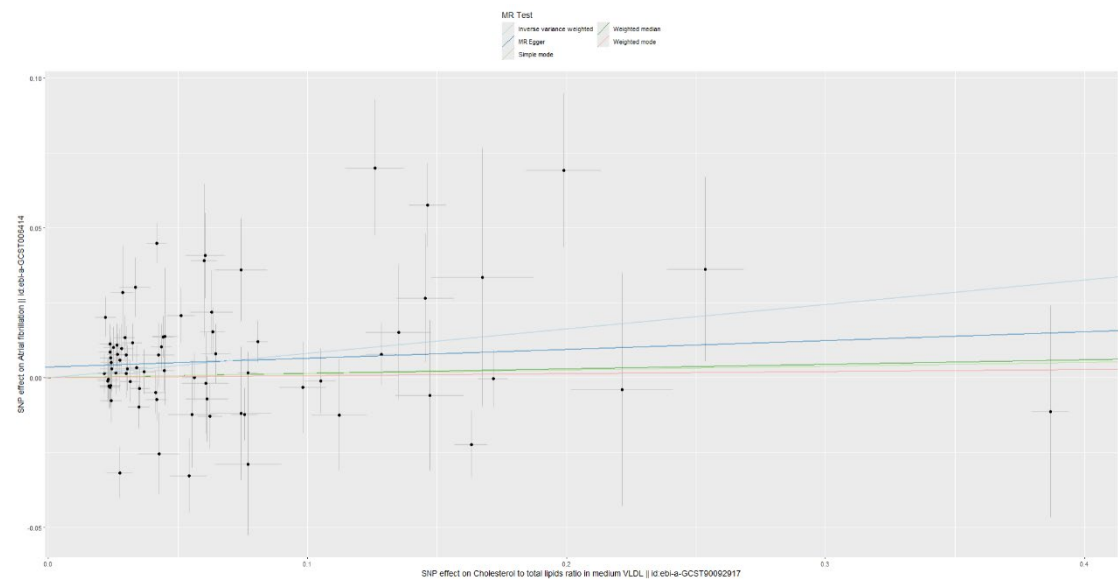


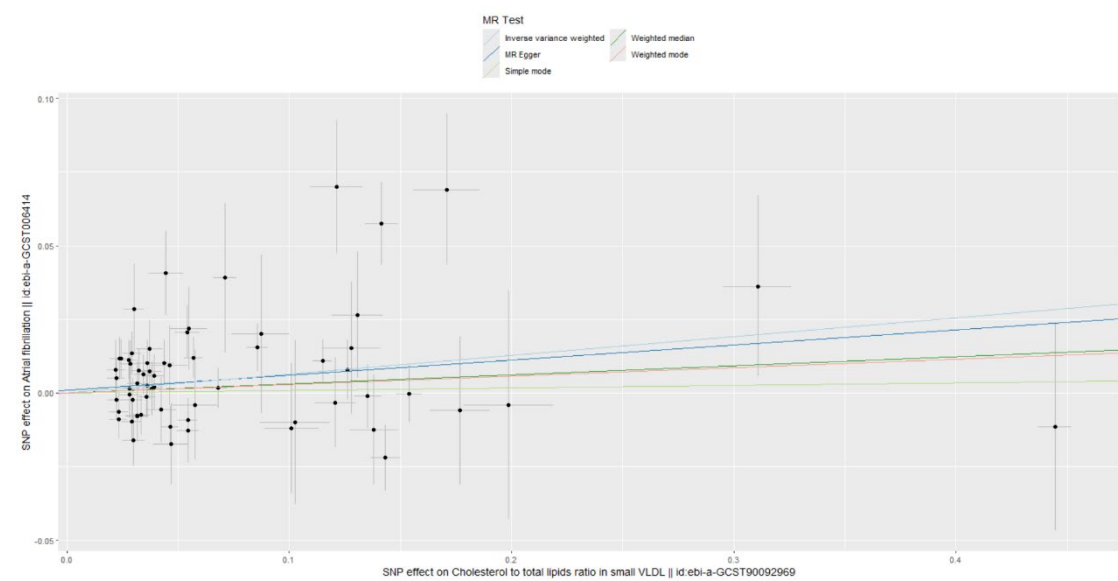
Supplementary materials

Figure S1 Scatter plot of MR effect size for causal associations between lipid traits and atrial fibrillation

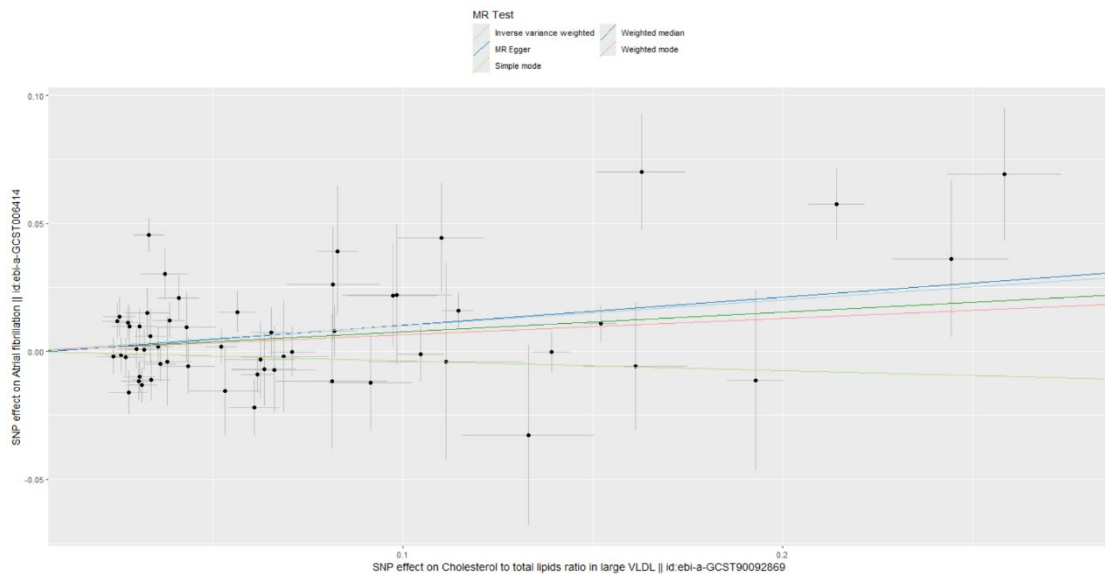
1) Cholesterol to total lipids ratio in medium VLDL and AF



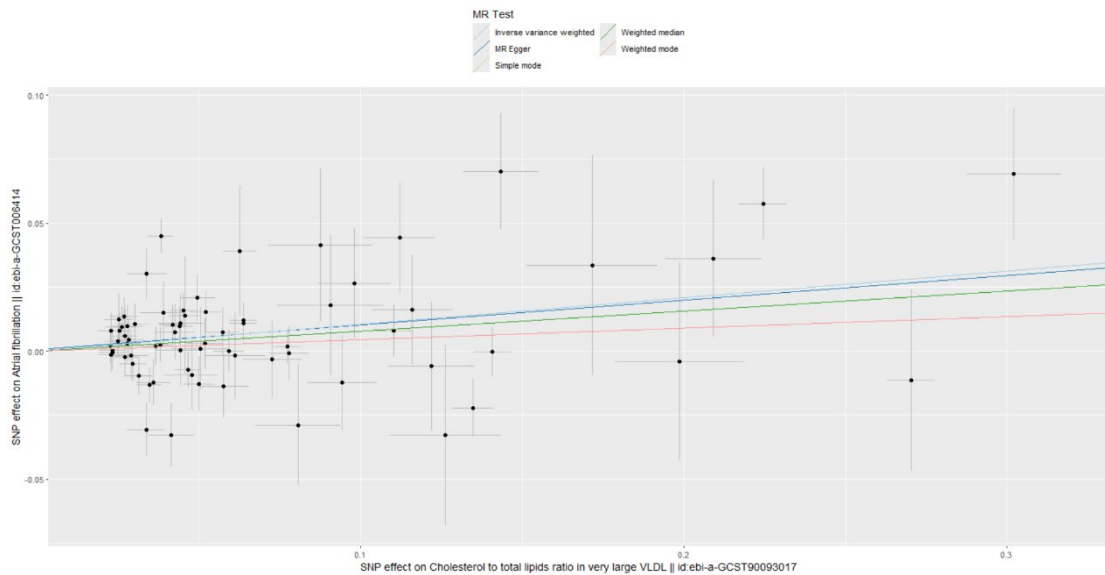
2) Cholesterol to total lipids ratio in small VLDL and AF



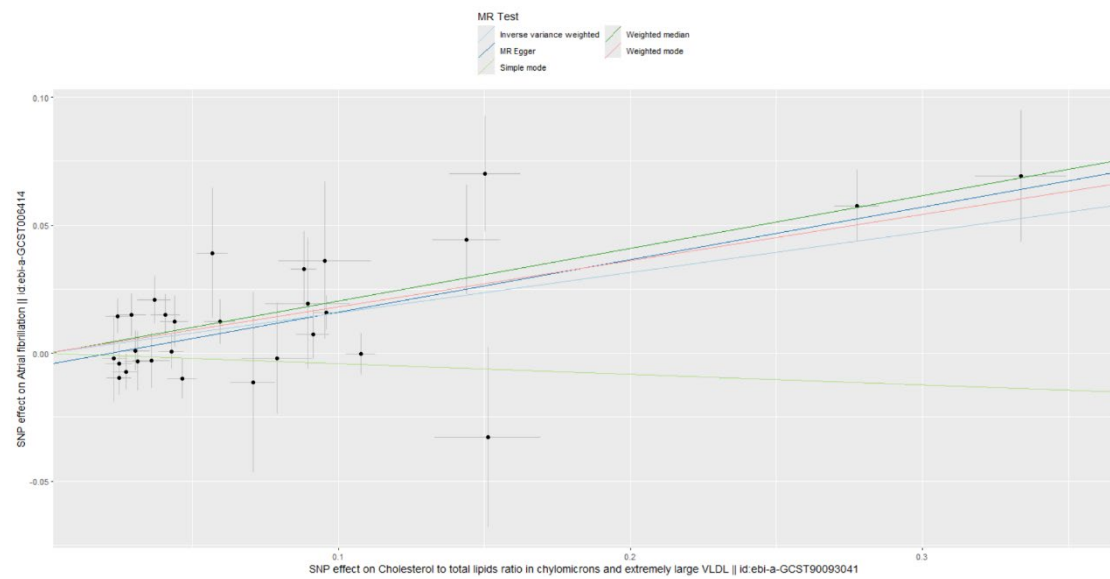
3) Cholesterol to total lipids ratio in large VLDL and AF



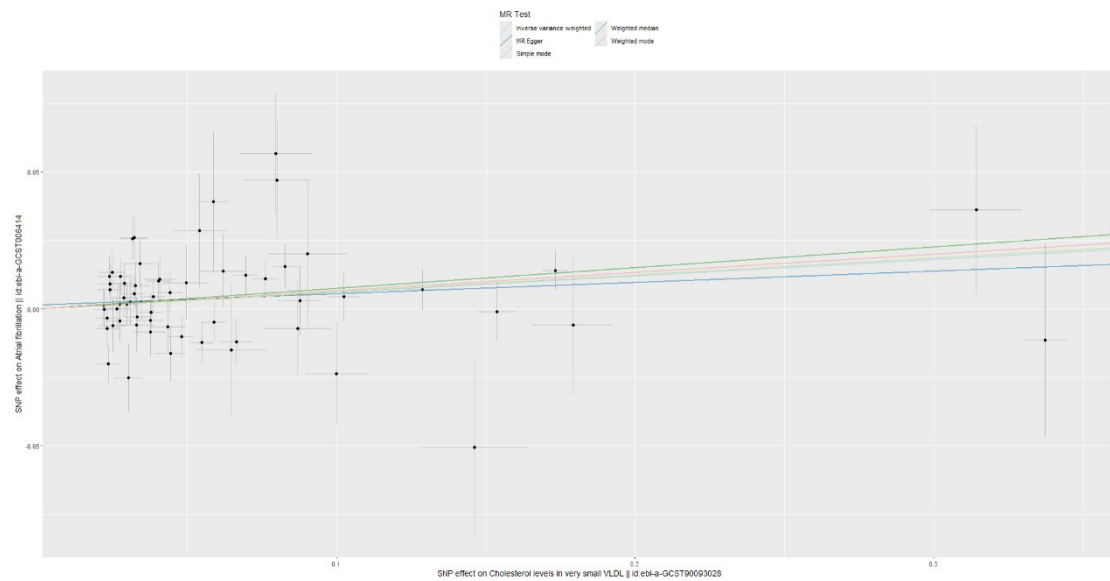
4) Cholesterol to total lipids ratio in very large VLDL and AF



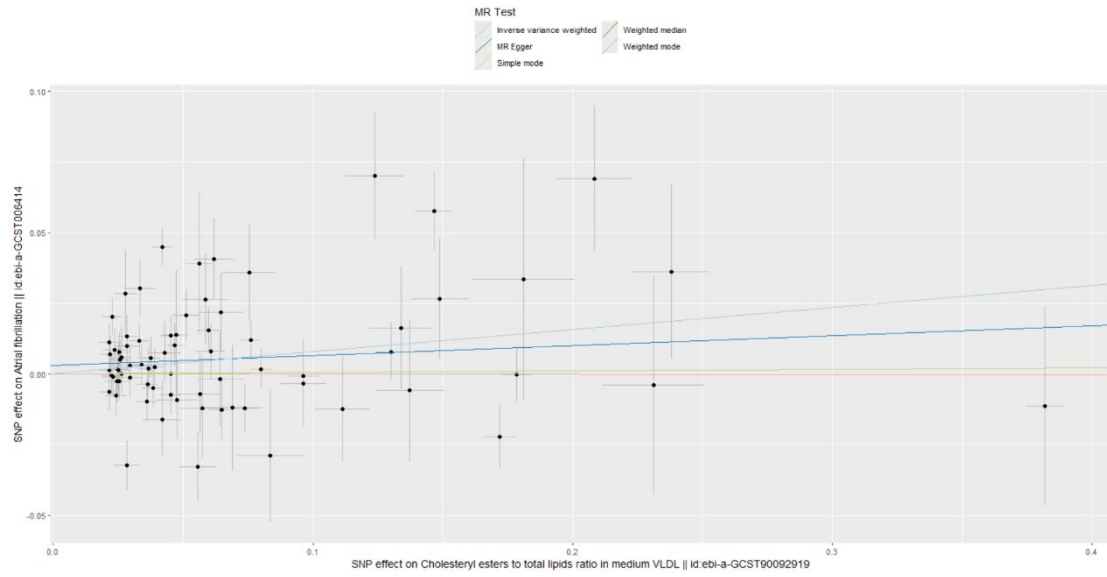
5) Cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



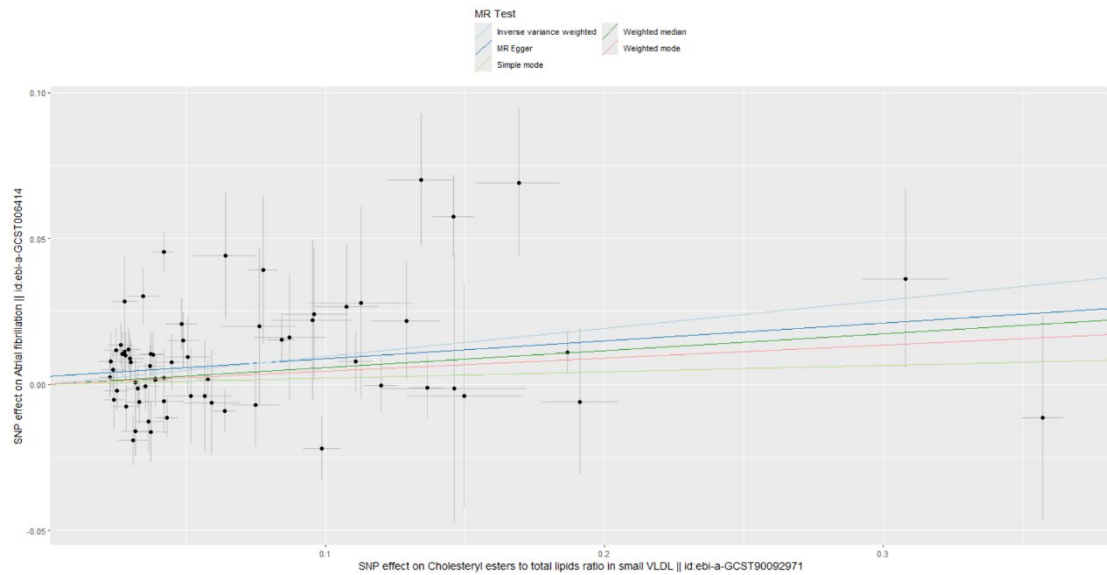
6) Cholesterol levels in very small VLDL and AF



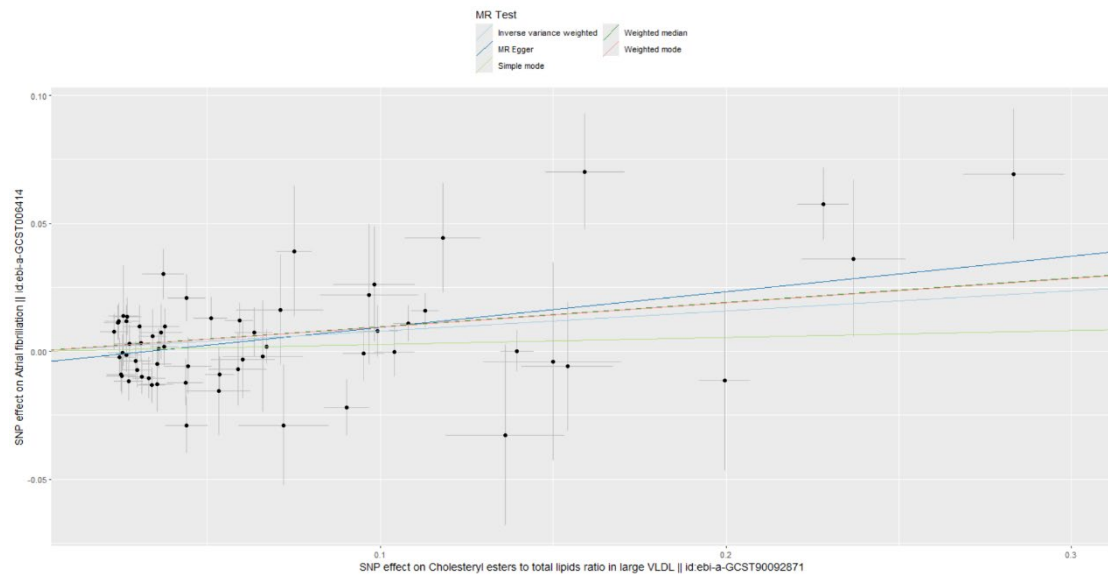
7) Cholesteryl esters to total lipids ratio in medium VLDL and AF



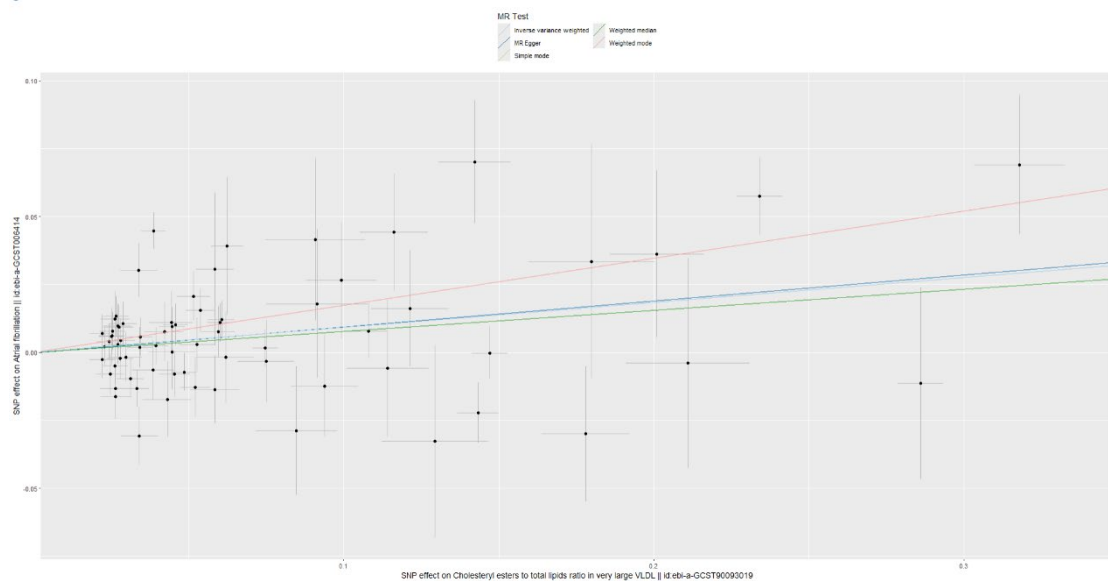
8) Cholesteryl esters to total lipids ratio in small VLDL and AF



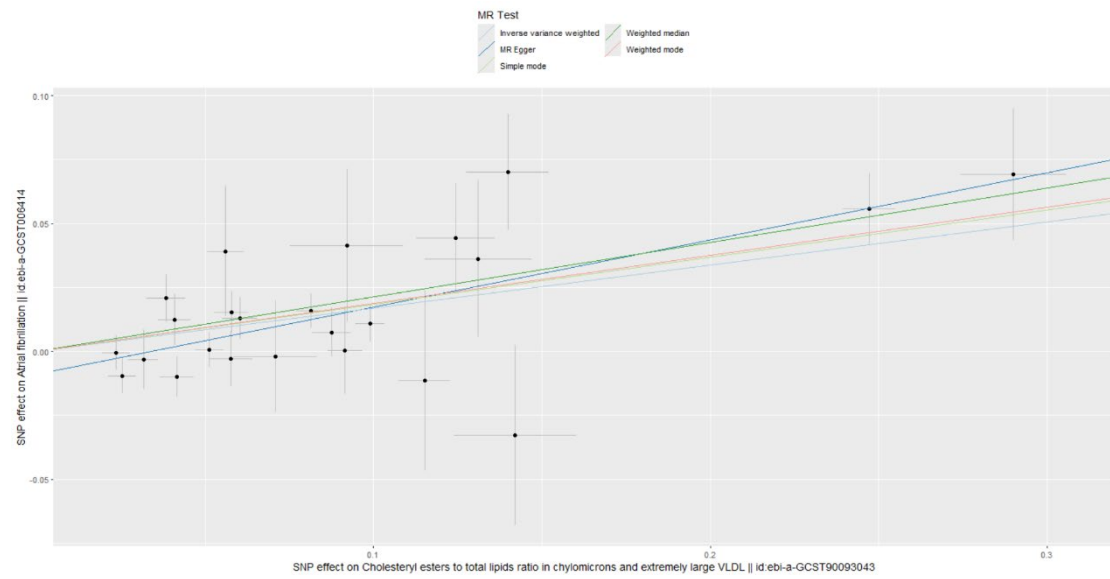
9) Cholesteryl esters to total lipids ratio in large VLDL and AF



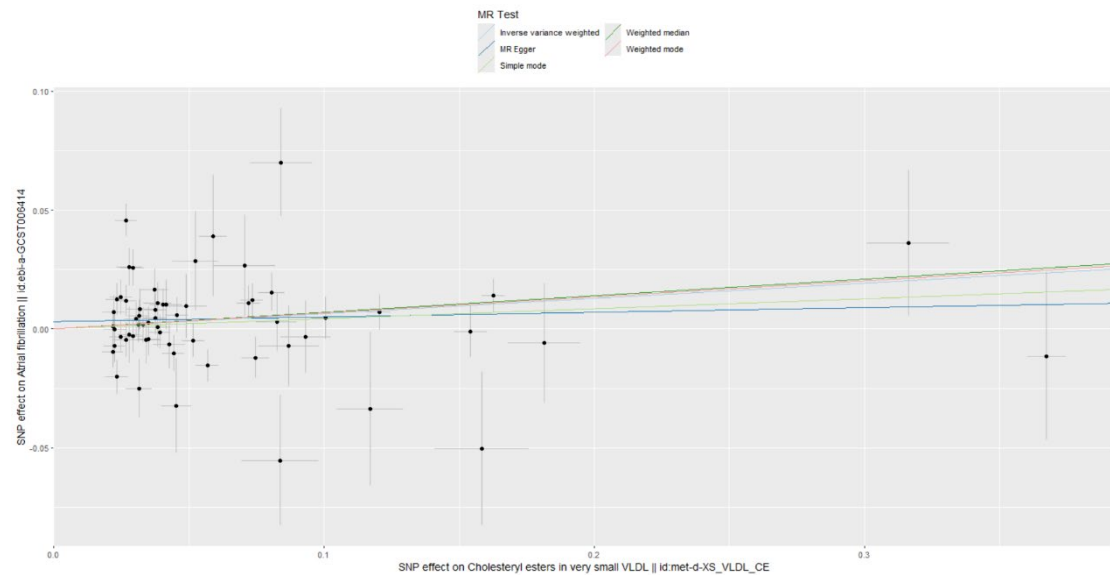
10) Cholesteryl esters to total lipids ratio in very large VLDL and AF



