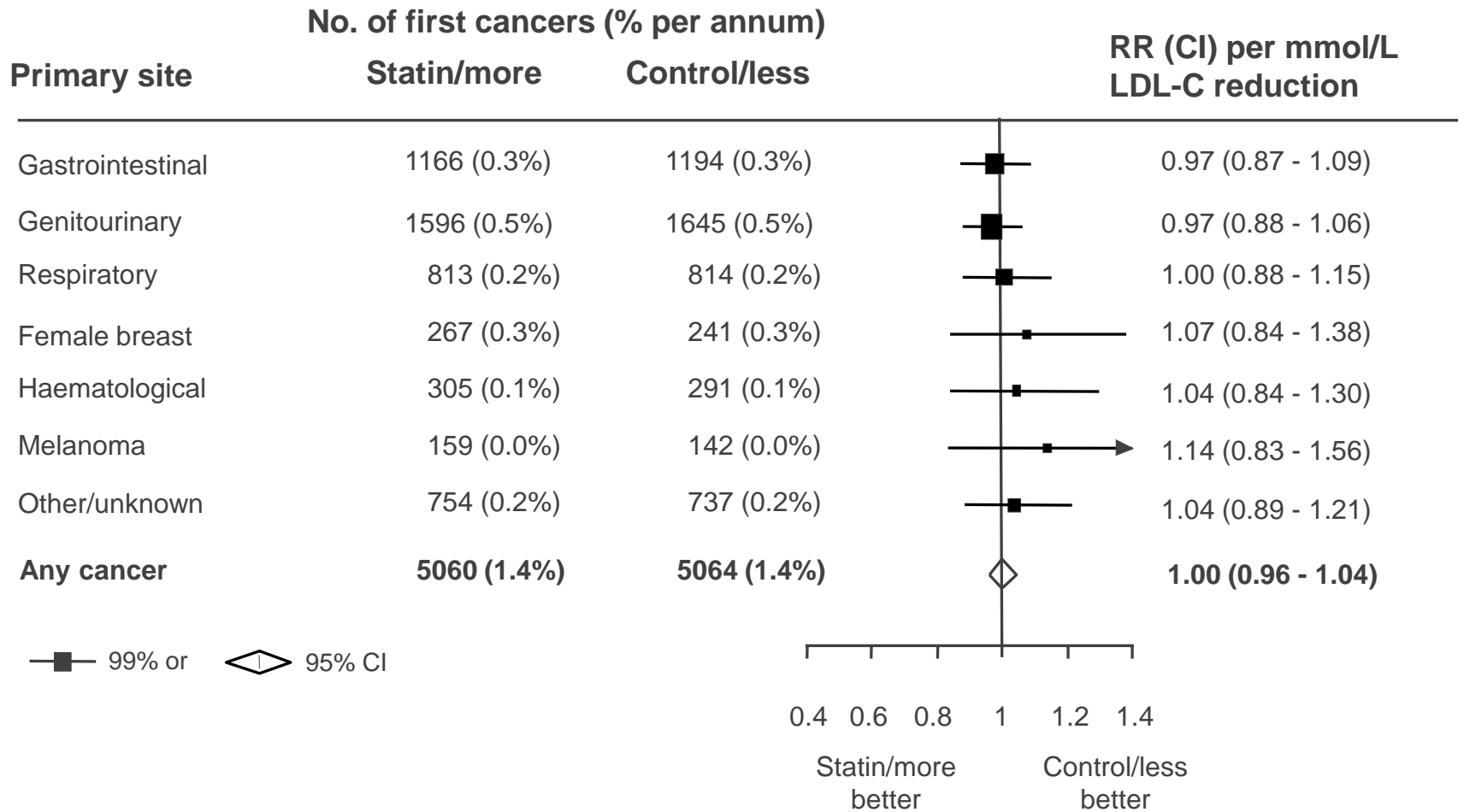
MAJOR VASCULAR EVENTS avoided per 1,000 treated over 5 years