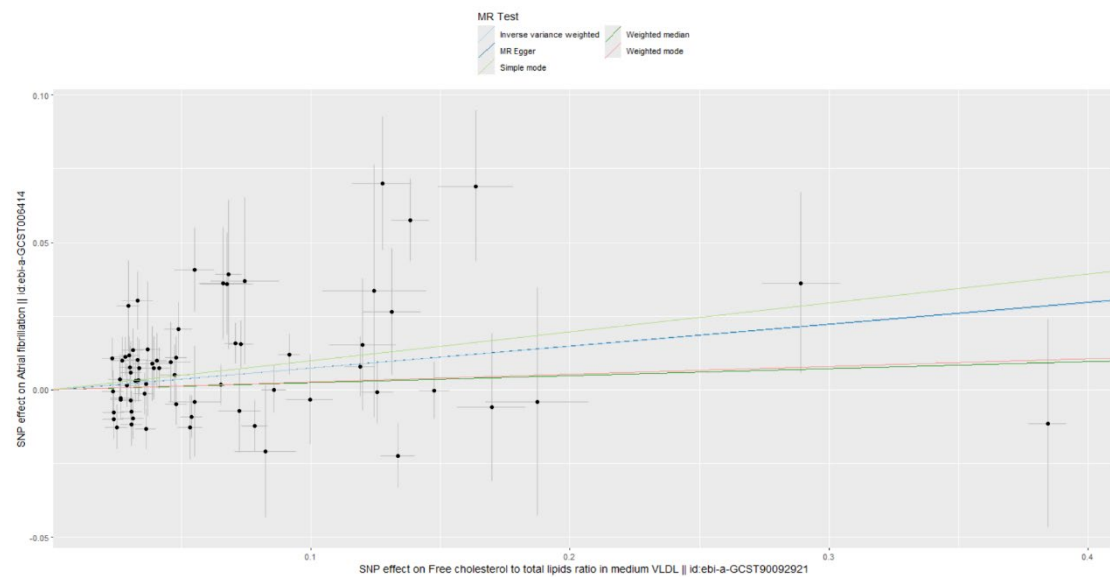
11) Cholesteryl esters to total lipids ratio in chylomicrons and extremely large VLDL and AF



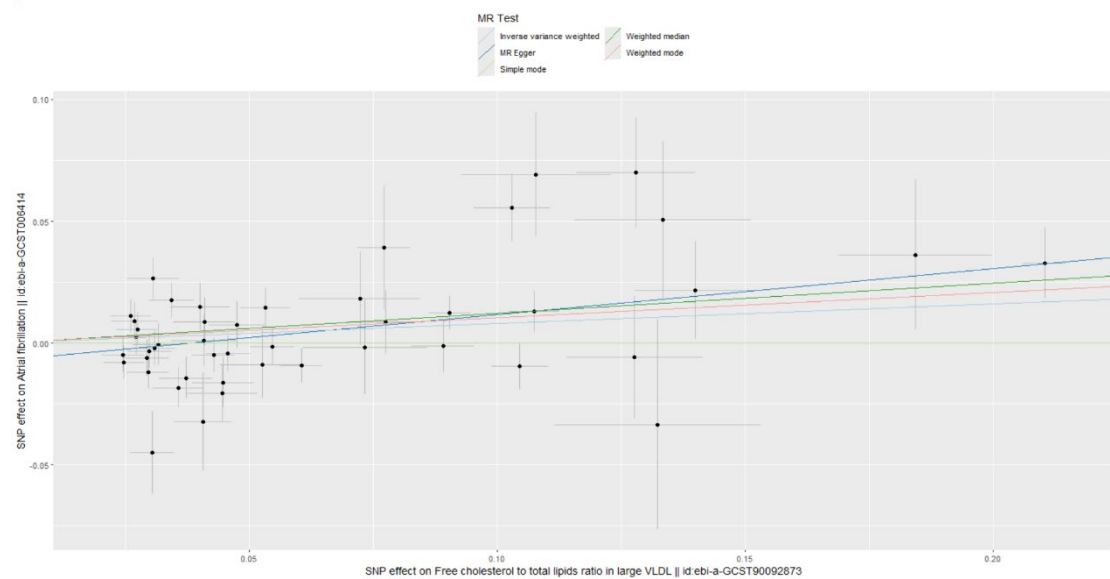
12) Cholesteryl esters in very small VLDL and AF



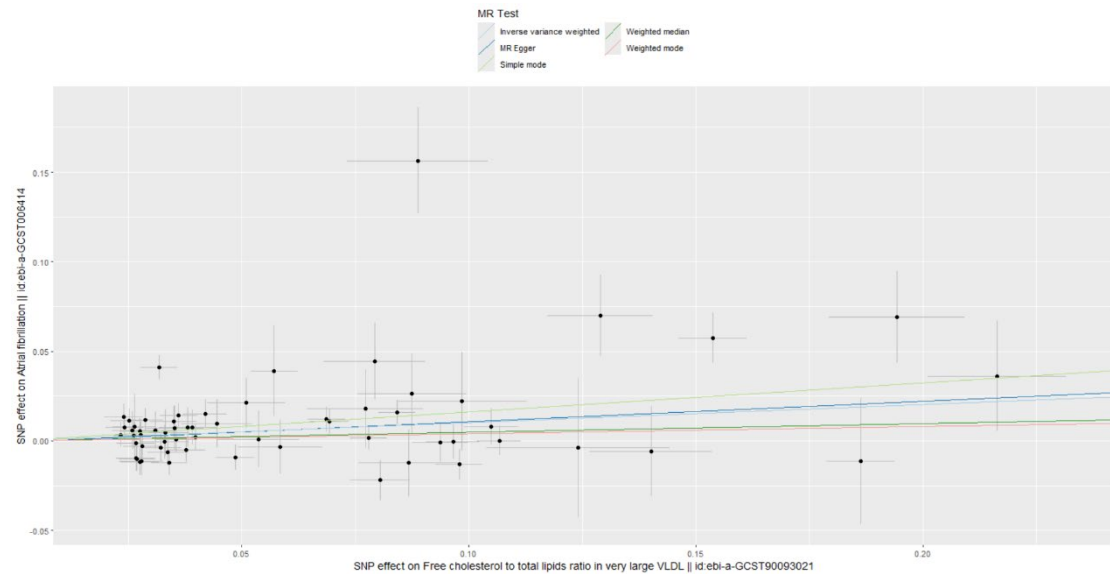
13) Free cholesterol to total lipids ratio in medium VLDL and AF



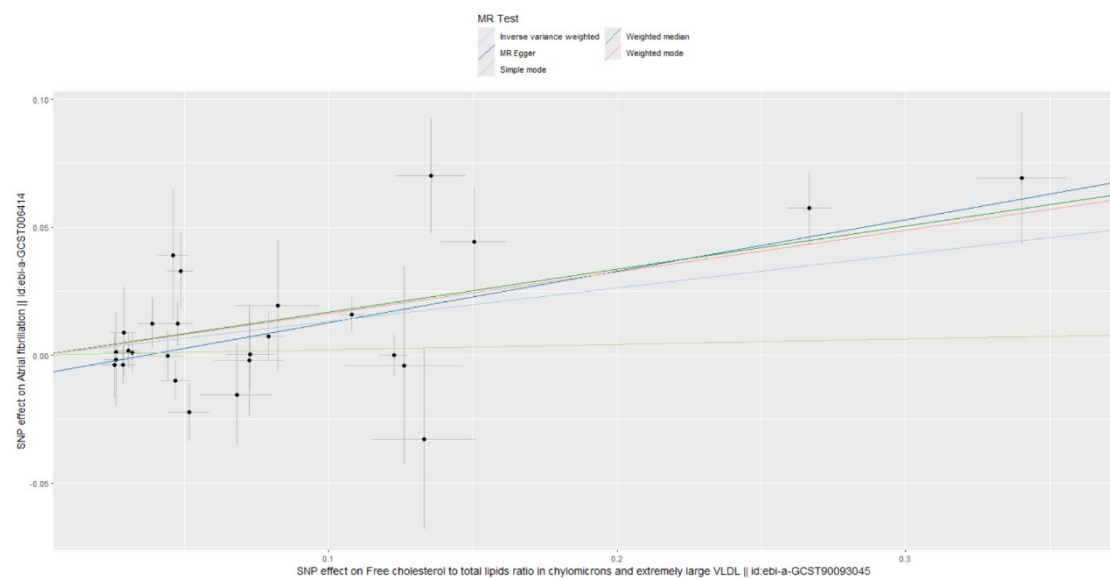
14) Free cholesterol to total lipids ratio in large VLDL and AF



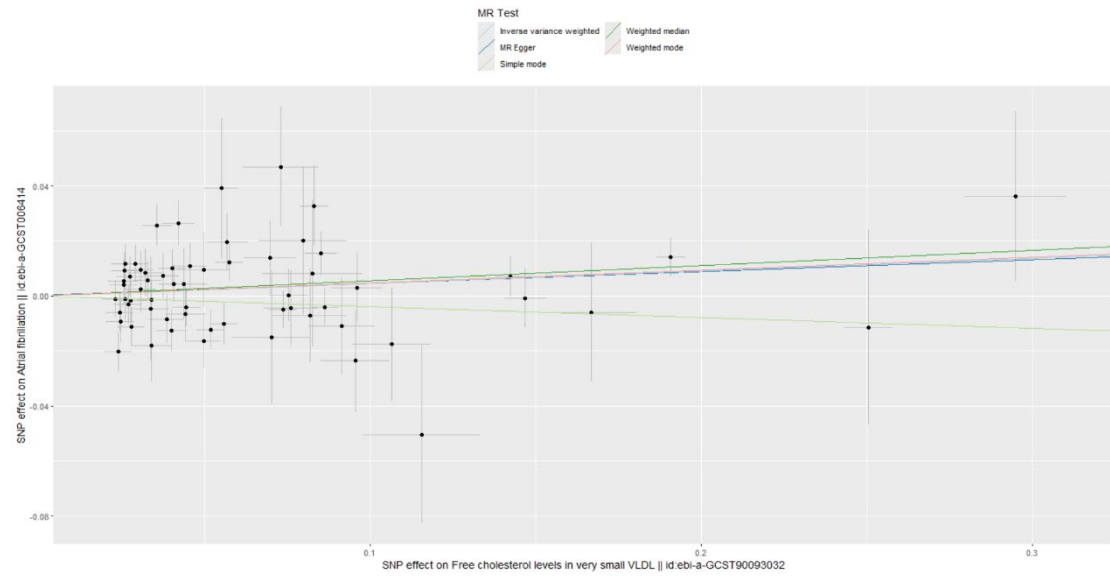
15) Free cholesterol to total lipids ratio in very large VLDL and AF



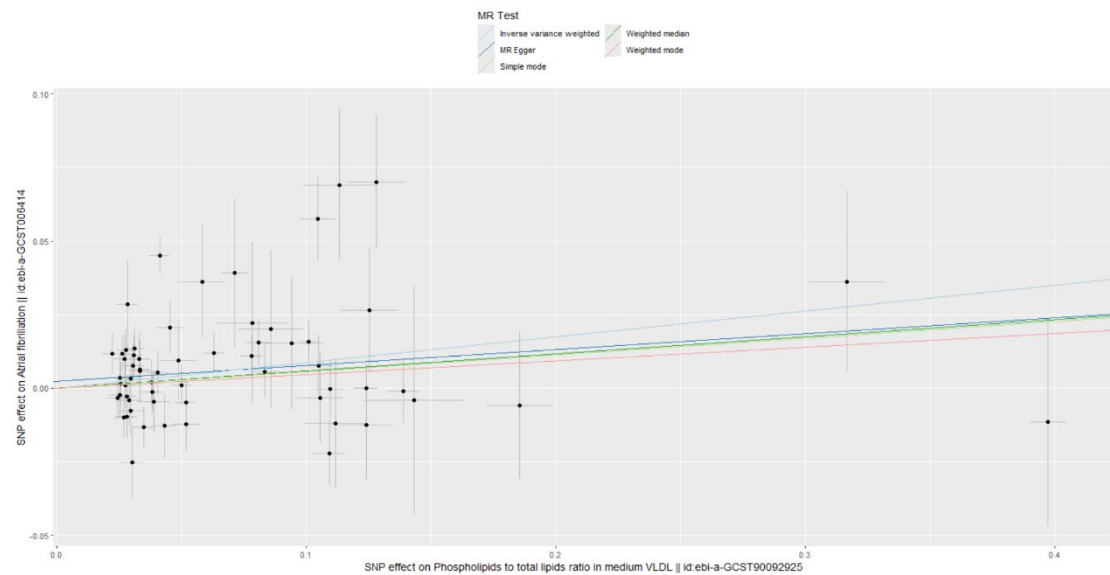
16) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



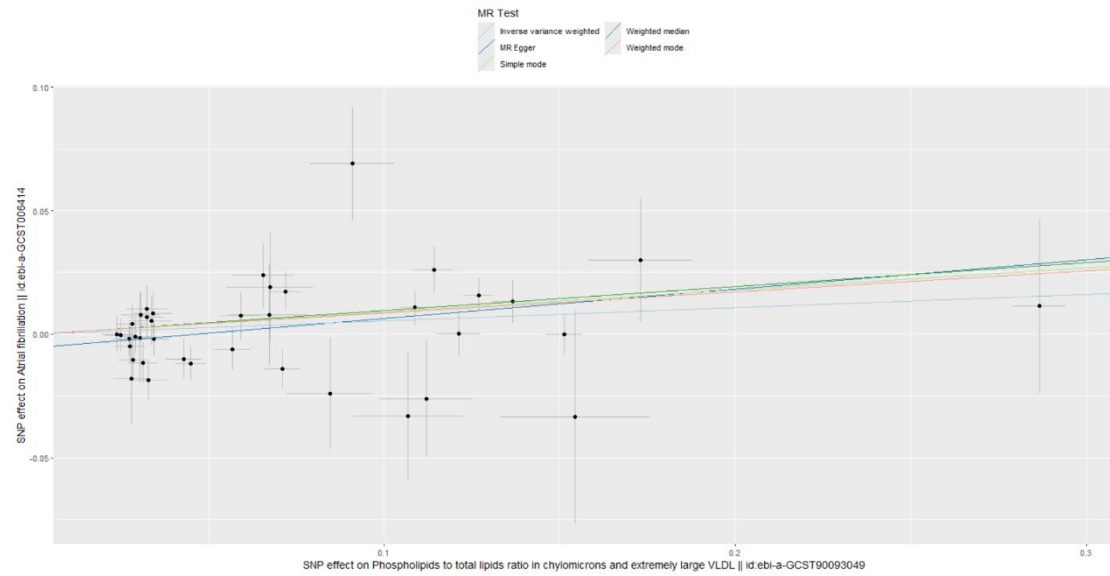
17) Free cholesterol levels in very small VLDL and AF



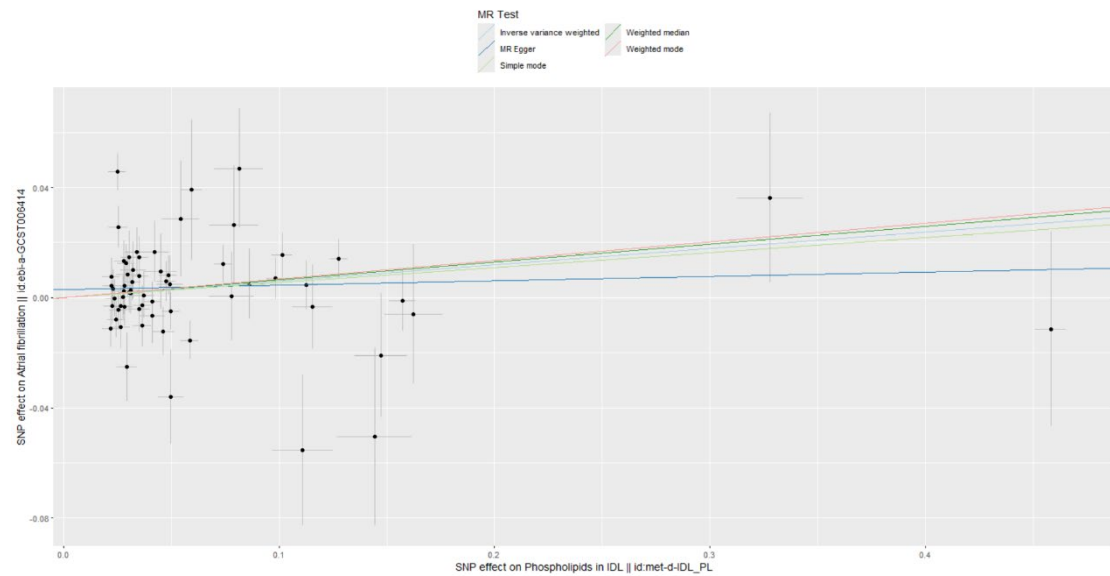
18) Phospholipids to total lipids ratio in medium VLDL and AF



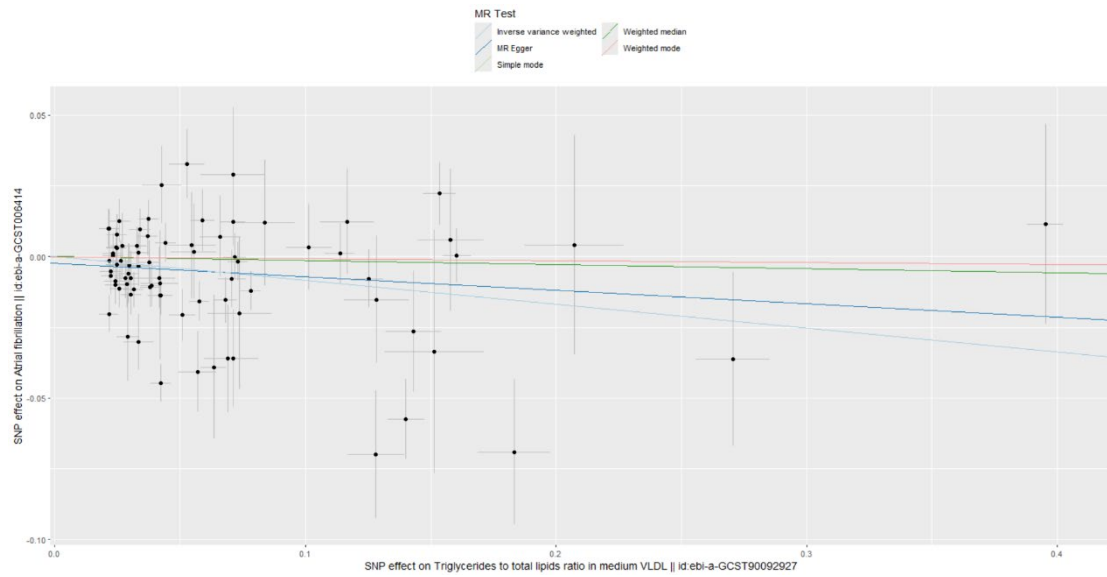
19) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL and AF



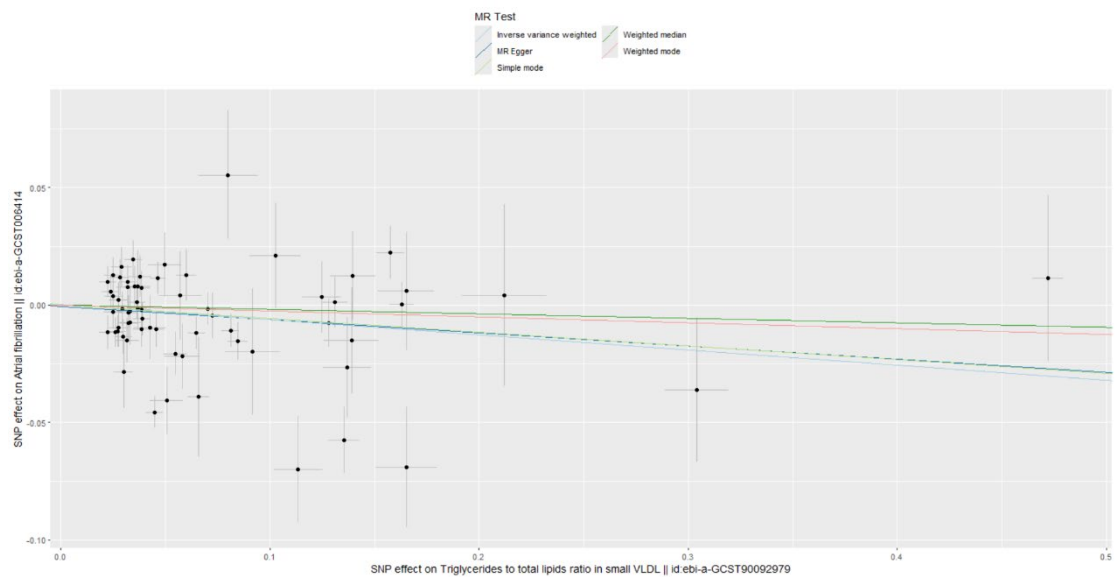
20) Phospholipids in IDL and AF



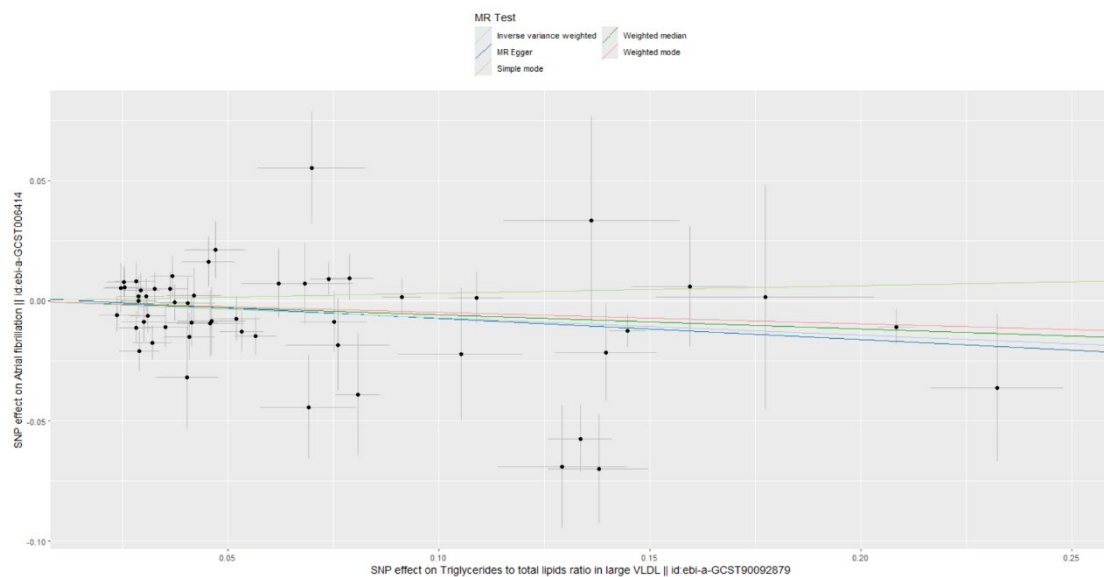
21) Triglycerides to total lipids ratio in medium VLDL and AF



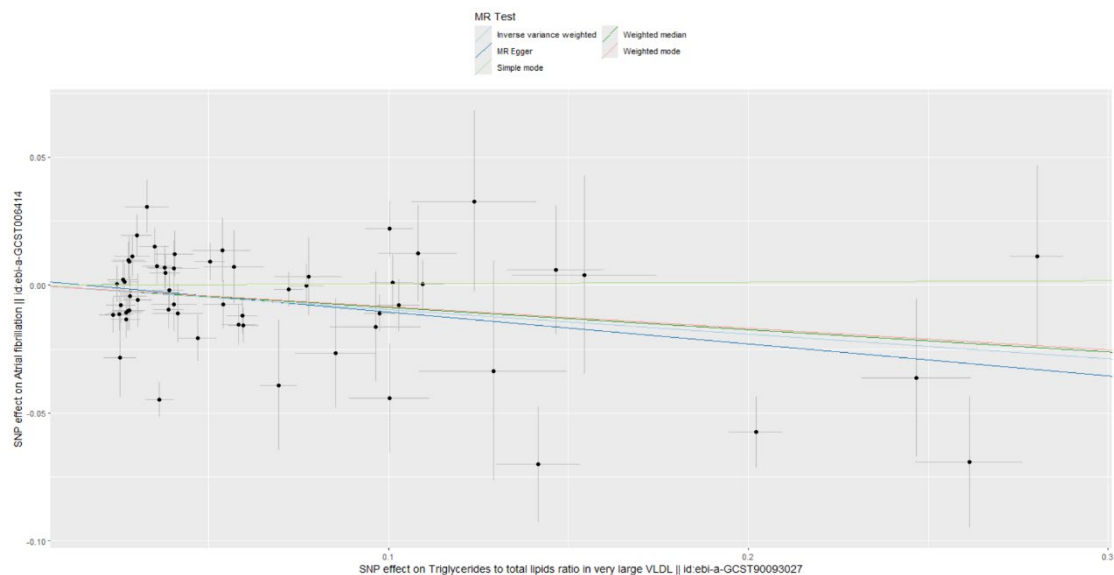
22) Triglycerides to total lipids ratio in small VLDL and AF



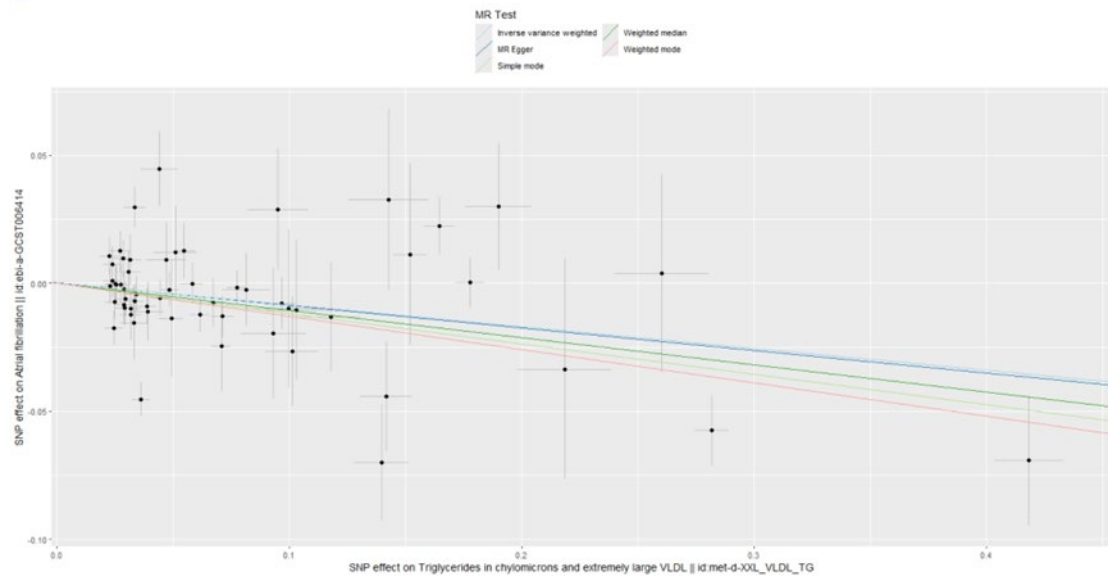
23) Triglycerides to total lipids ratio in large VLDL and AF



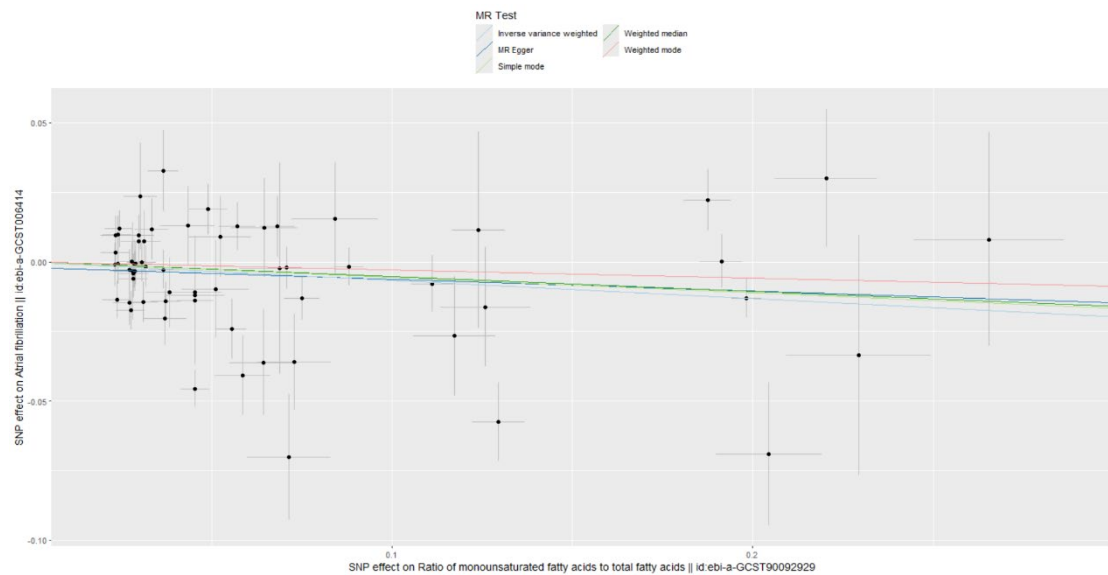
24) Triglycerides to total lipids ratio in very large VLDL and AF



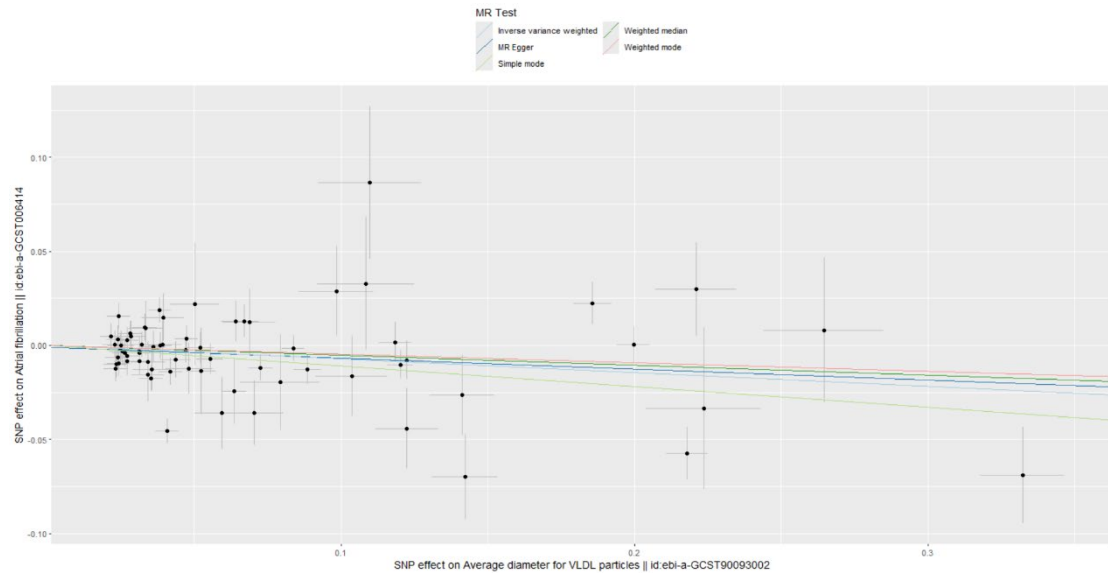
25) Triglycerides in chylomicrons and extremely large VLDL and AF



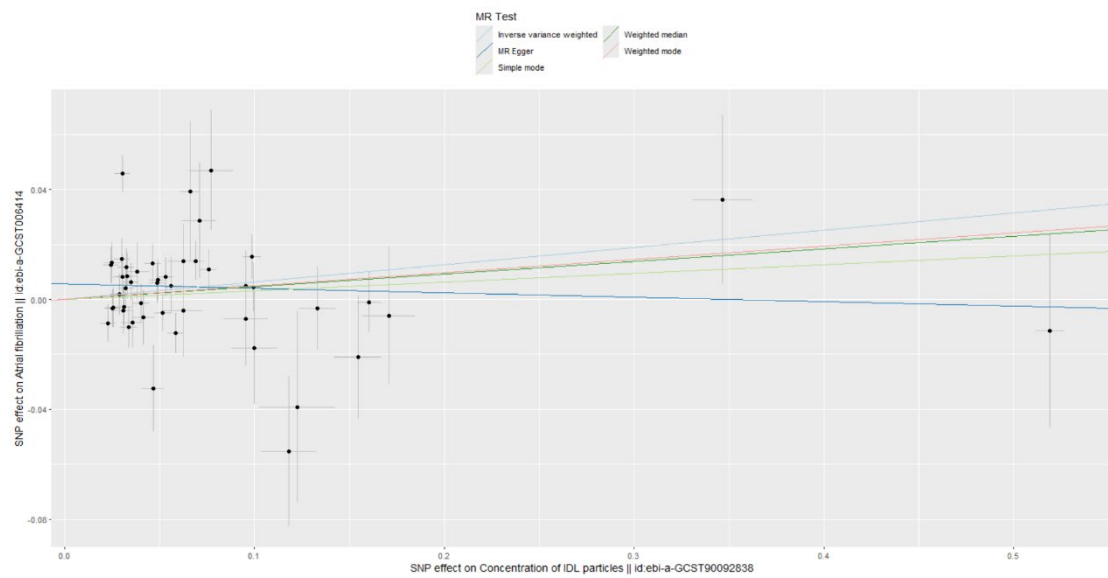
26) Ratio of monounsaturated fatty acids to total fatty acids and AF



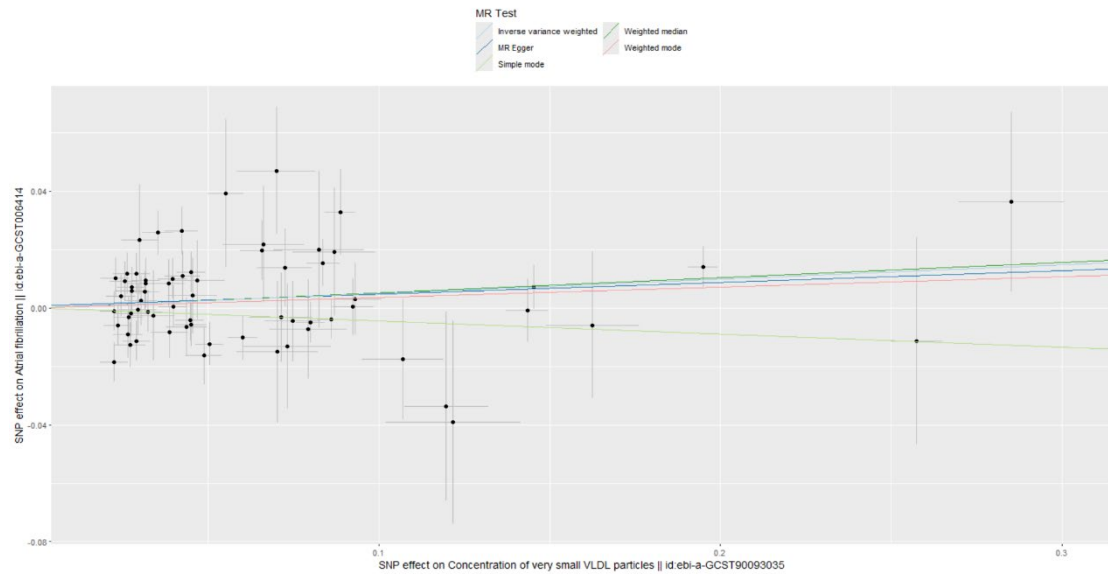
27) Average diameter for VLDL particles and AF



28) Concentration of IDL particles and AF



29) Concentration of very small VLDL particles and AF



30) Total lipids in chylomicrons and extremely large VLDL and AF

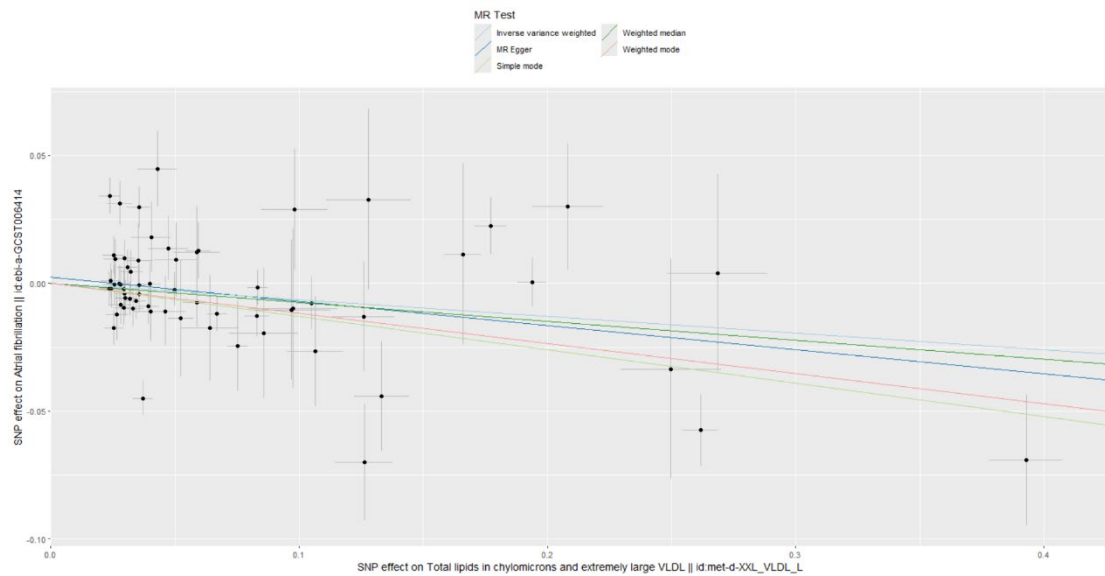
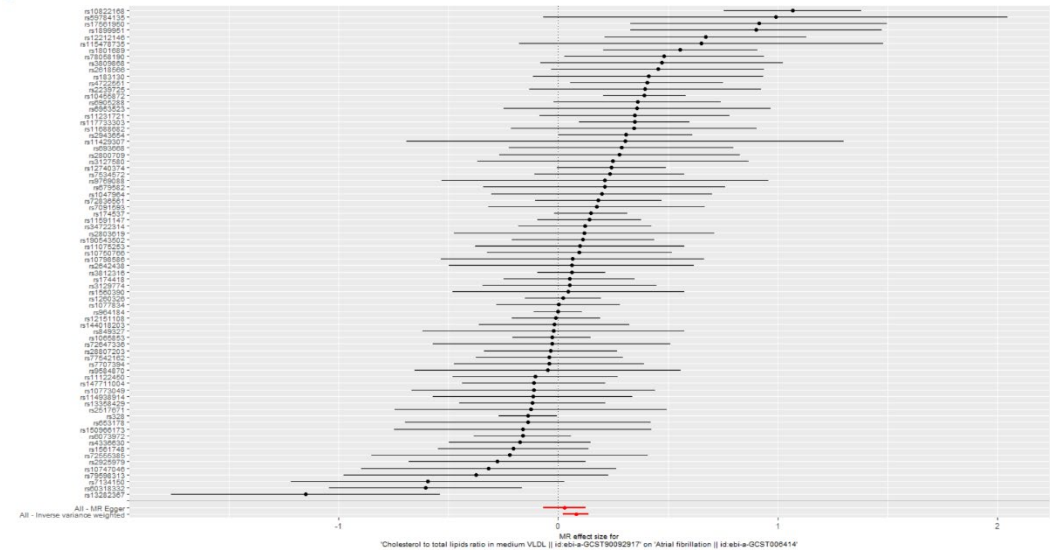
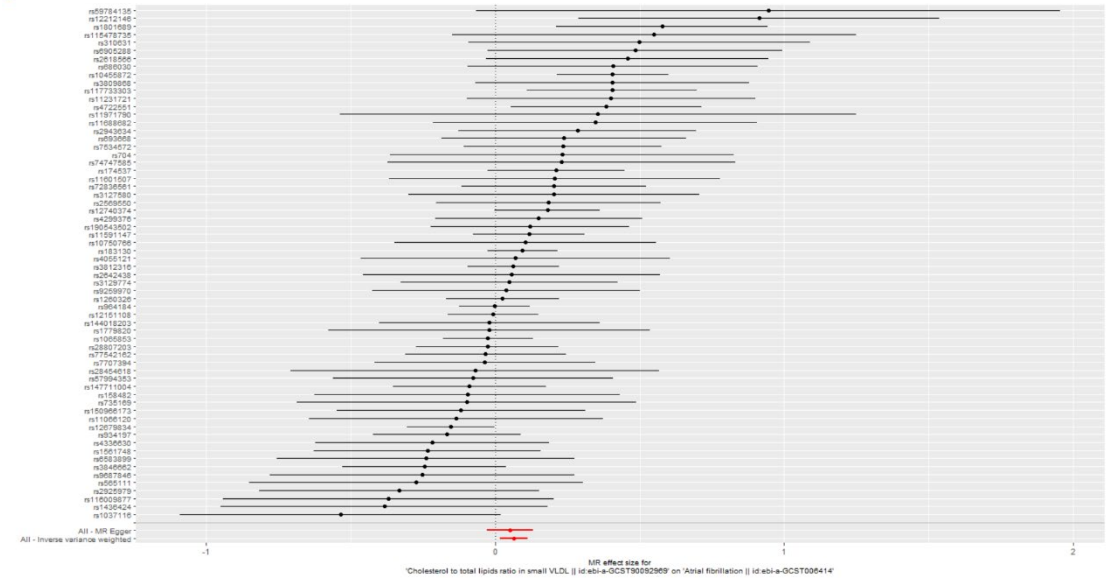


Figure S2 Forest plot of MR effect size using IVW methods for causal associations between lipid traits and atrial fibrillation.

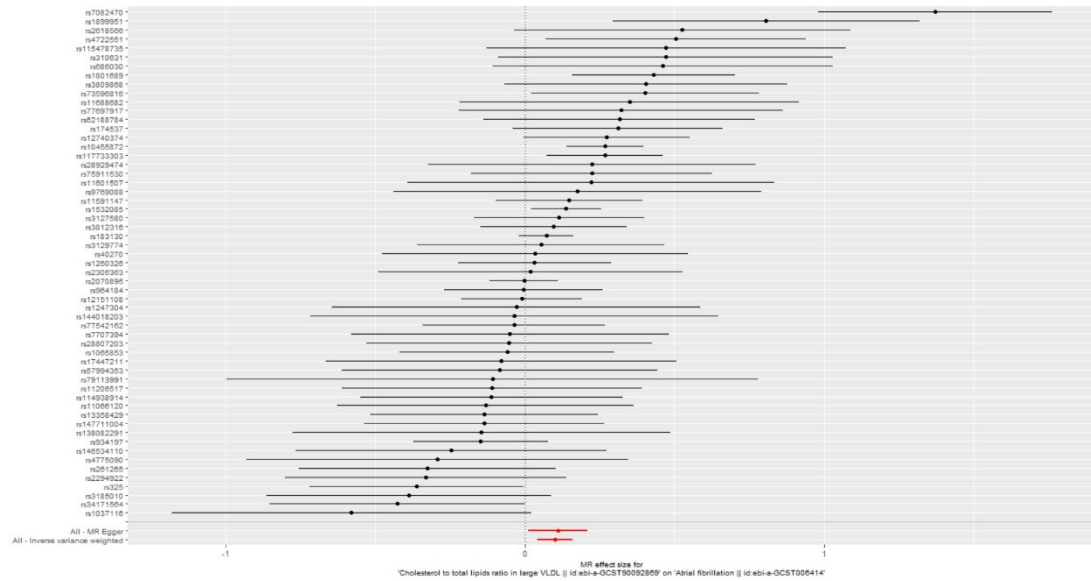
1) Cholesterol to total lipids ratio in medium VLDL and AF



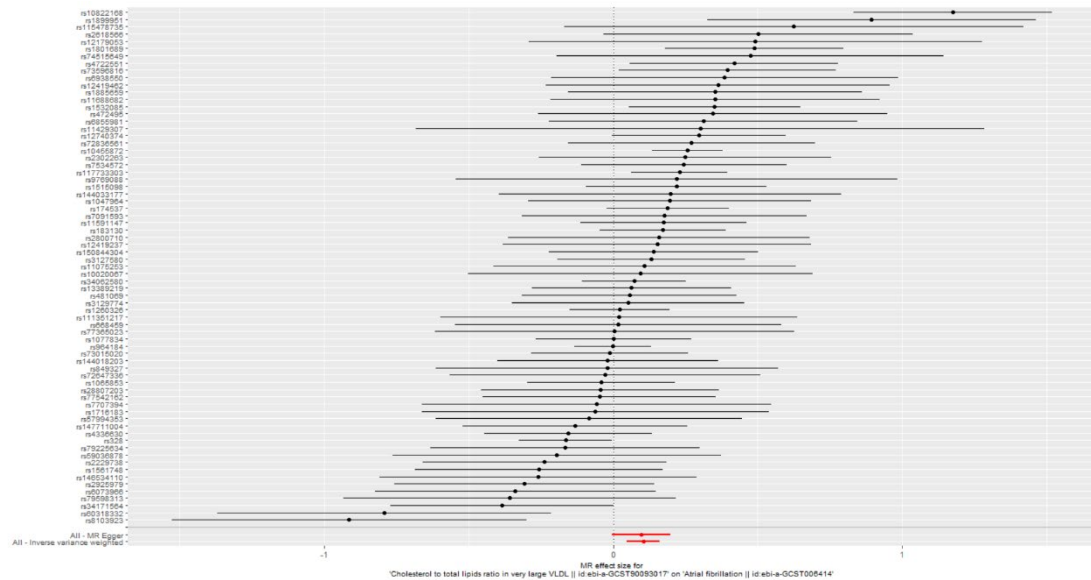
2) Cholesterol to total lipids ratio in small VLDL and AF



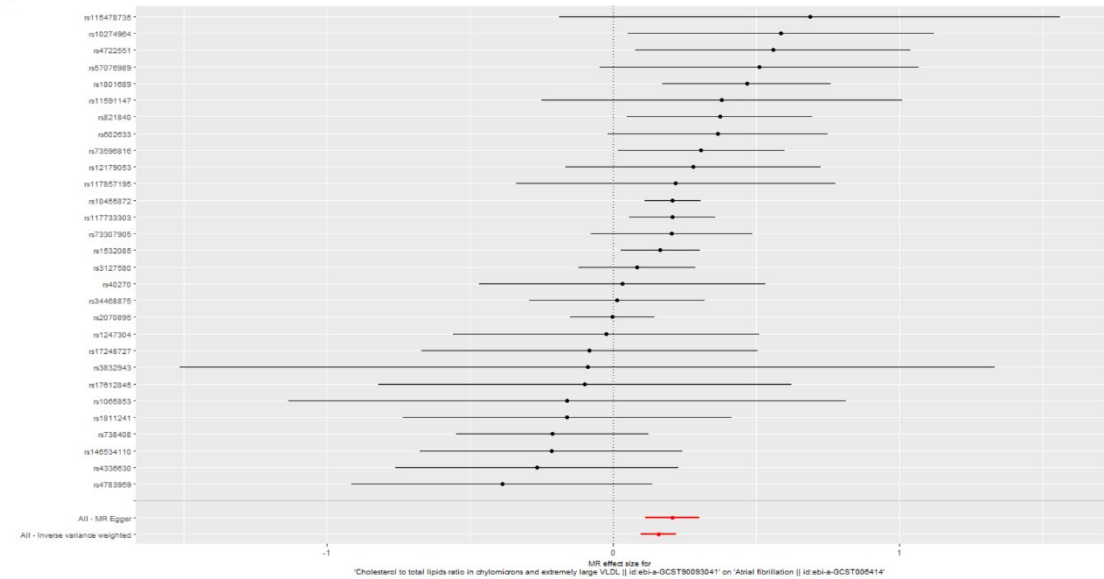
3) Cholesterol to total lipids ratio in large VLDL and AF



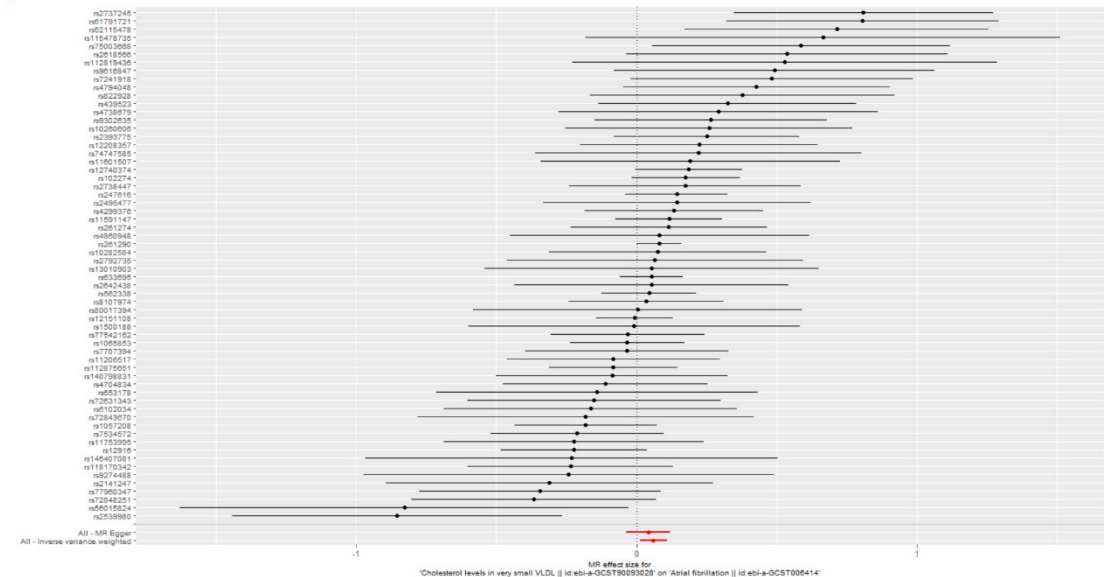
4) Cholesterol to total lipids ratio in very large VLDL and AF



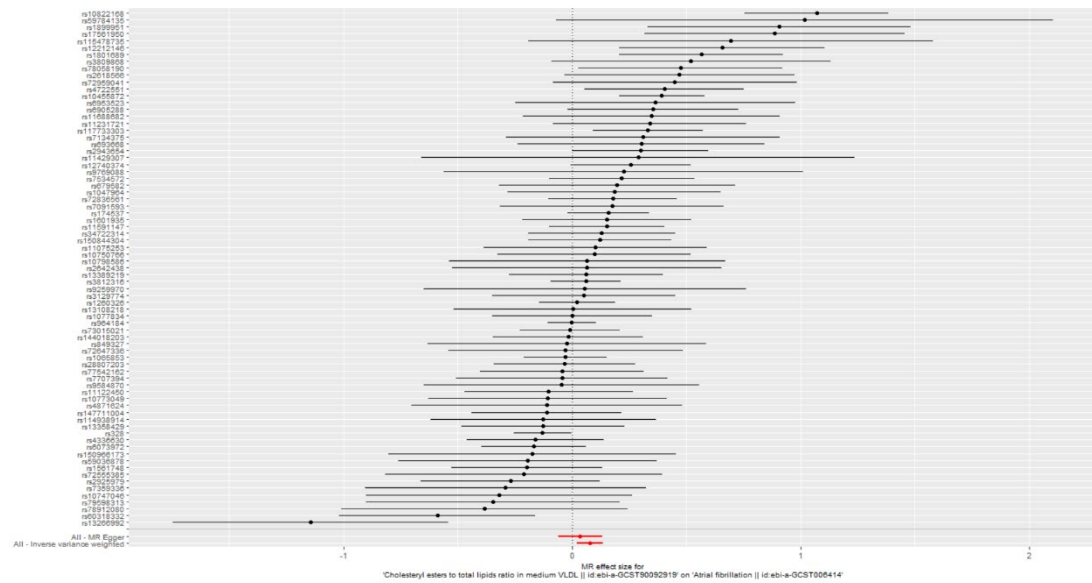
5) Cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



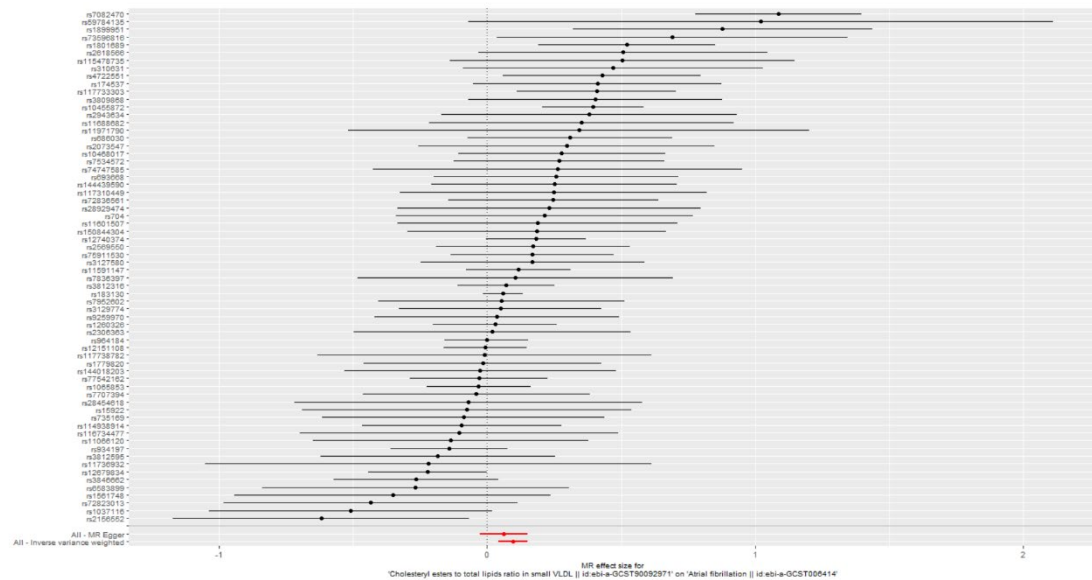
6) Cholesterol levels in very small VLDL and AF