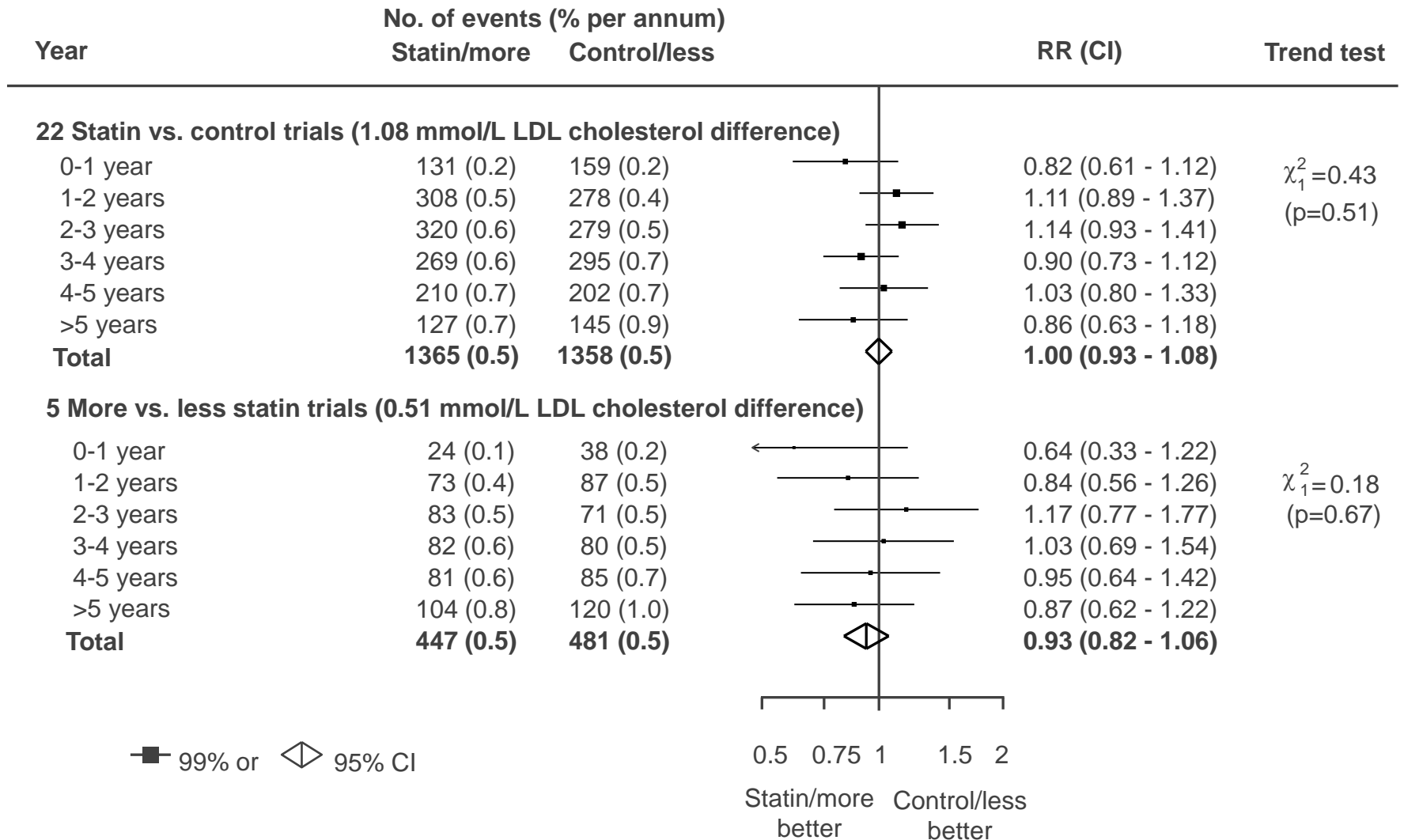
VASCULAR DEATHS avoided per 1,000 treated over 5 years