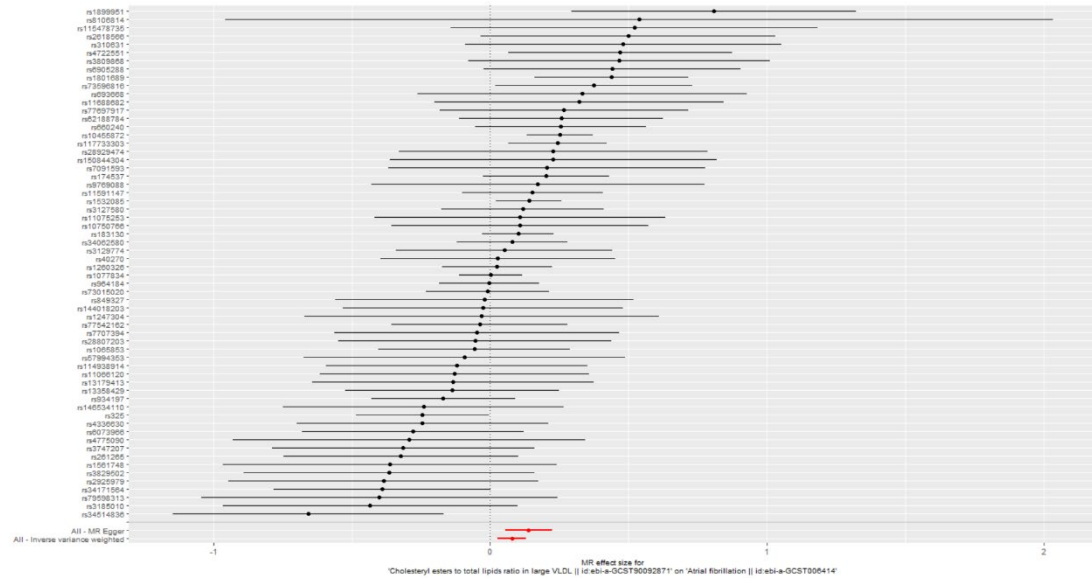
7) Cholesteryl esters to total lipids ratio in medium VLDL and AF



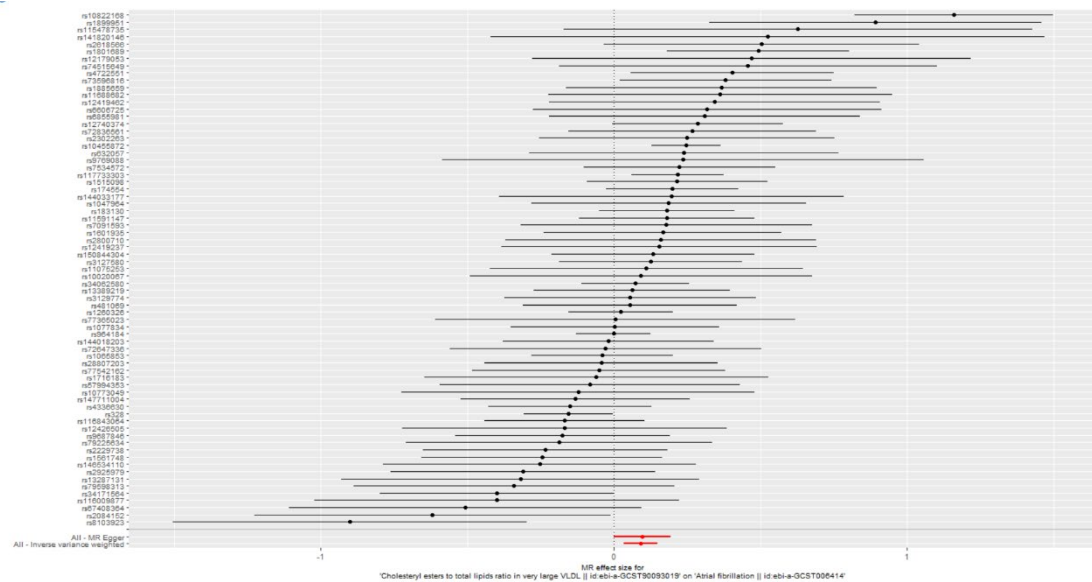
8) Cholesteryl esters to total lipids ratio in small VLDL and AF



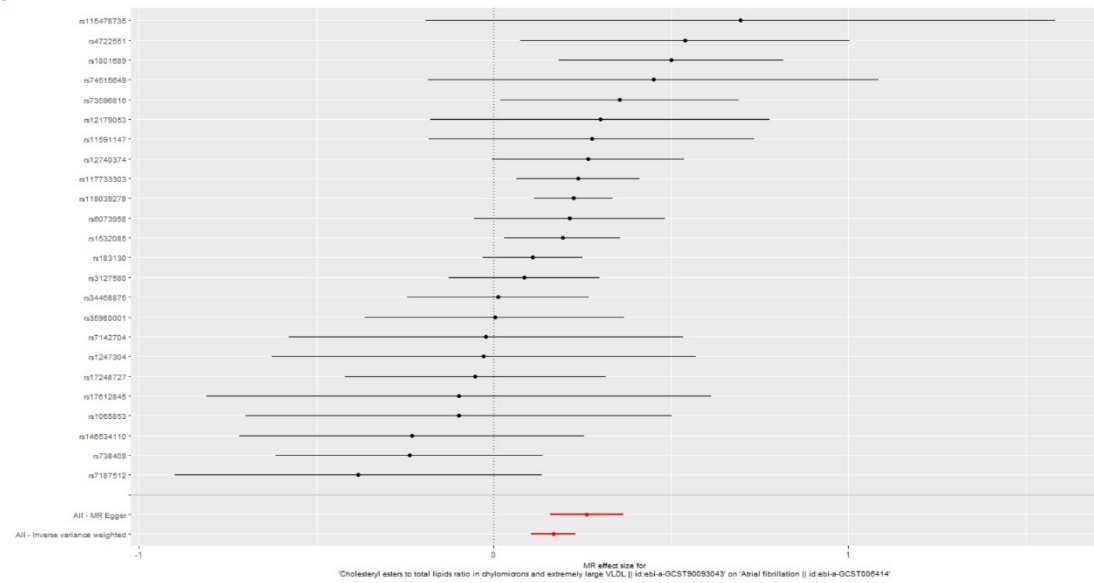
9) Cholesteryl esters to total lipids ratio in large VLDL and AF



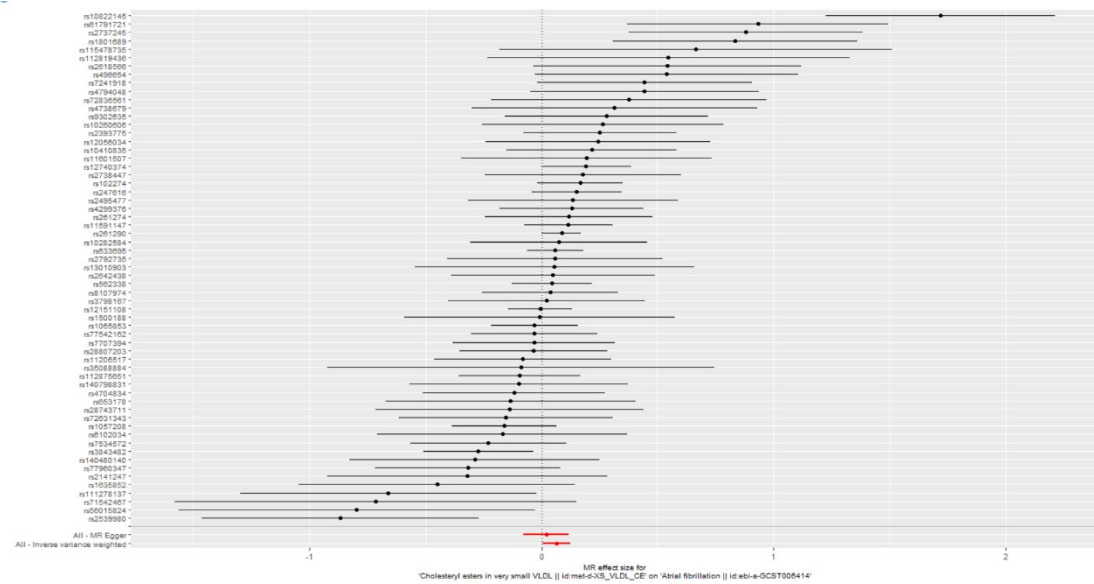
10) Cholesteryl esters to total lipids ratio in very large VLDL and AF



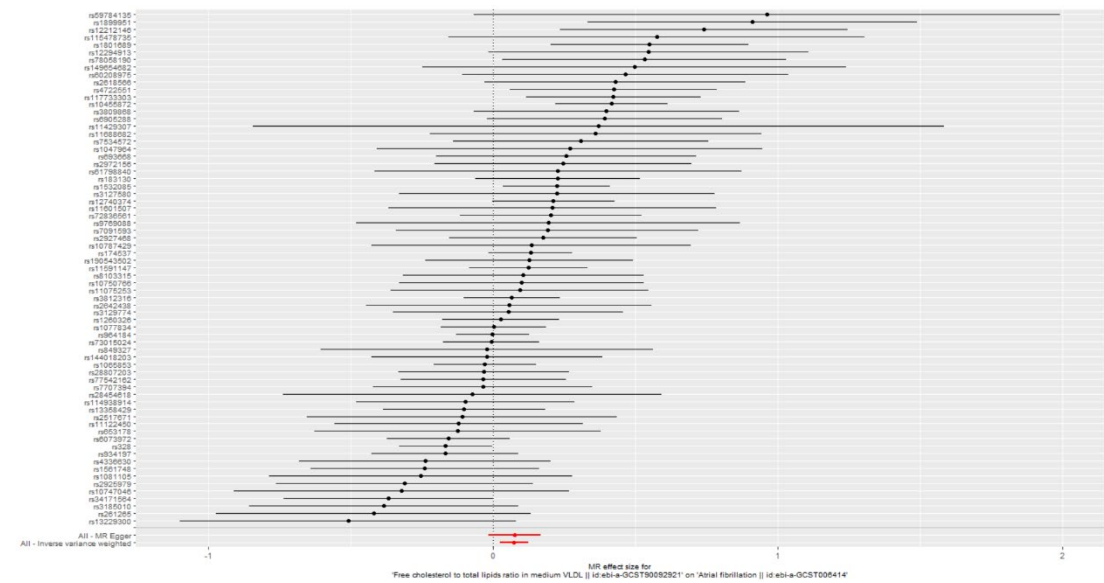
11) Cholesteryl esters to total lipids ratio in chylomicrons and extremely large VLDL and AF



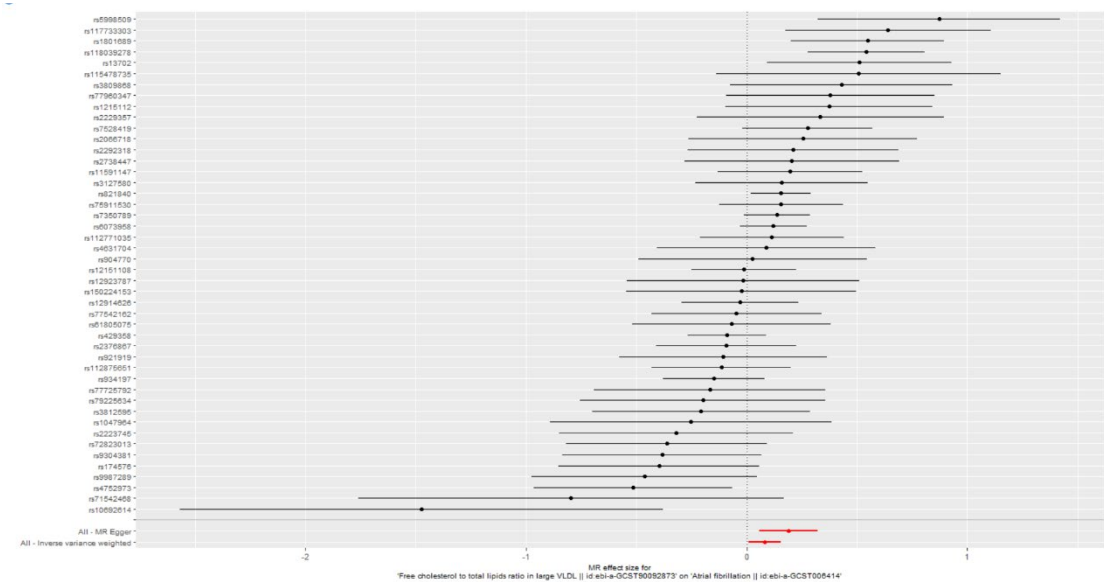
12) Cholesteryl esters in very small VLDL and AF



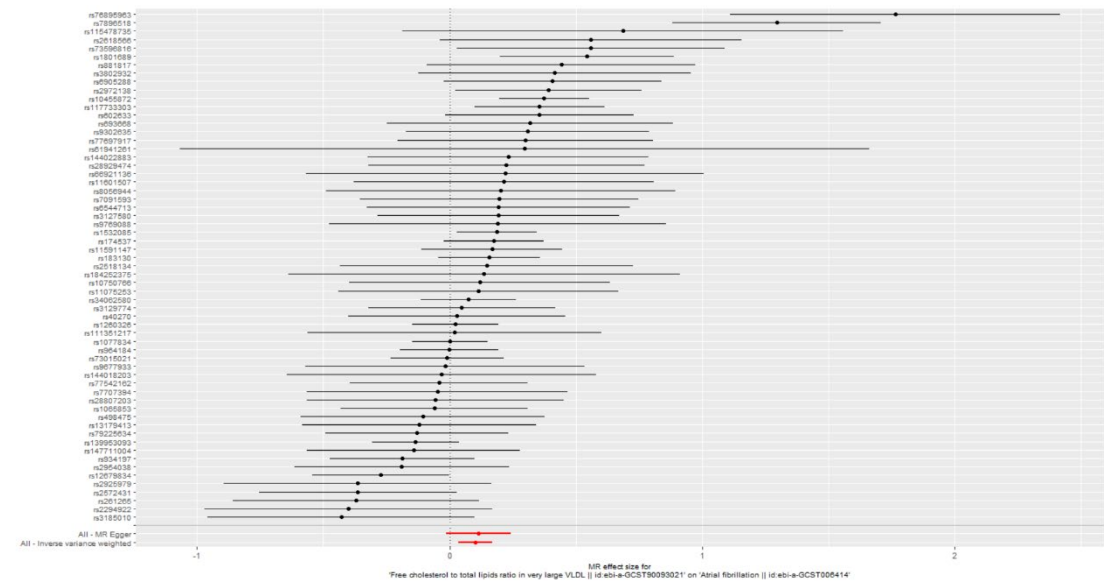
13) Free cholesterol to total lipids ratio in medium VLDL and AF



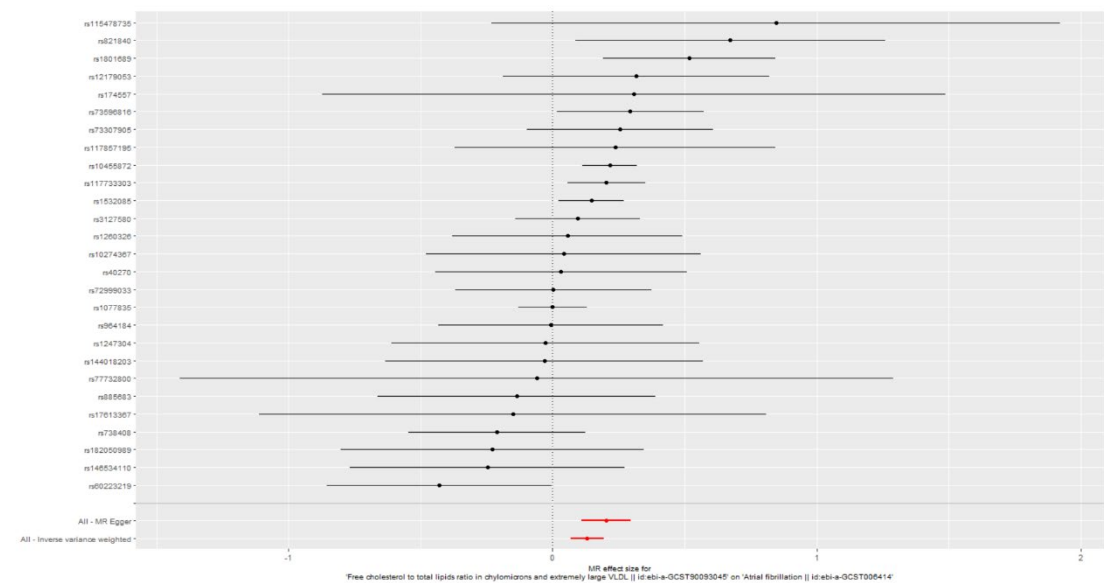
14) Free cholesterol to total lipids ratio in large VLDL and AF



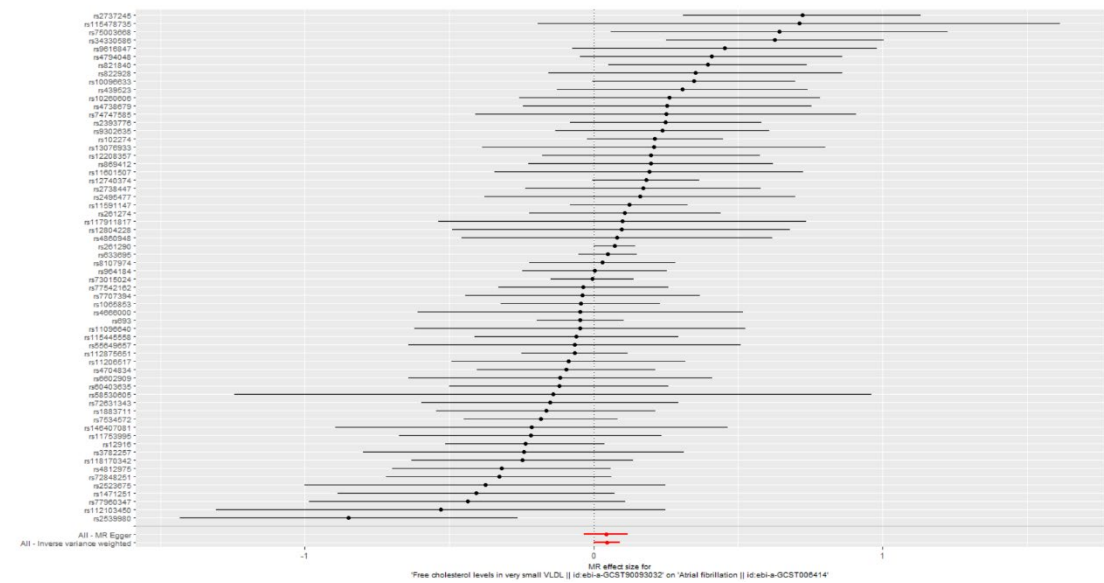
15) Free cholesterol to total lipids ratio in very large VLDL and AF



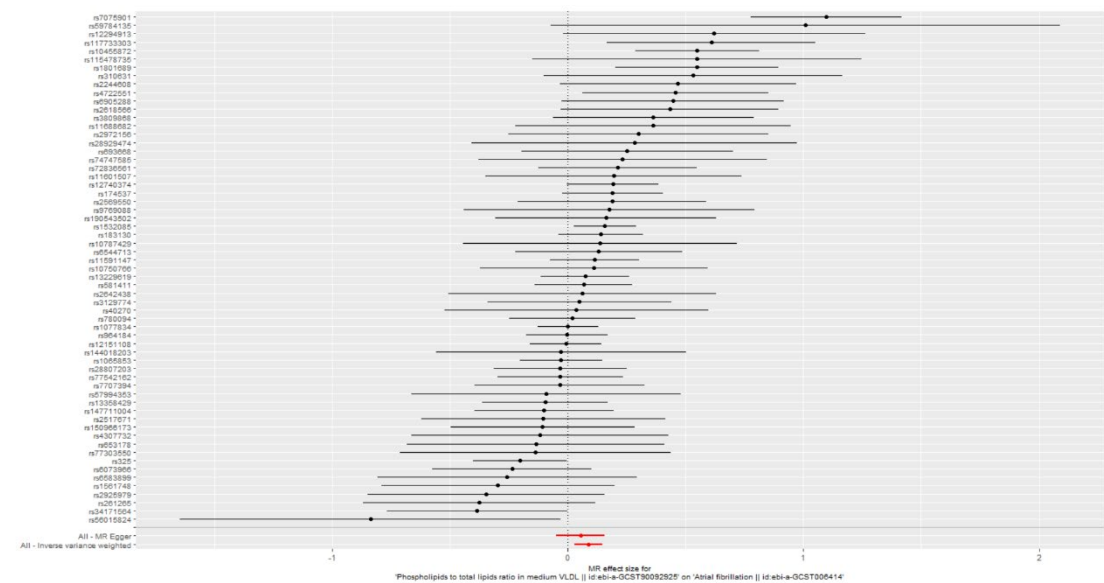
16) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



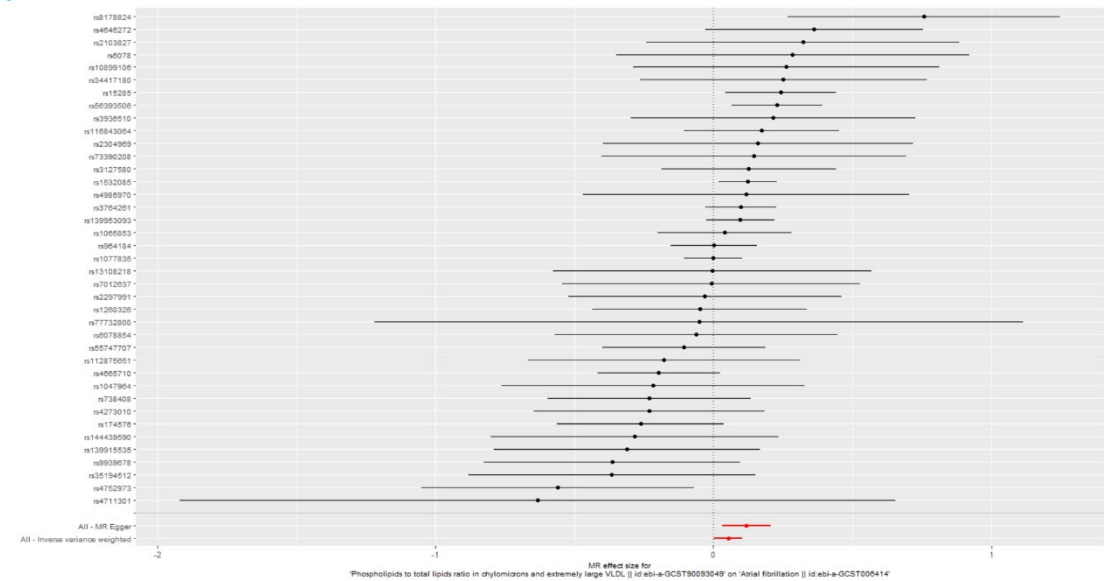
17) Free cholesterol levels in very small VLDL and AF



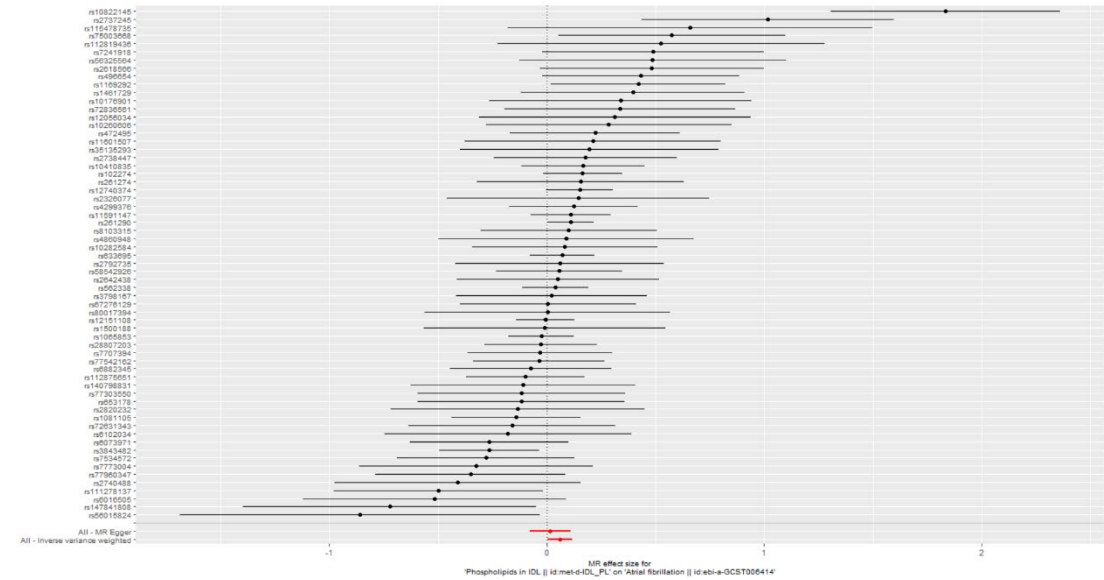
18) Phospholipids to total lipids ratio in medium VLDL and AF



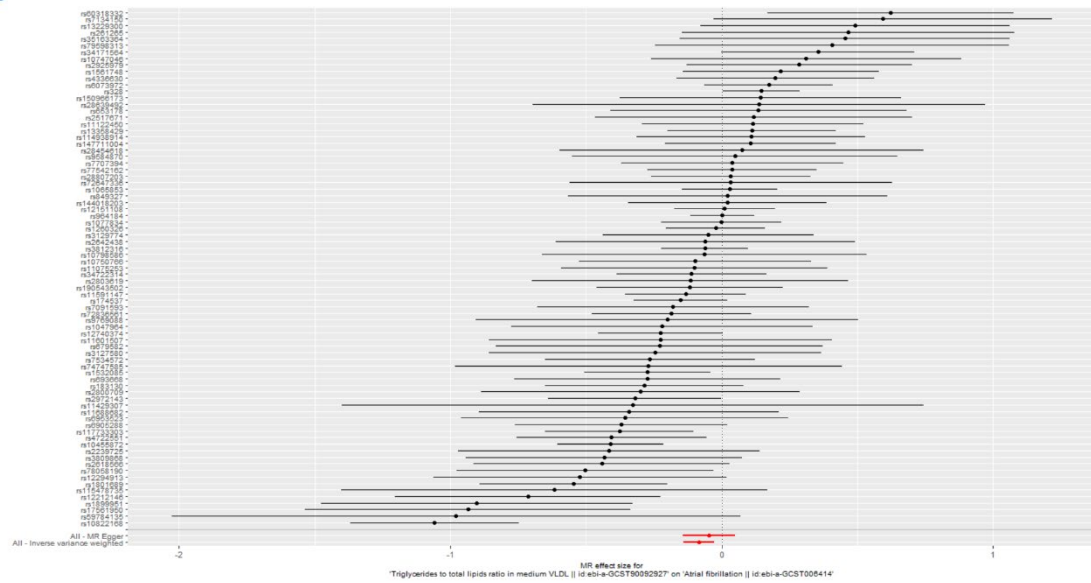
19) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL and AF



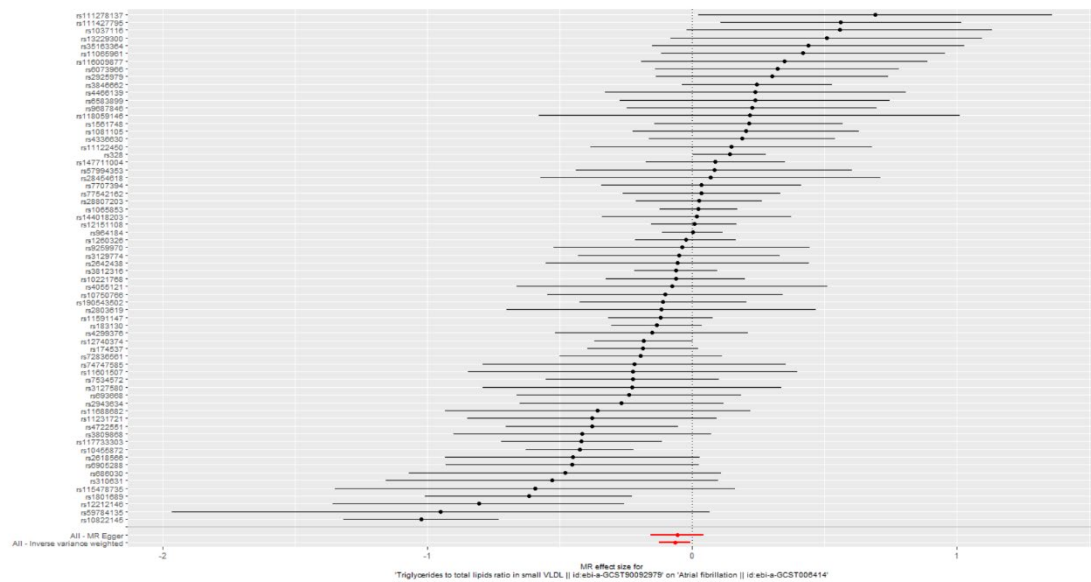
20) Phospholipids in IDL and AF



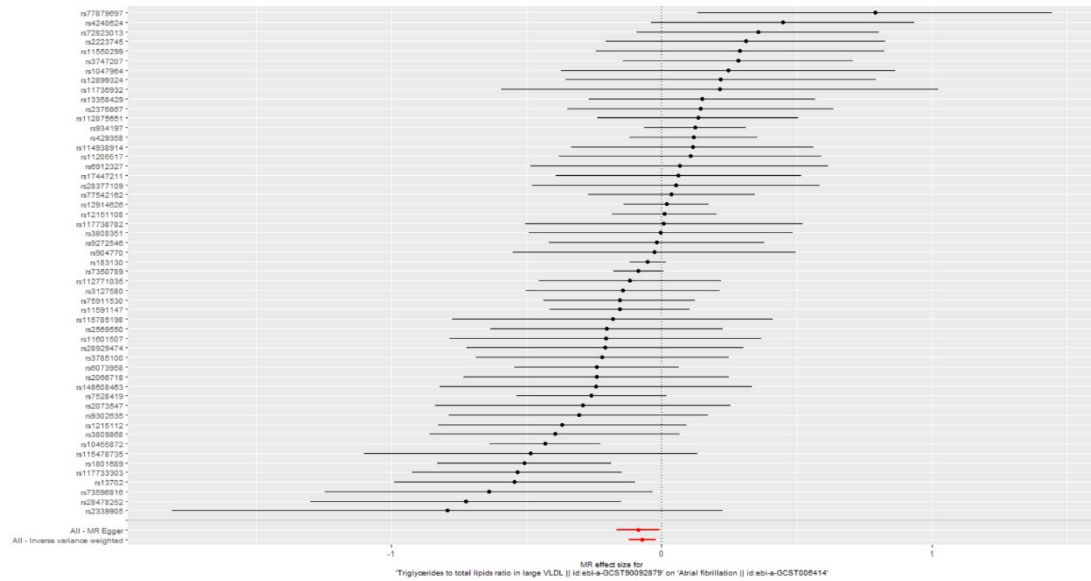
21) Triglycerides to total lipids ratio in medium VLDL and AF



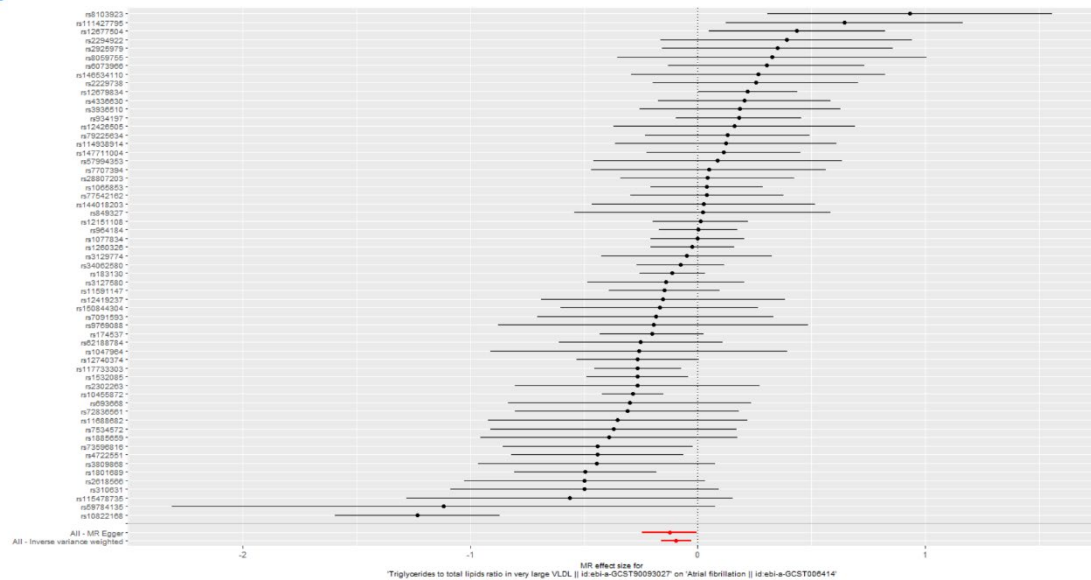
22) Triglycerides to total lipids ratio in small VLDL and AF



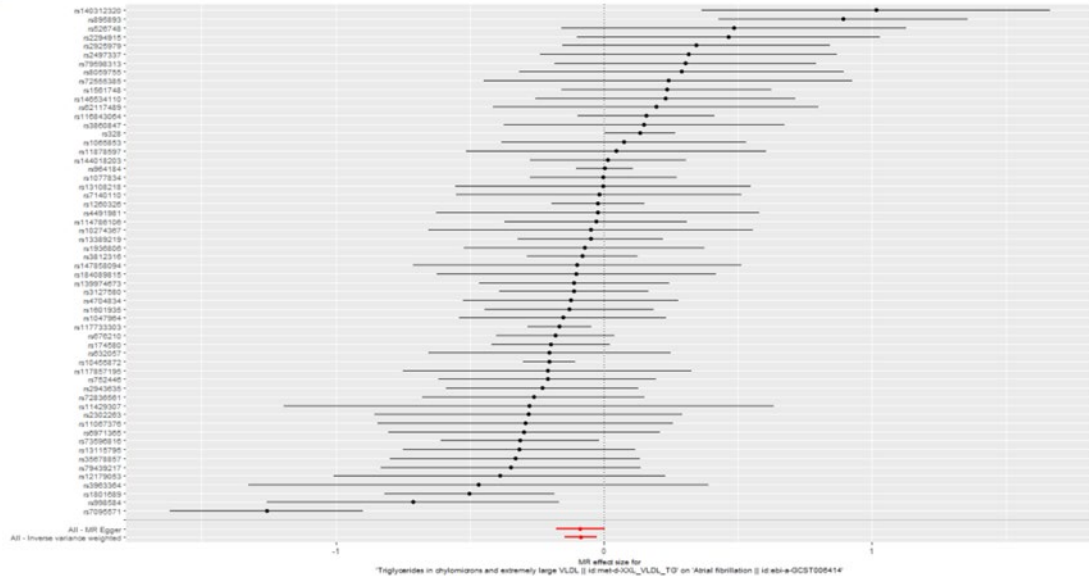
23) Triglycerides to total lipids ratio in large VLDL and AF



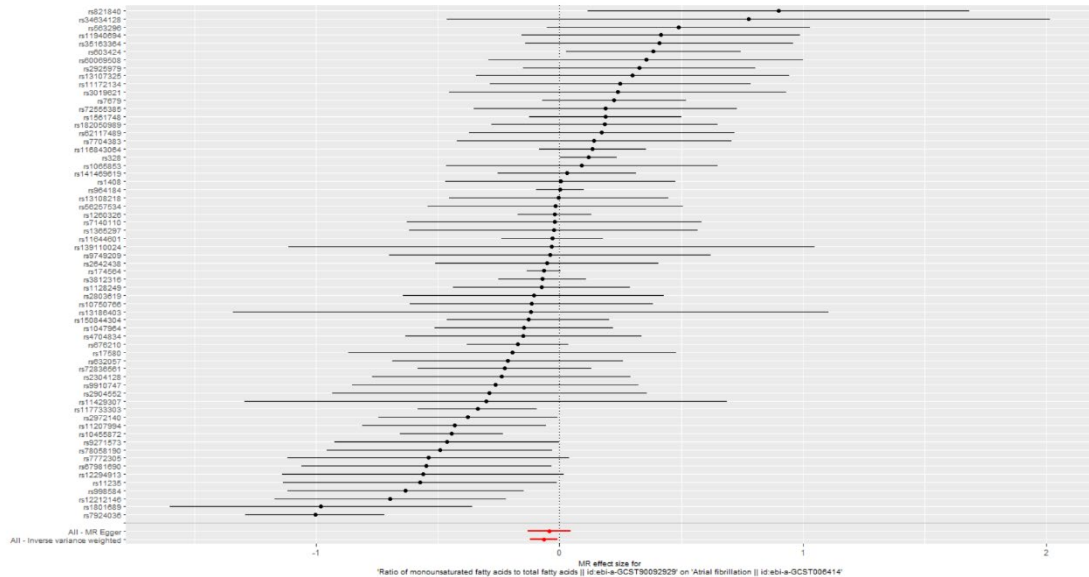
24) Triglycerides to total lipids ratio in very large VLDL and AF



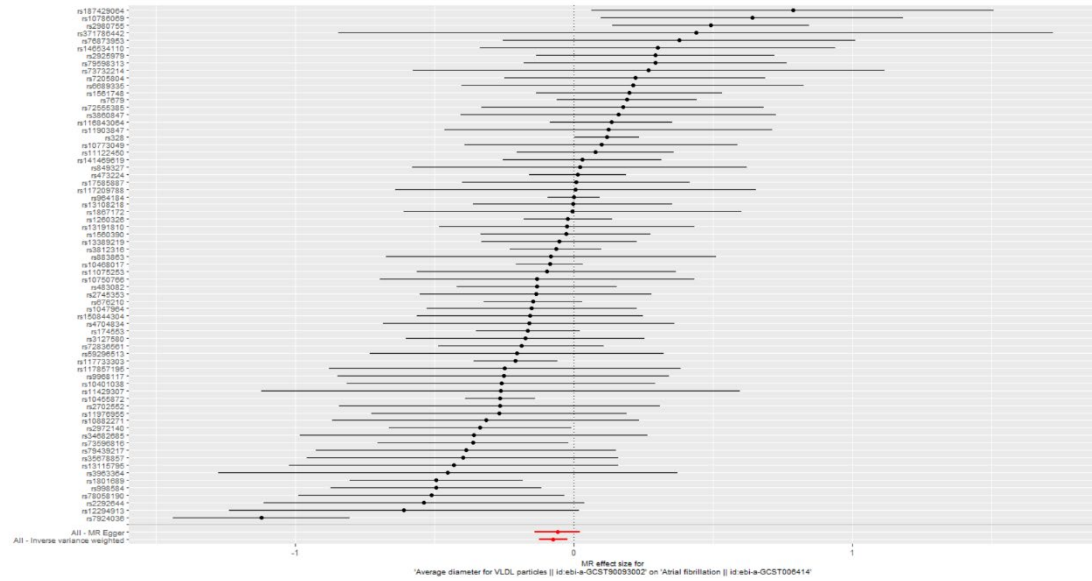
25) Triglycerides in chylomicrons and extremely large VLDL and AF



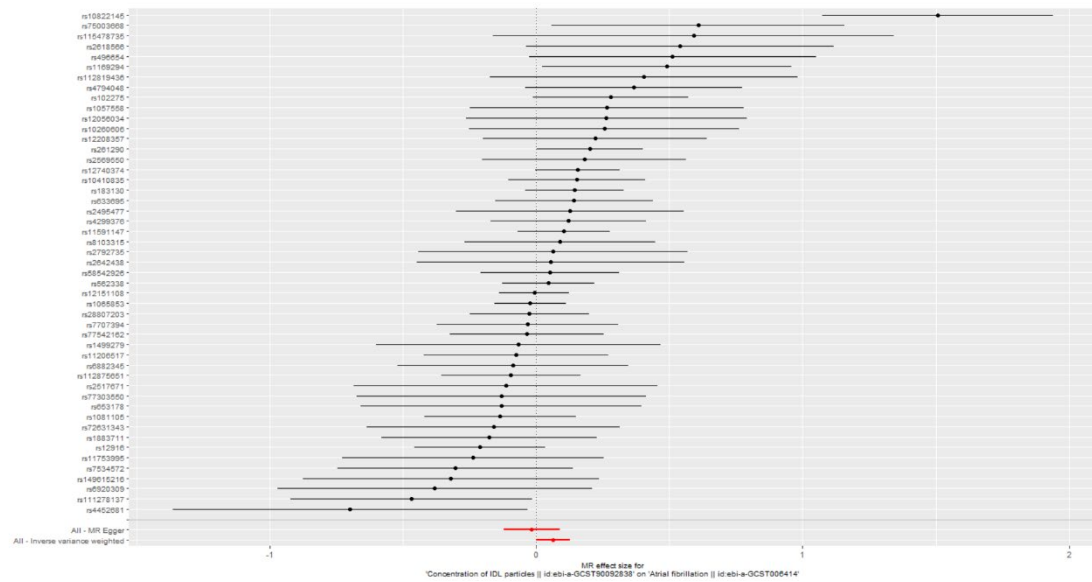
26) Ratio of monounsaturated fatty acids to total fatty acids and AF



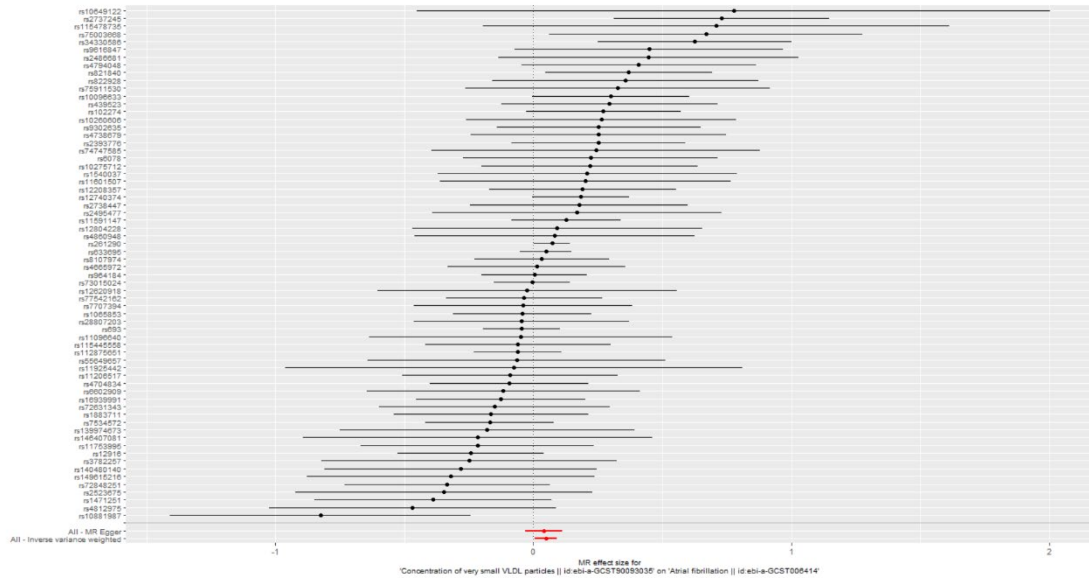
27) Average diameter for VLDL particles and AF



28) Concentration of IDL particles and AF



29) Concentration of very small VLDL particles and AF



30) Total lipids in chylomicrons and extremely large VLDL and AF

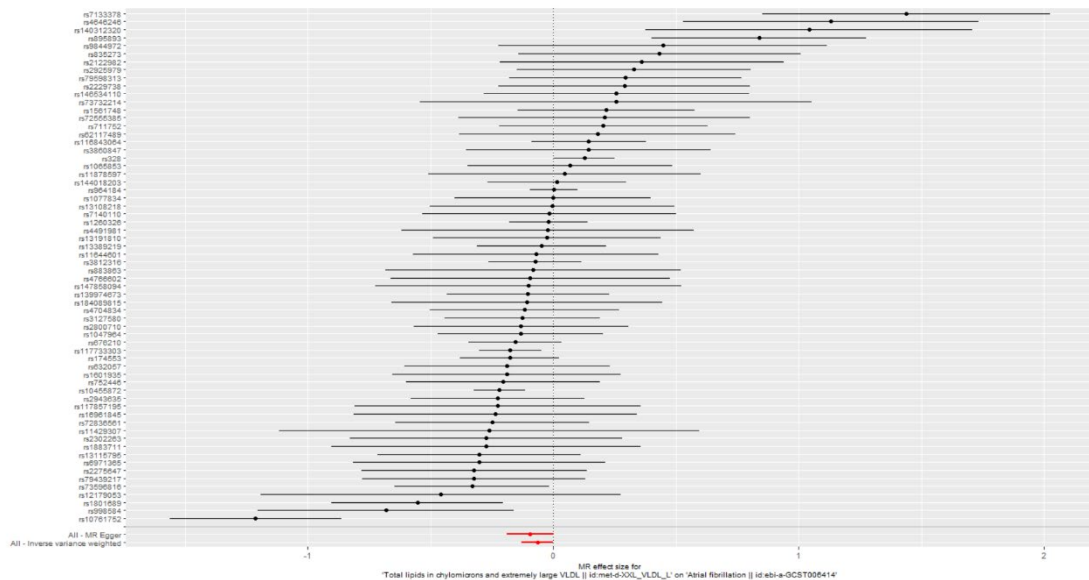
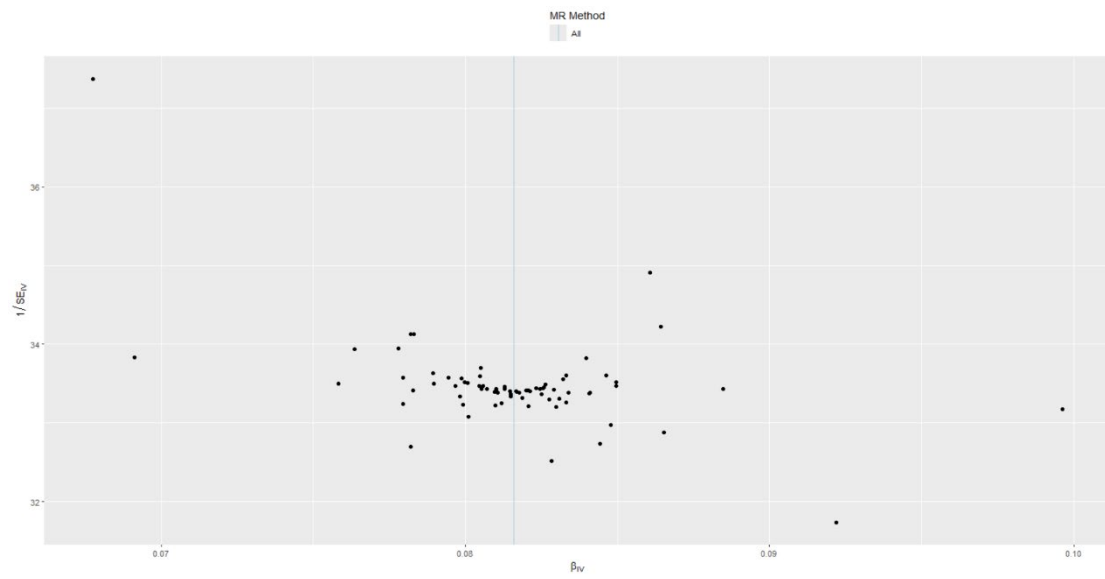
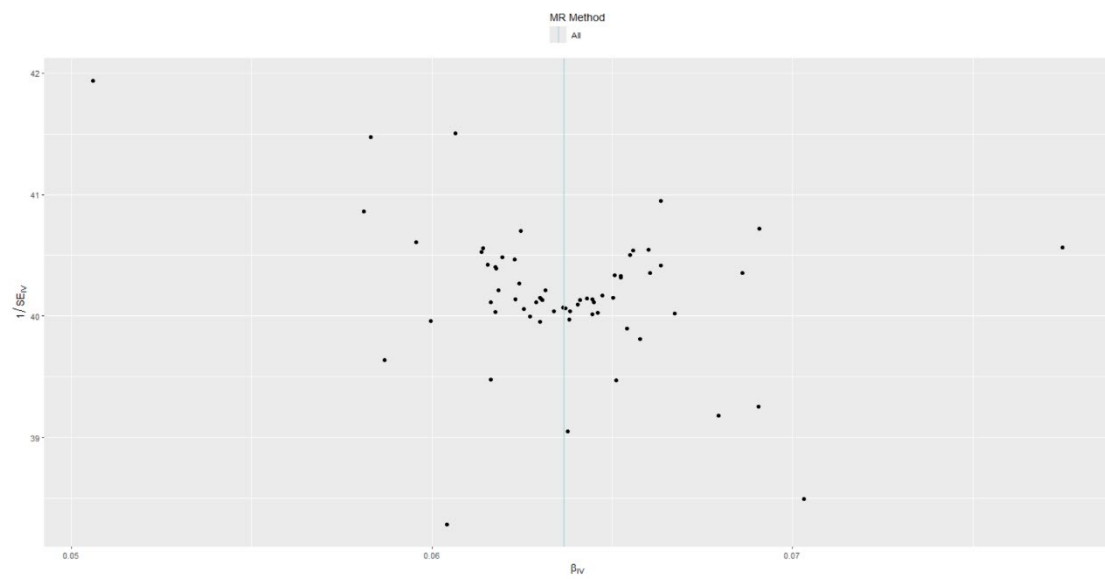


Figure S3 Funnel plot of causal associations between lipid traits and atrial fibrillation.