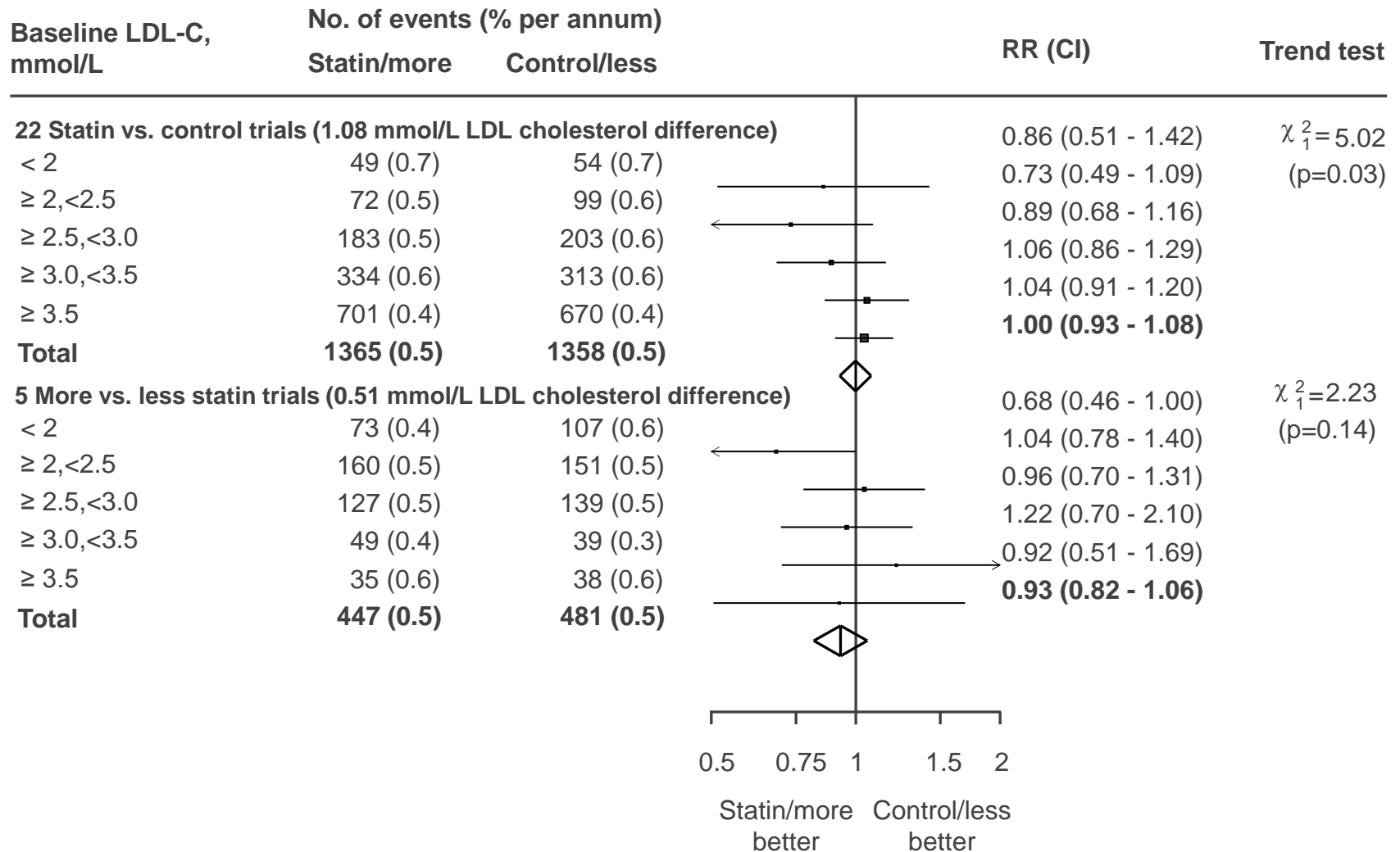
Proportional effects on **SITE SPECIFIC CANCER** per mmol/L LDL-C reduction



Effects of statin therapy on **CANCER MORTALITY** by duration of treatment



Effects of statin therapy on **CANCER MORTALITY** by baseline LDL cholesterol



Thank you to our funders:



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CTT Collaboration
Cholesterol Treatment Trialists' Collaboration