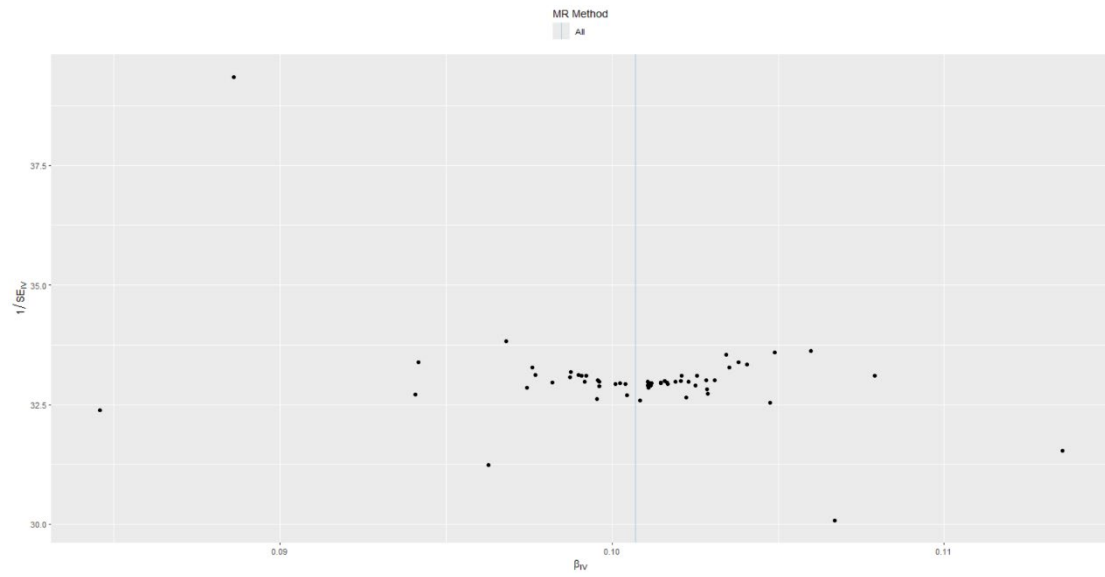
1) Cholesterol to total lipids ratio in medium VLDL and AF



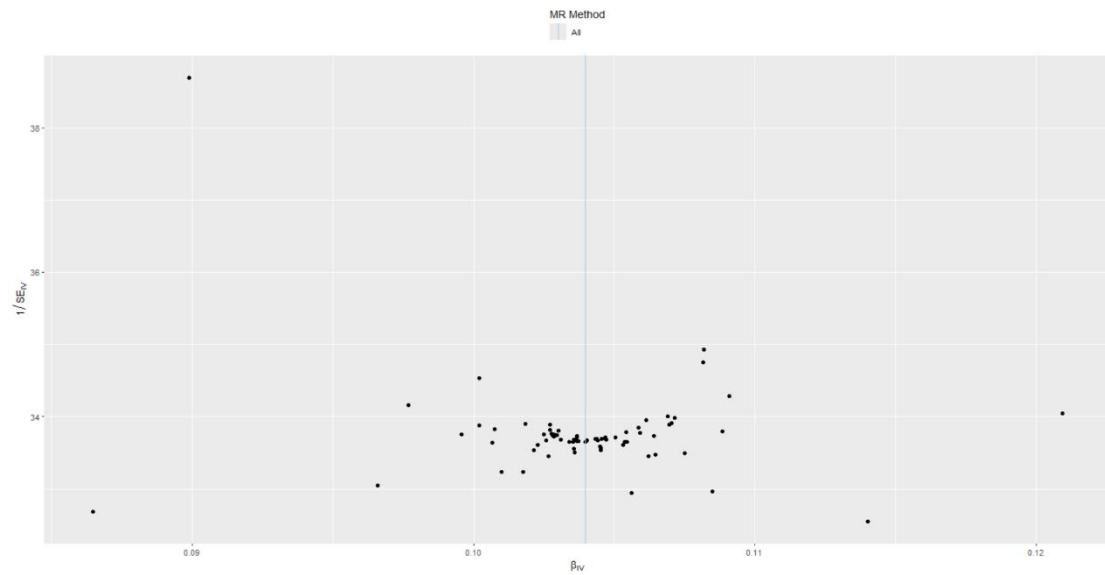
2) Cholesterol to total lipids ratio in small VLDL and AF



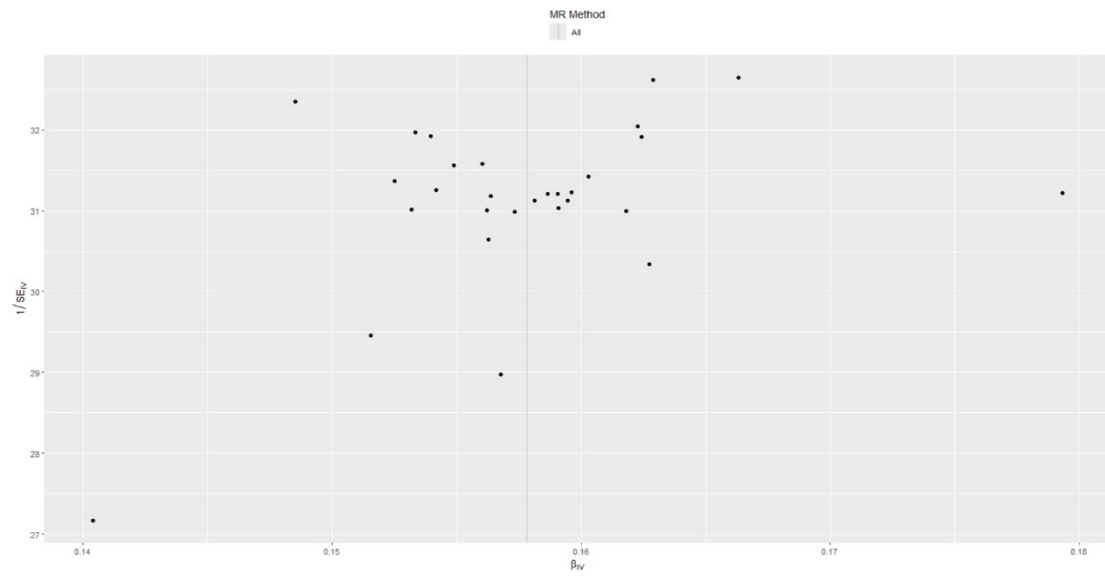
3) Cholesterol to total lipids ratio in large VLDL and AF



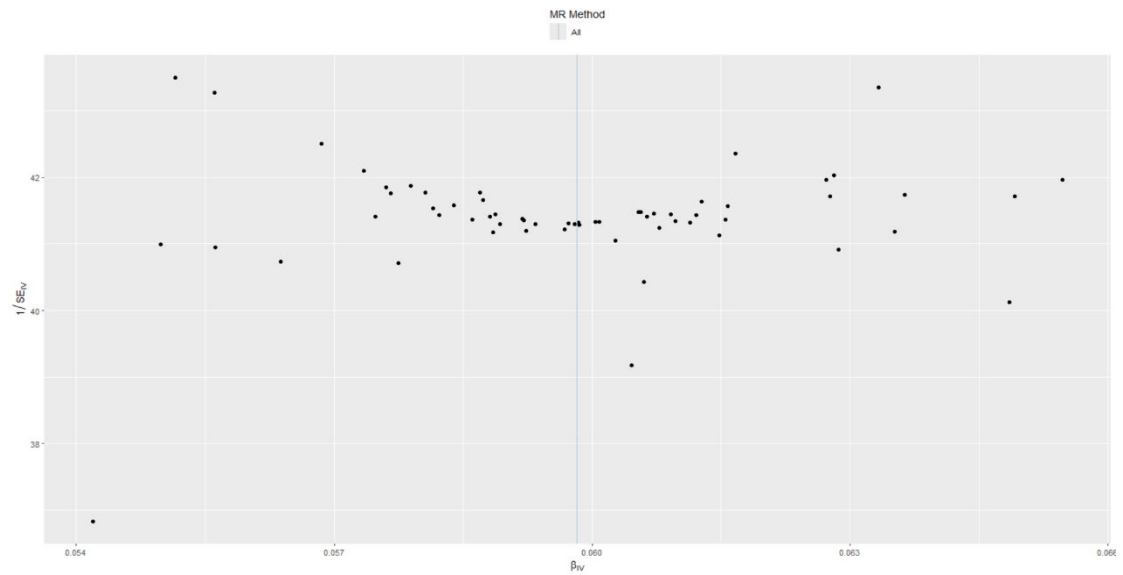
4) Cholesterol to total lipids ratio in very large VLDL and AF



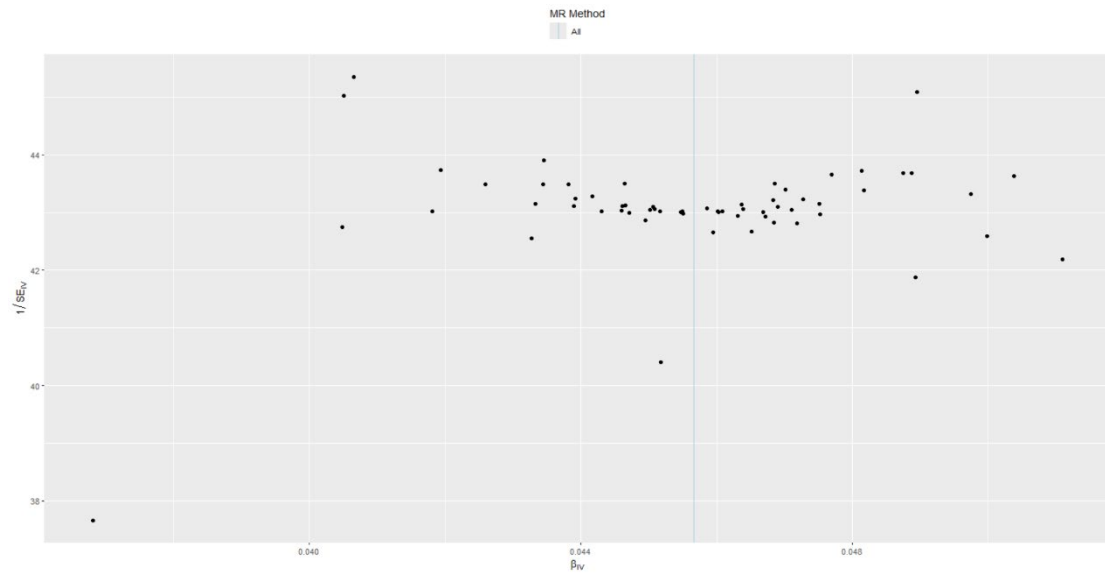
5) Cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



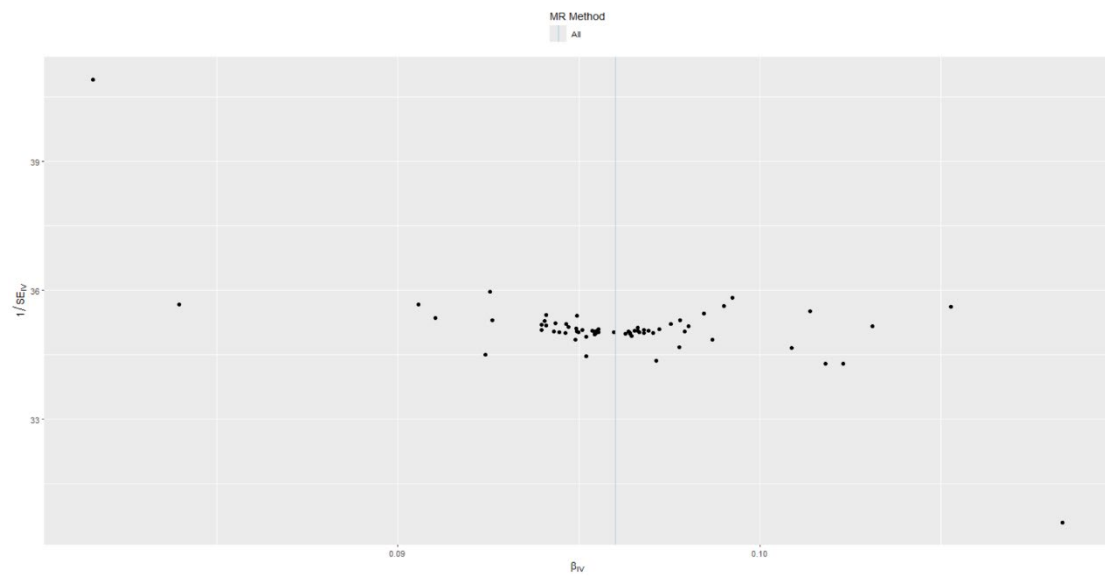
6) Cholesterol levels in very small VLDL and AF



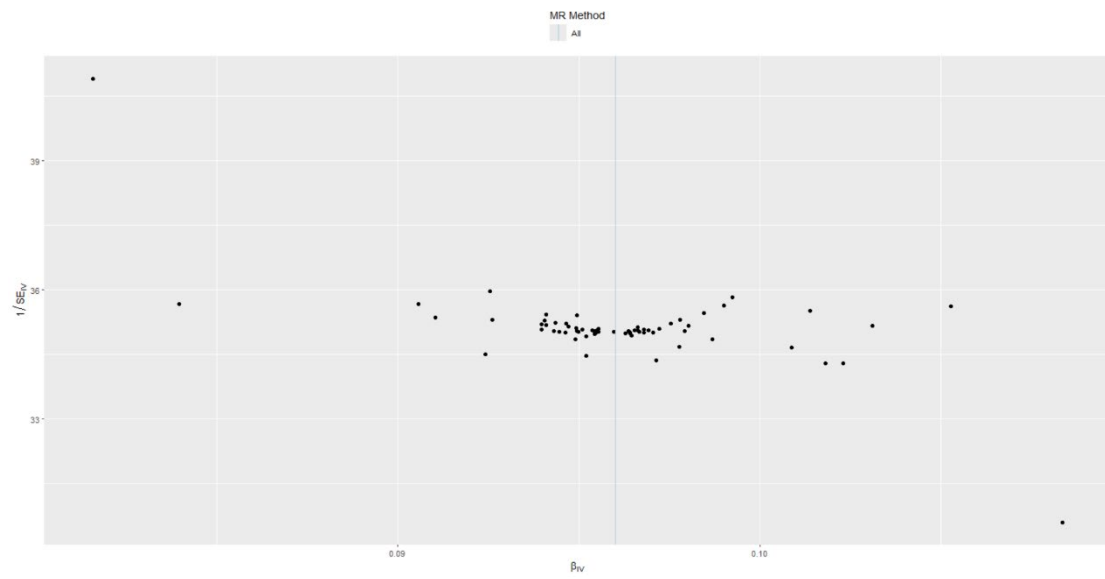
7) Cholesteryl esters to total lipids ratio in medium VLDL and AF



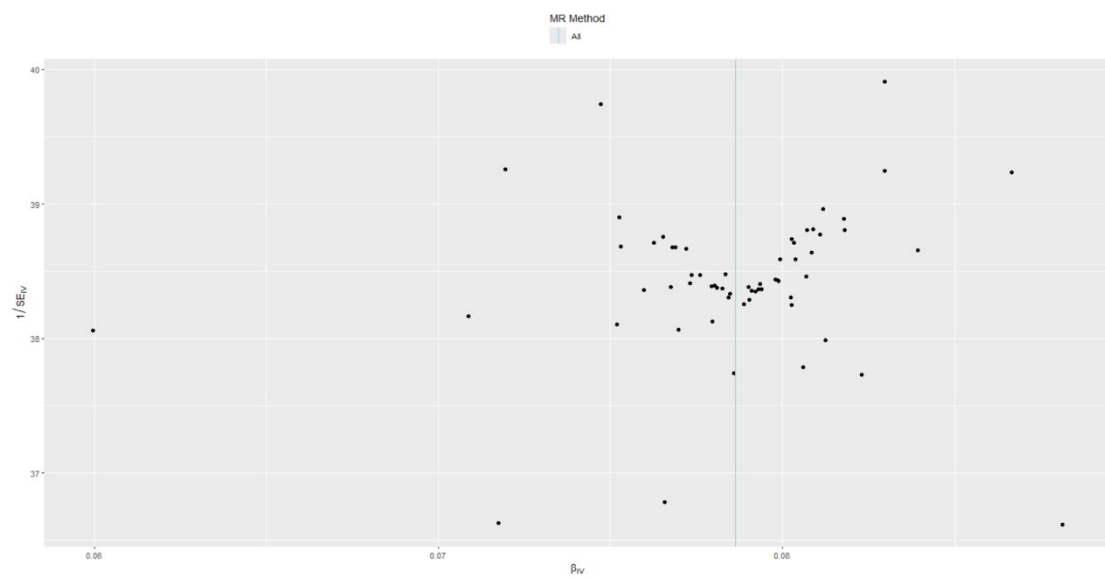
8) Cholesteryl esters to total lipids ratio in small VLDL and AF



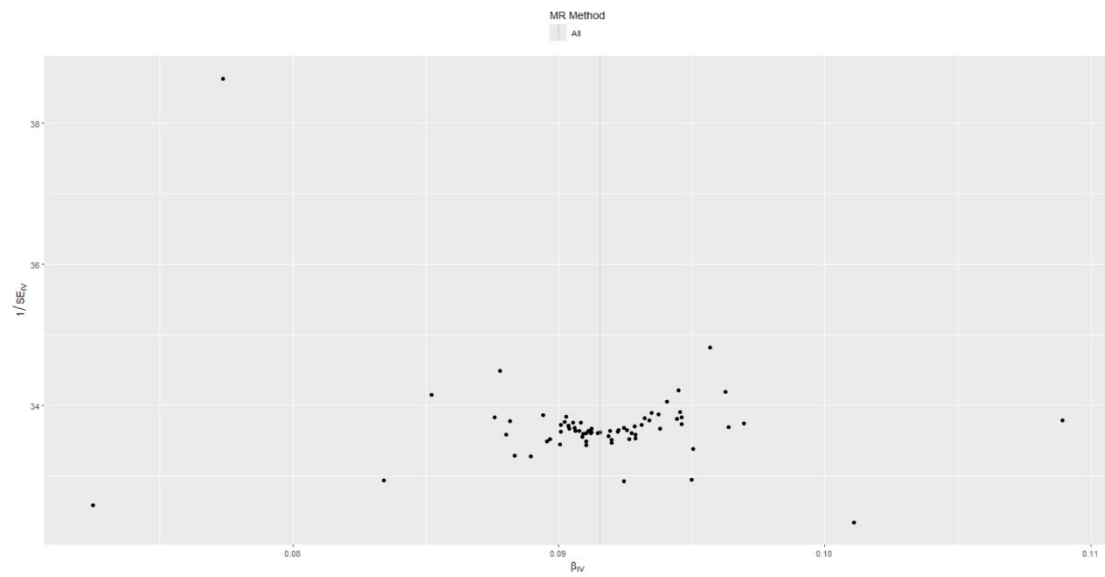
9) Cholesteryl esters to total lipids ratio in large VLDL and AF



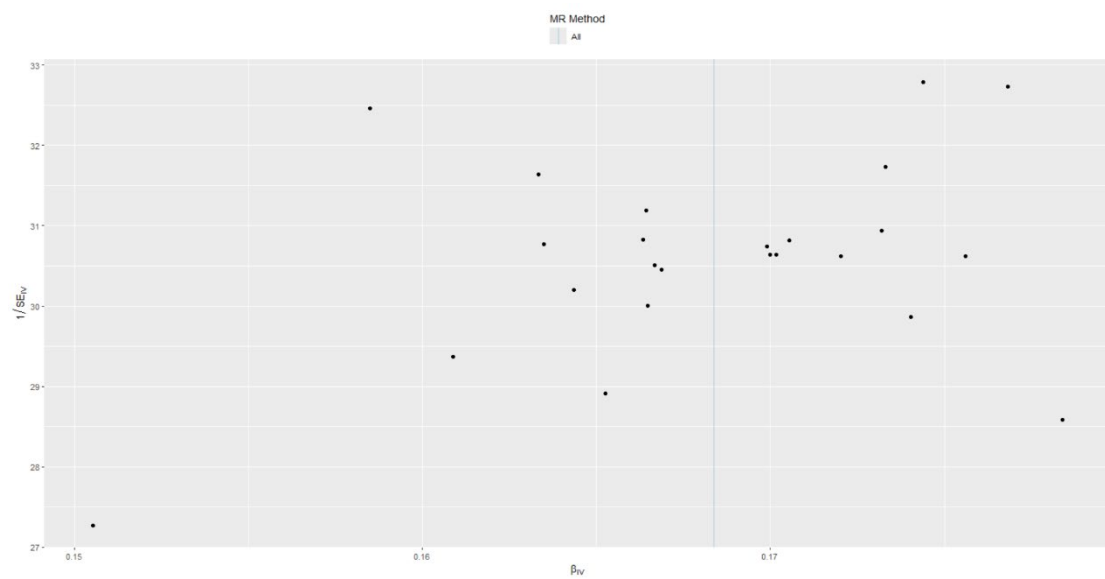
10) Cholesteryl esters to total lipids ratio in very large VLDL and AF



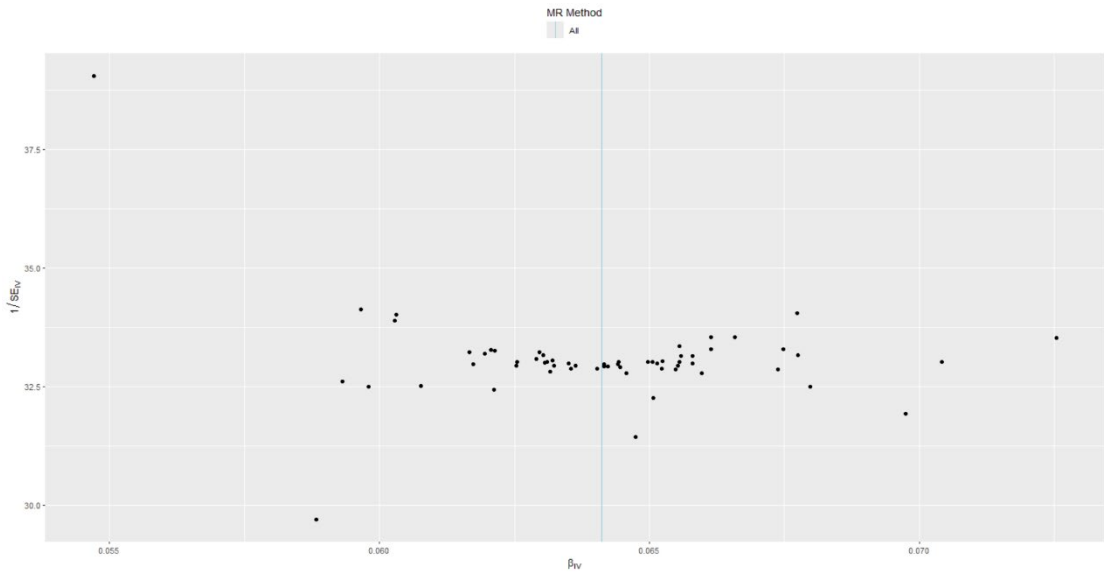
11) Cholesteryl esters to total lipids ratio in chylomicrons and extremely large VLDL and AF



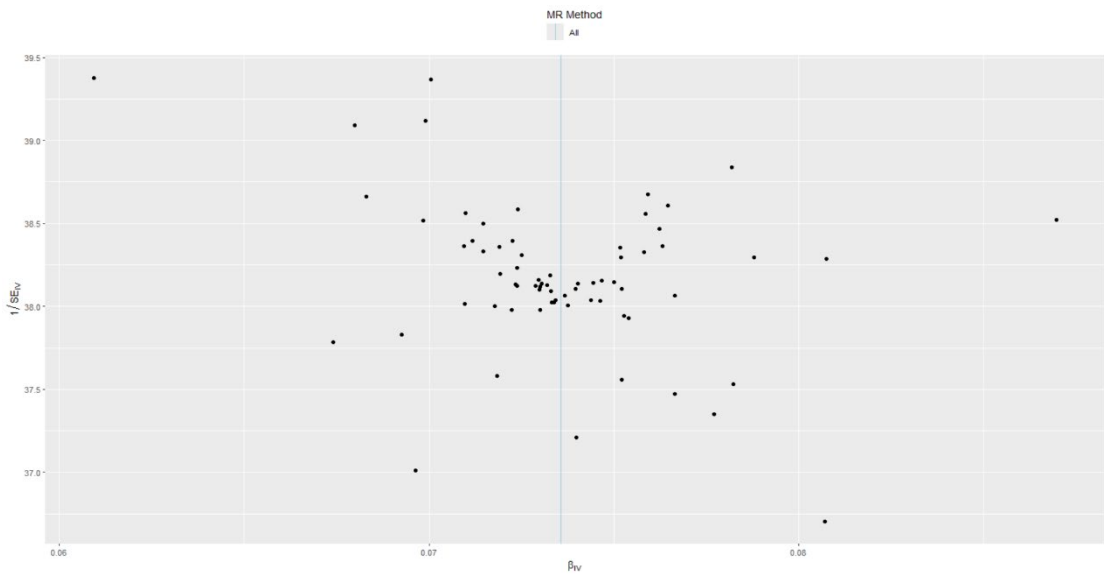
12) Cholesteryl esters in very small VLDL and AF



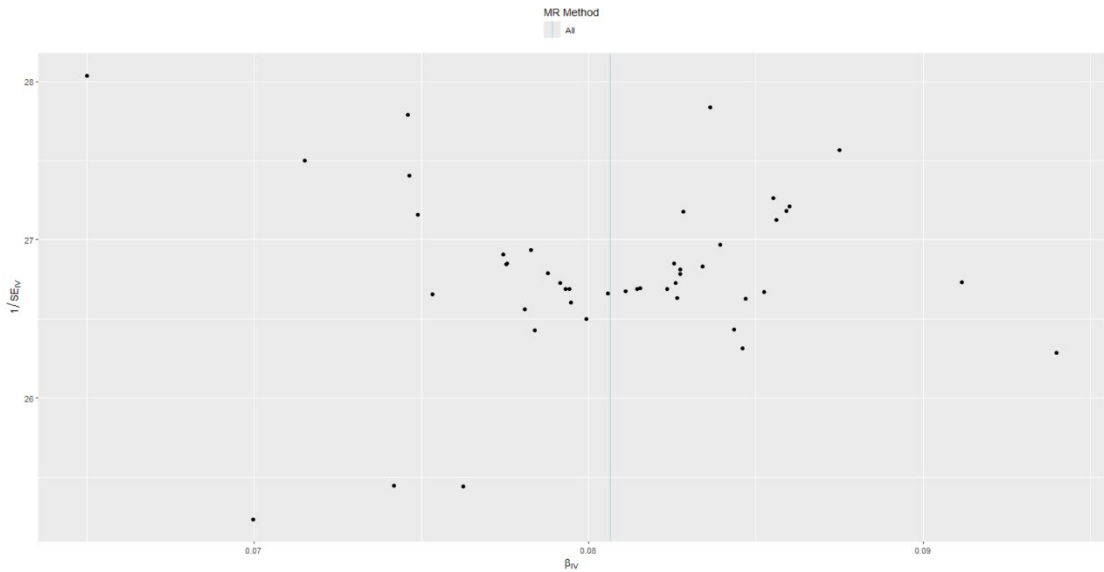
13) Free cholesterol to total lipids ratio in medium VLDL and AF



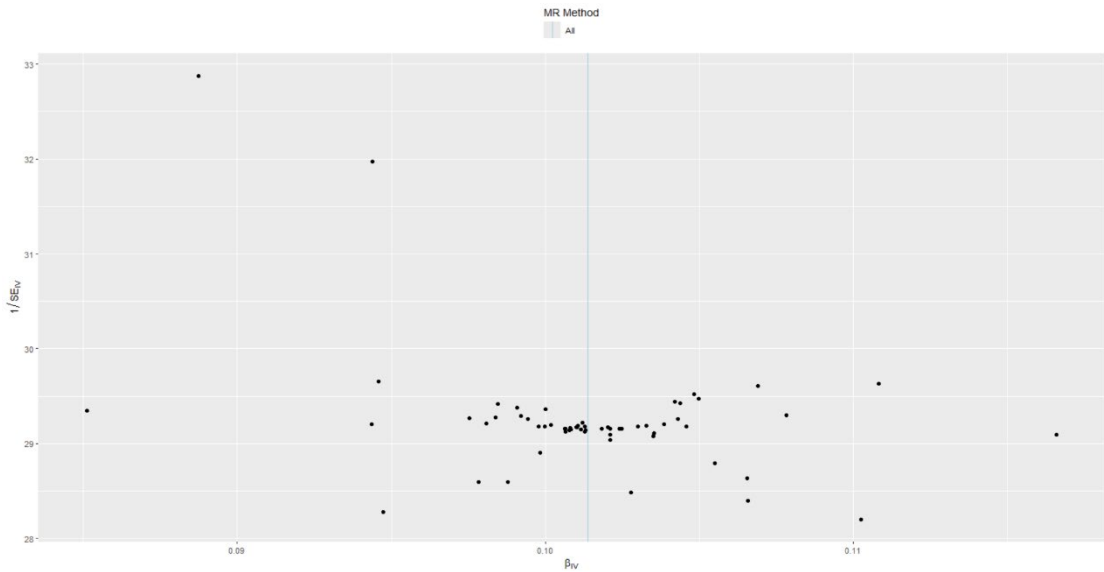
14) Free cholesterol to total lipids ratio in large VLDL and AF



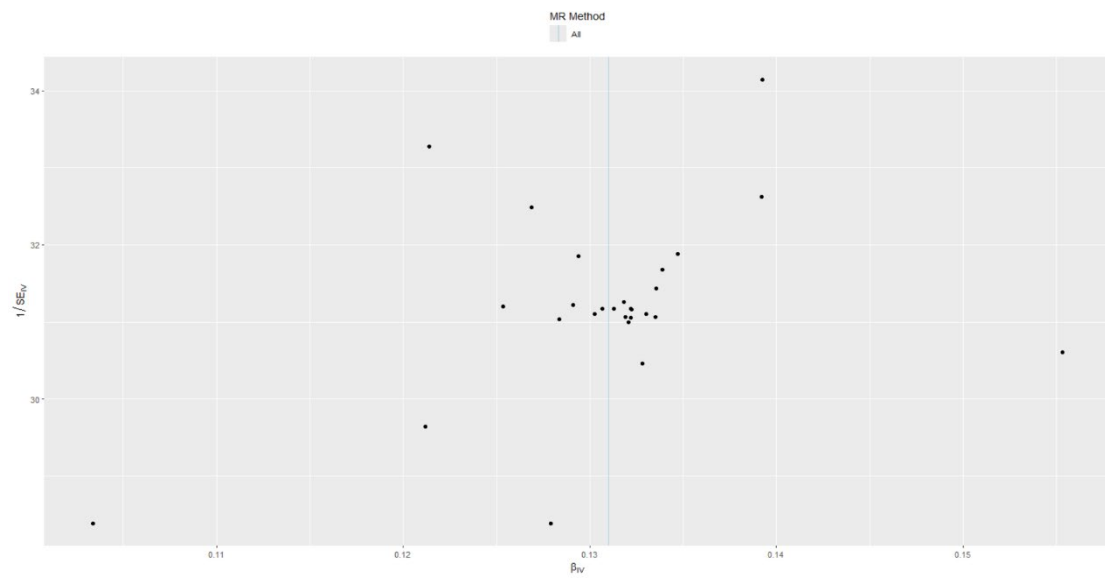
15) Free cholesterol to total lipids ratio in very large VLDL and AF



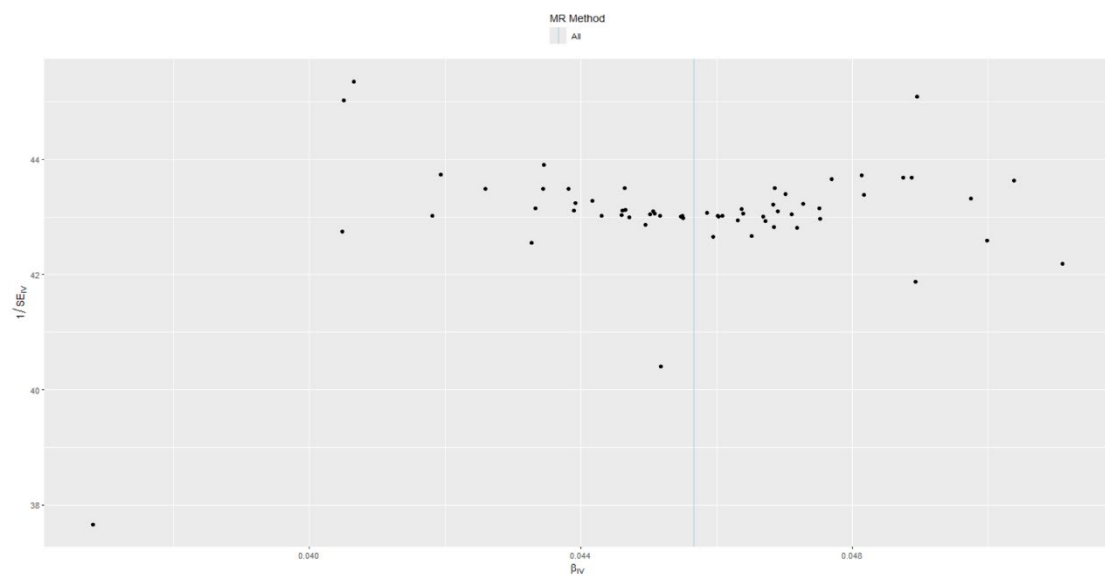
16) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



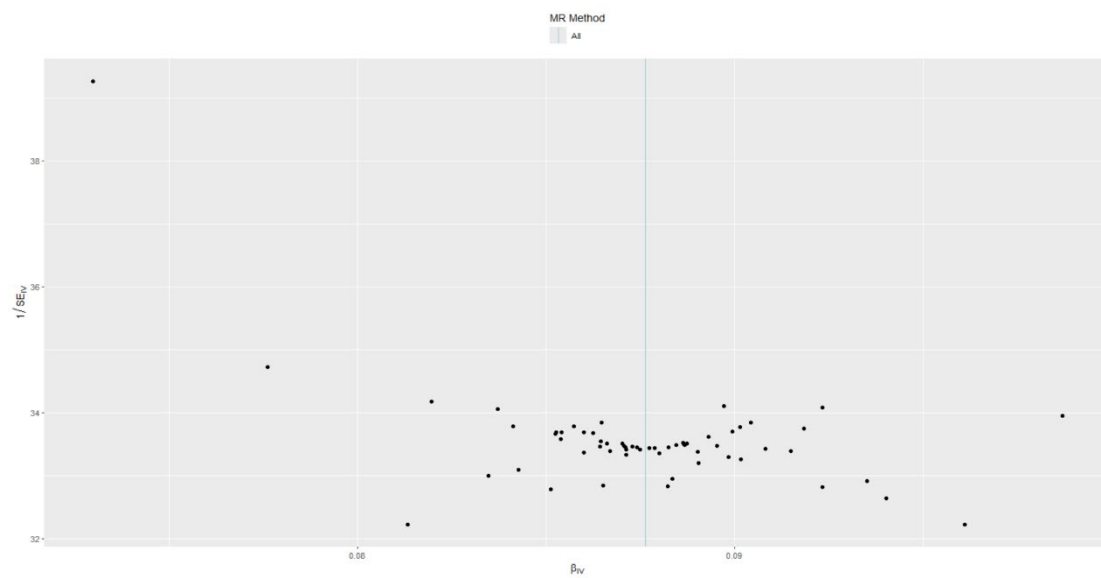
17) Free cholesterol levels in very small VLDL and AF



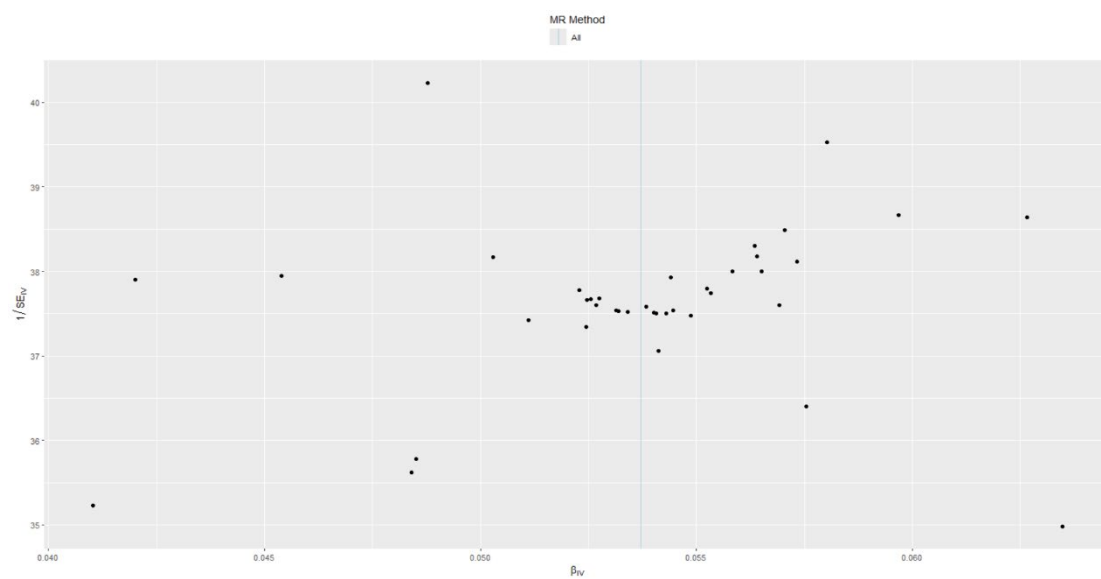
18) Phospholipids to total lipids ratio in medium VLDL and AF



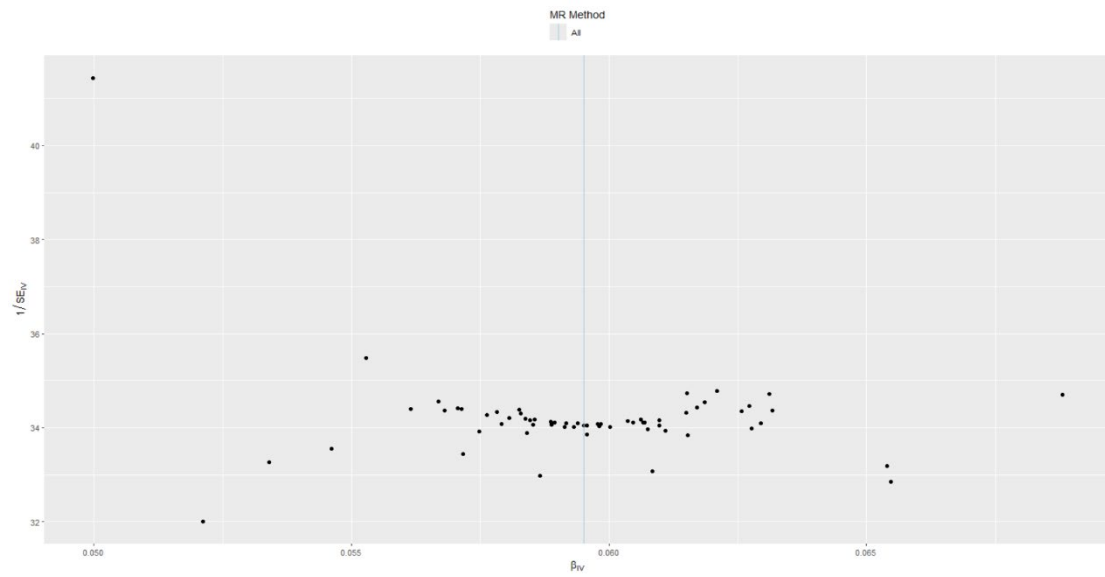
19) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL and AF



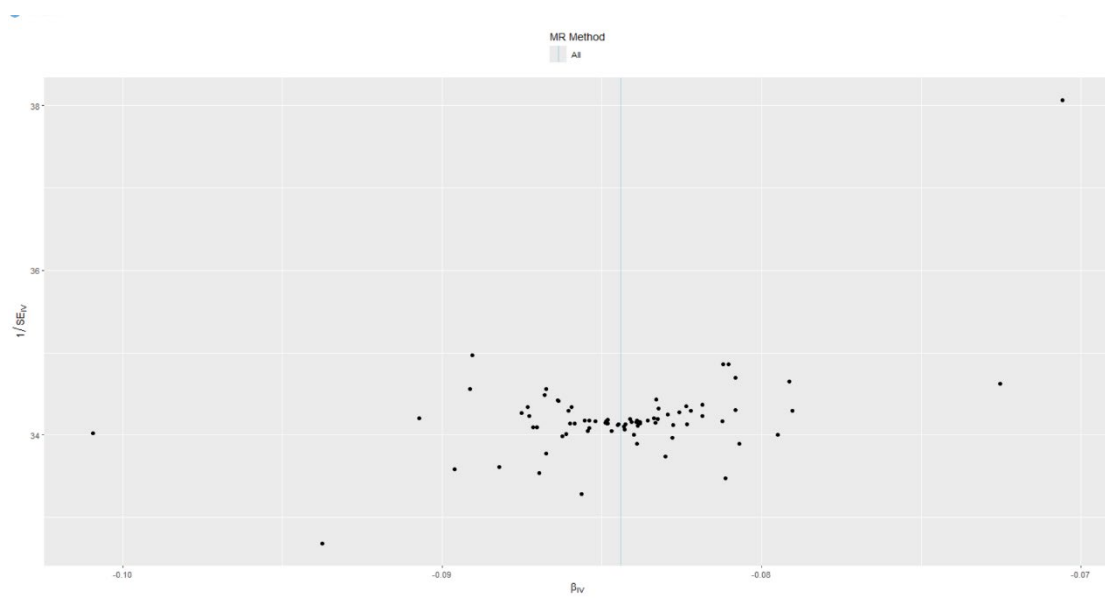
20) Phospholipids in IDL and AF



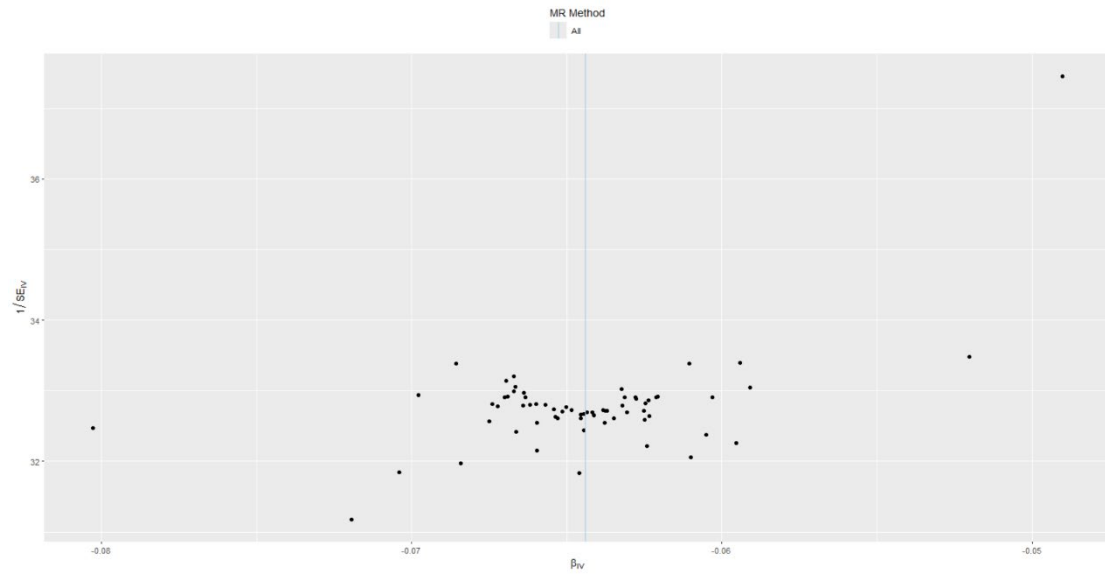
21) Triglycerides to total lipids ratio in medium VLDL and AF



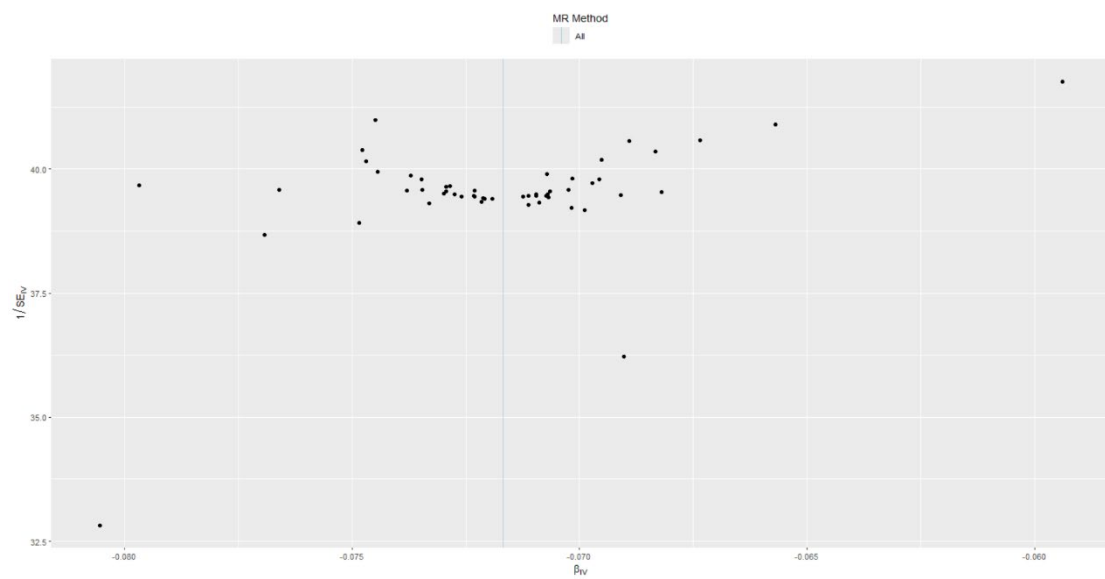
22) Triglycerides to total lipids ratio in small VLDL and AF



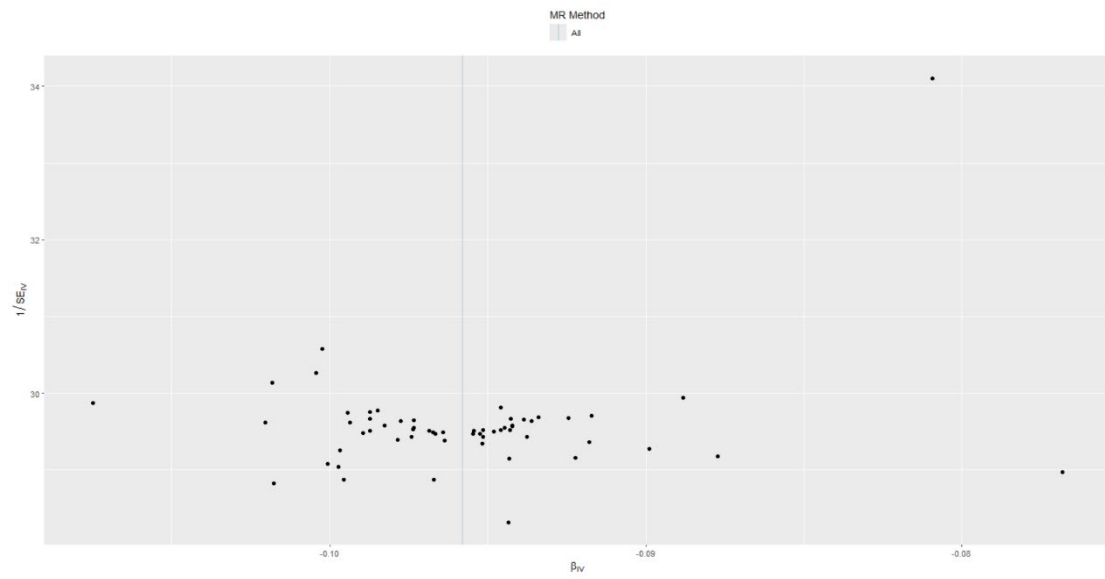
23) Triglycerides to total lipids ratio in large VLDL and AF



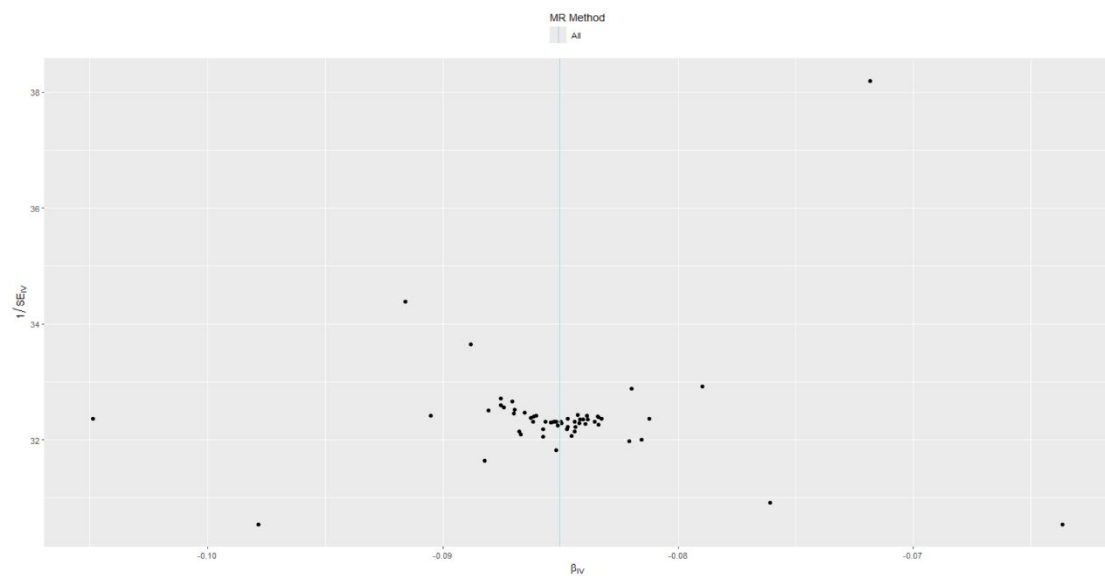
24) Triglycerides to total lipids ratio in very large VLDL and AF



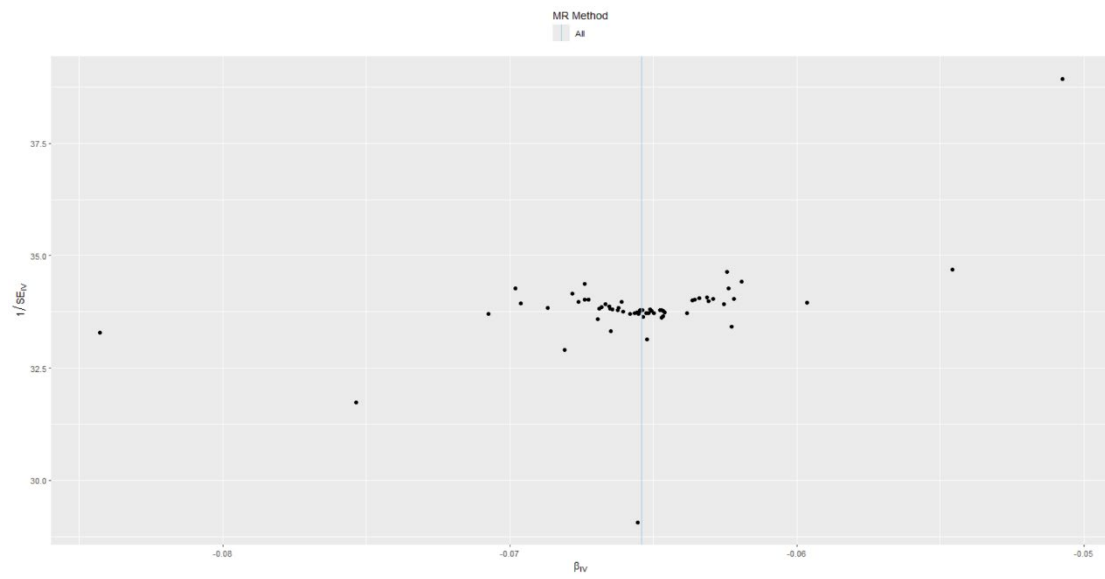
25) Triglycerides in chylomicrons and extremely large VLDL and AF



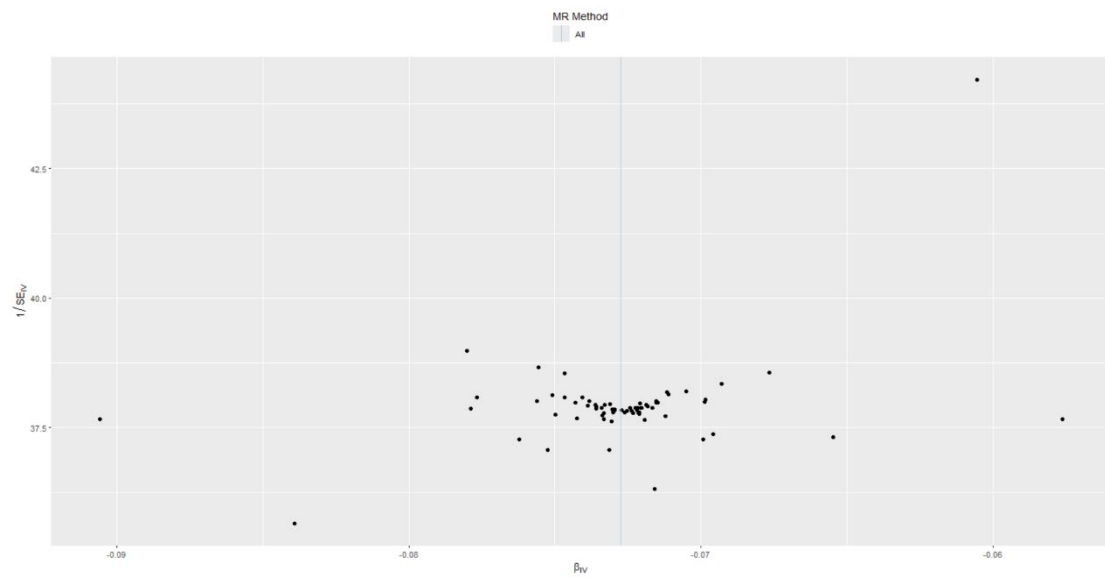
26) Ratio of monounsaturated fatty acids to total fatty acids and AF



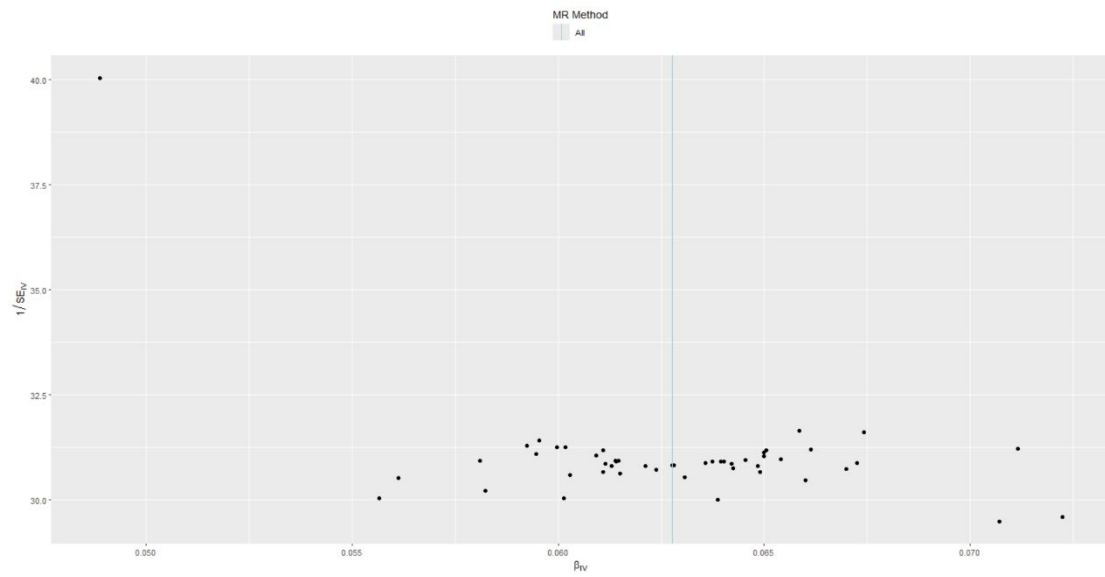
27) Average diameter for VLDL particles and AF



28) Concentration of IDL particles and AF



29) Concentration of very small VLDL particles and AF



30) Total lipids in chylomicrons and extremely large VLDL and AF

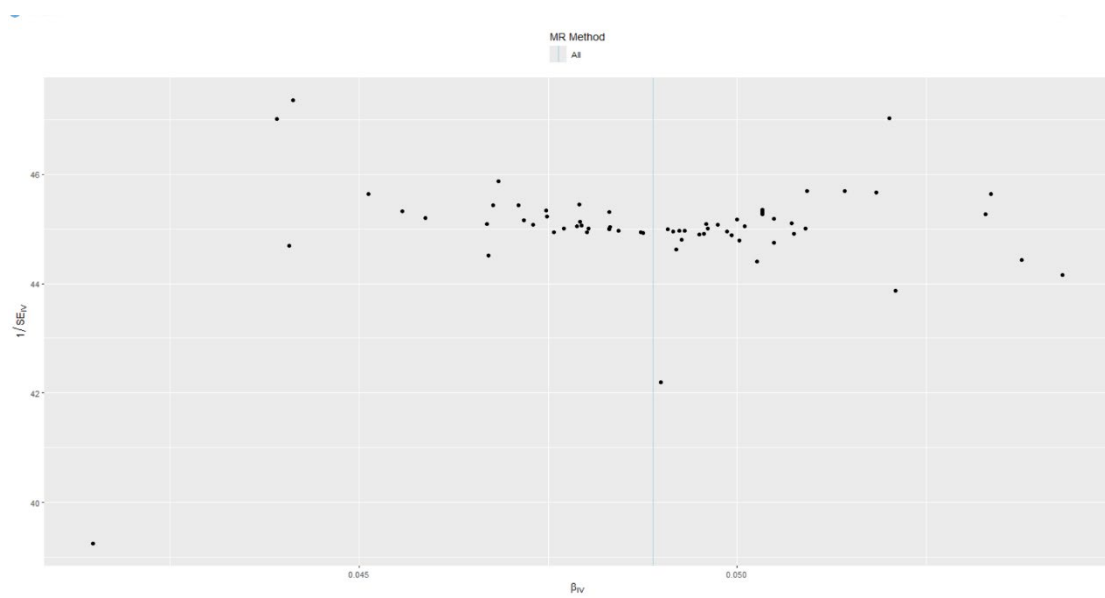
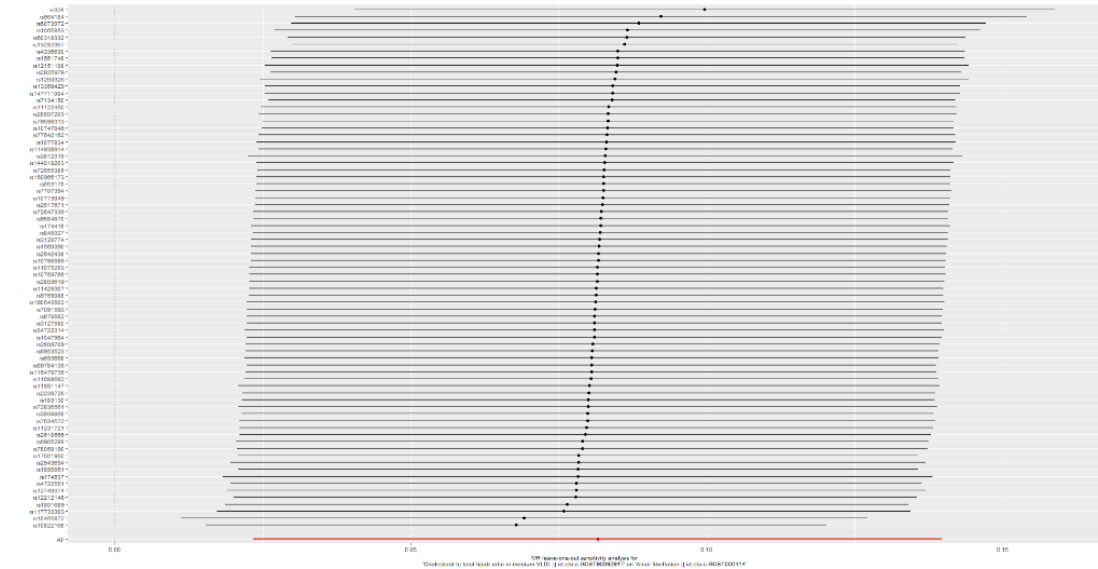
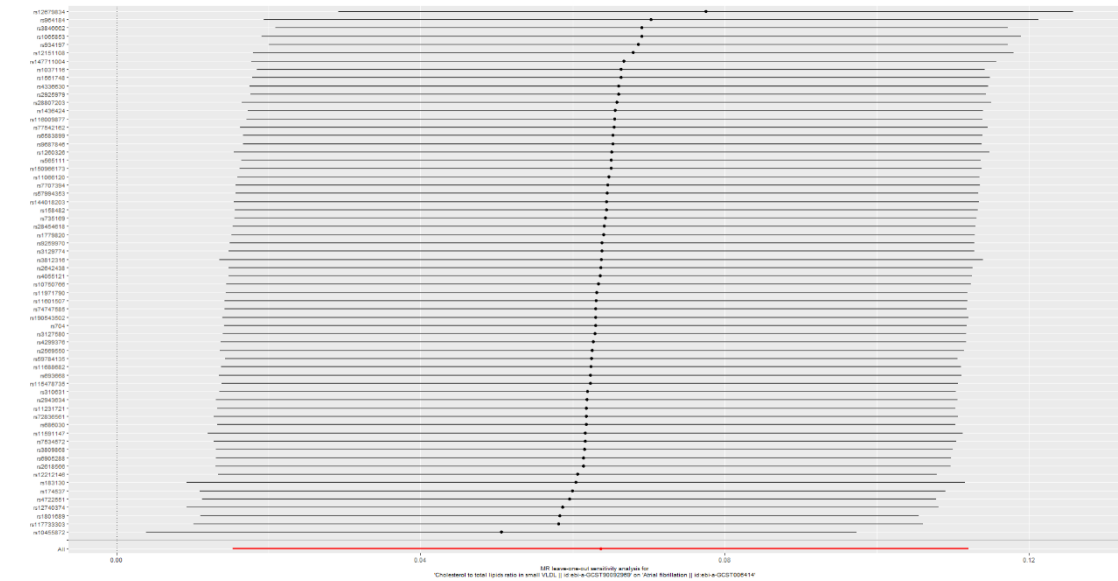


Figure S4 Leave-one-out plot to assess if a single variant is driving the association between lipid traits and atrial fibrillation

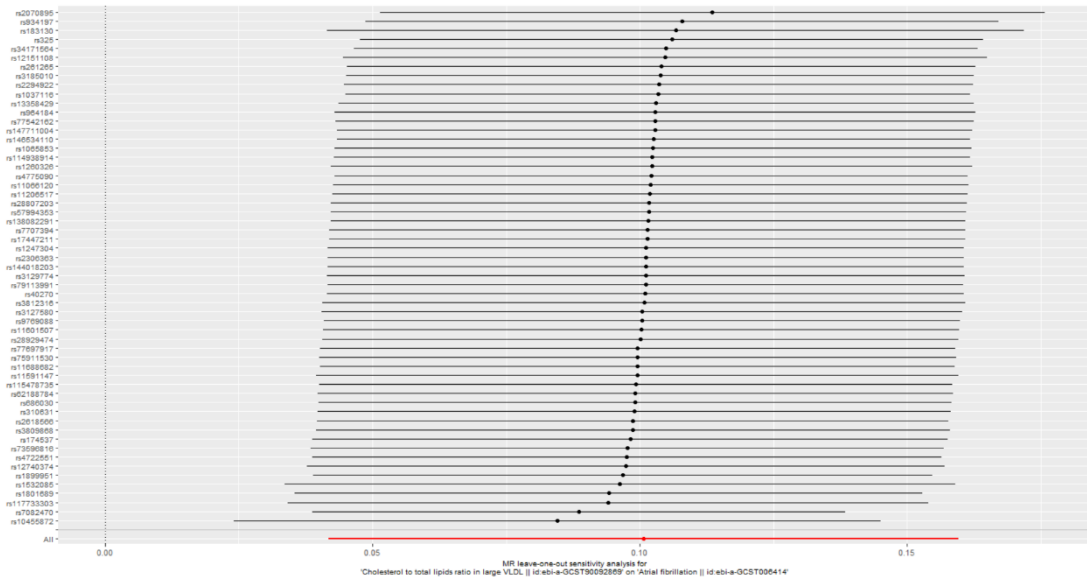
1) Cholesterol to total lipids ratio in medium VLDL and AF



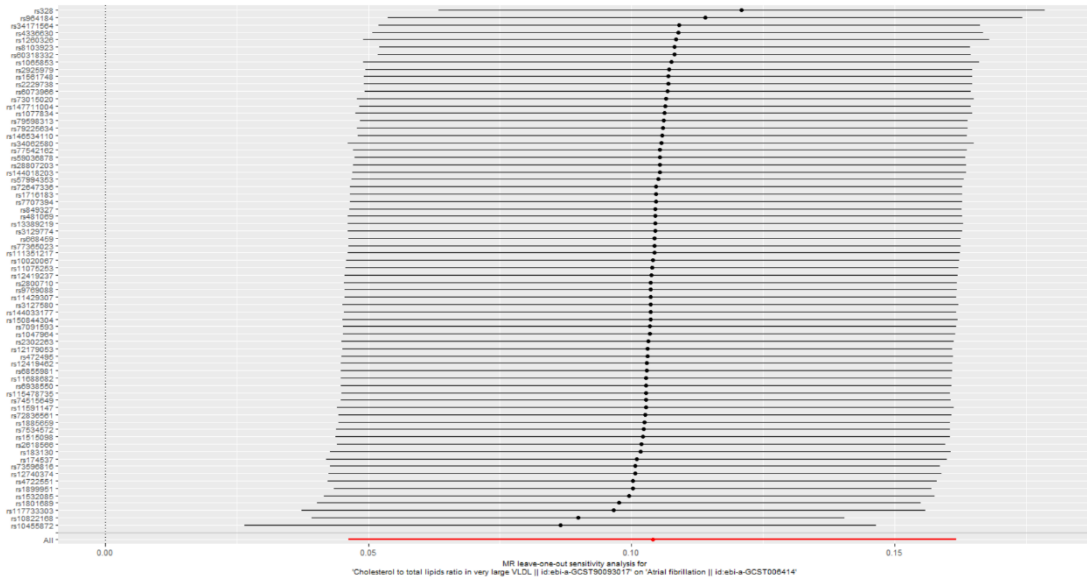
2) Cholesterol to total lipids ratio in small VLDL and AF



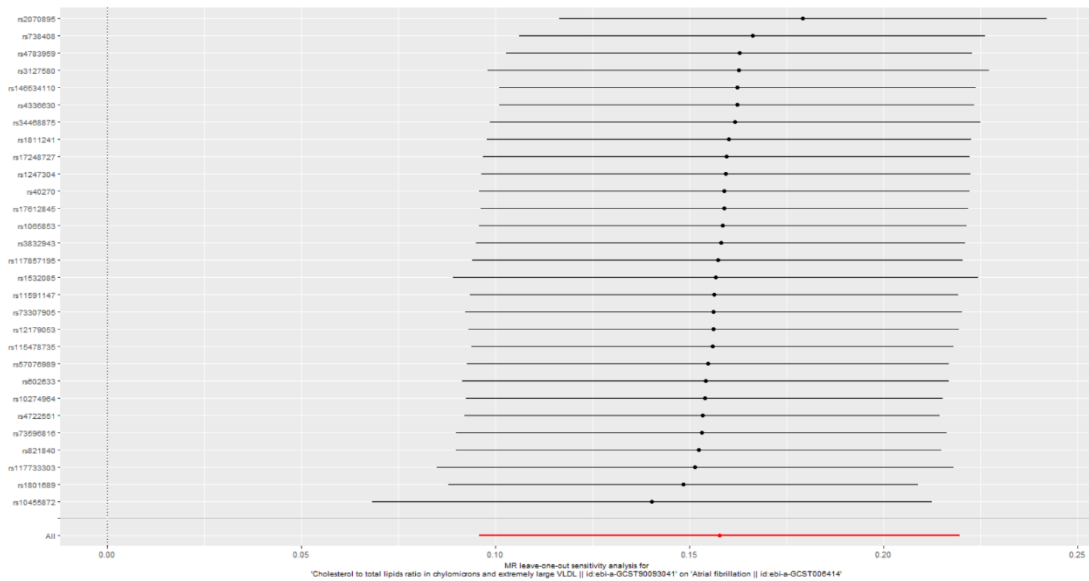
3) Cholesterol to total lipids ratio in large VLDL and AF



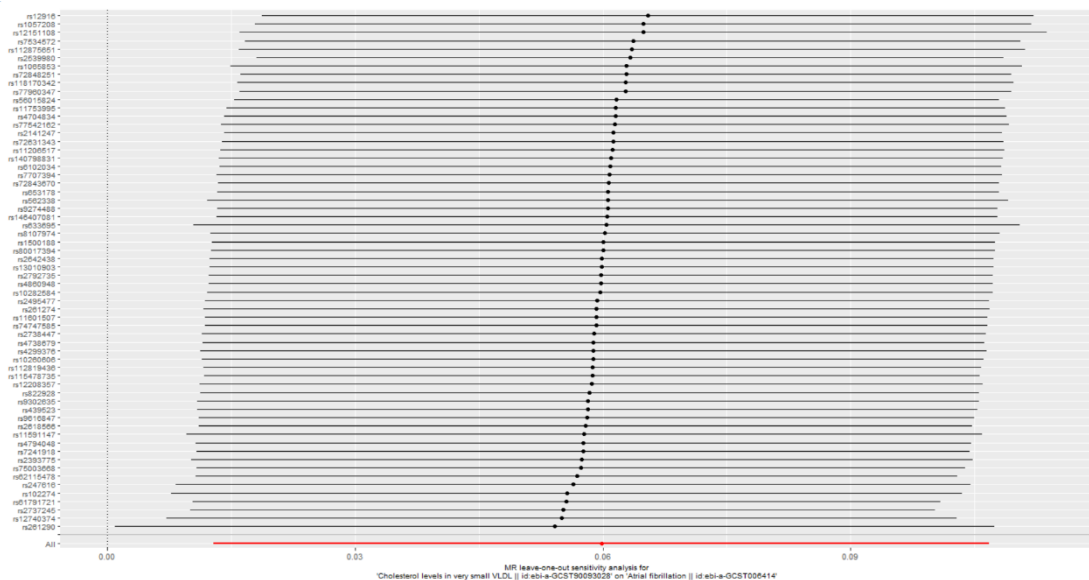
4) Cholesterol to total lipids ratio in very large VLDL and AF



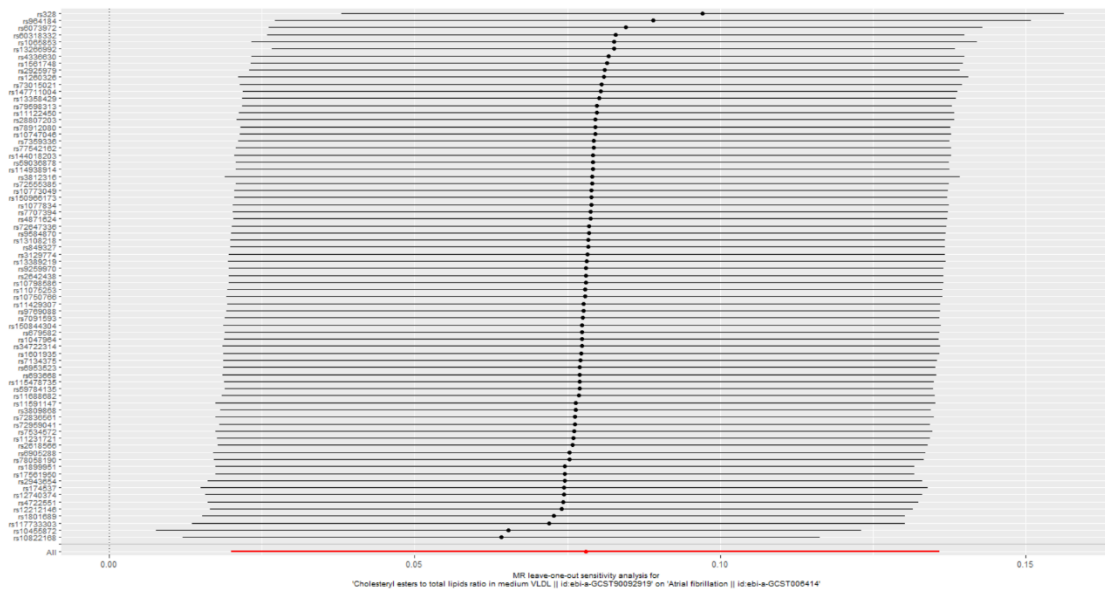
5) Cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



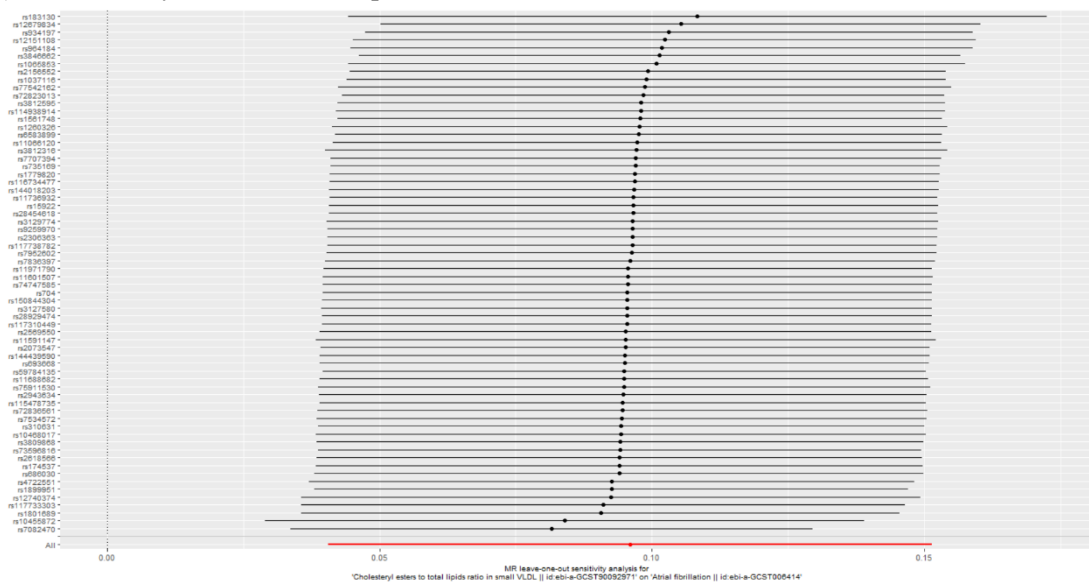
6) Cholesterol levels in very small VLDL and AF



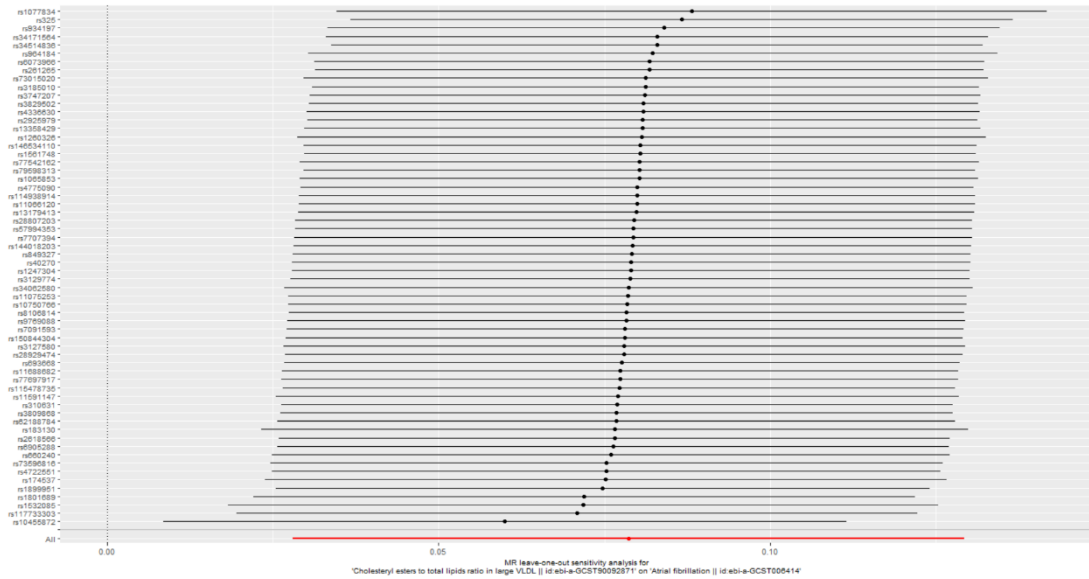
7) Cholesteryl esters to total lipids ratio in medium VLDL and AF



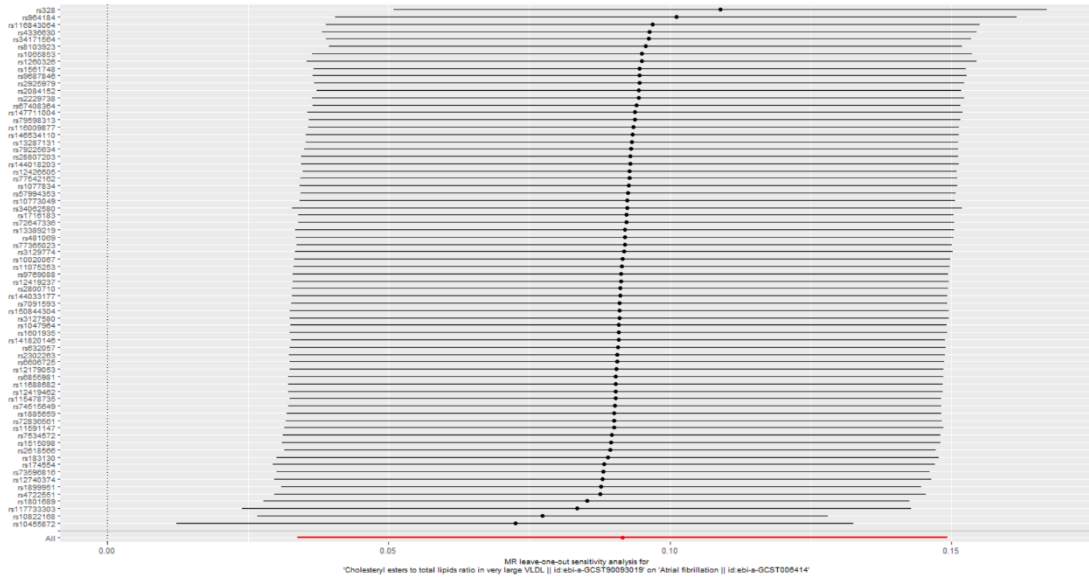
8) Cholesteryl esters to total lipids ratio in small VLDL and AF



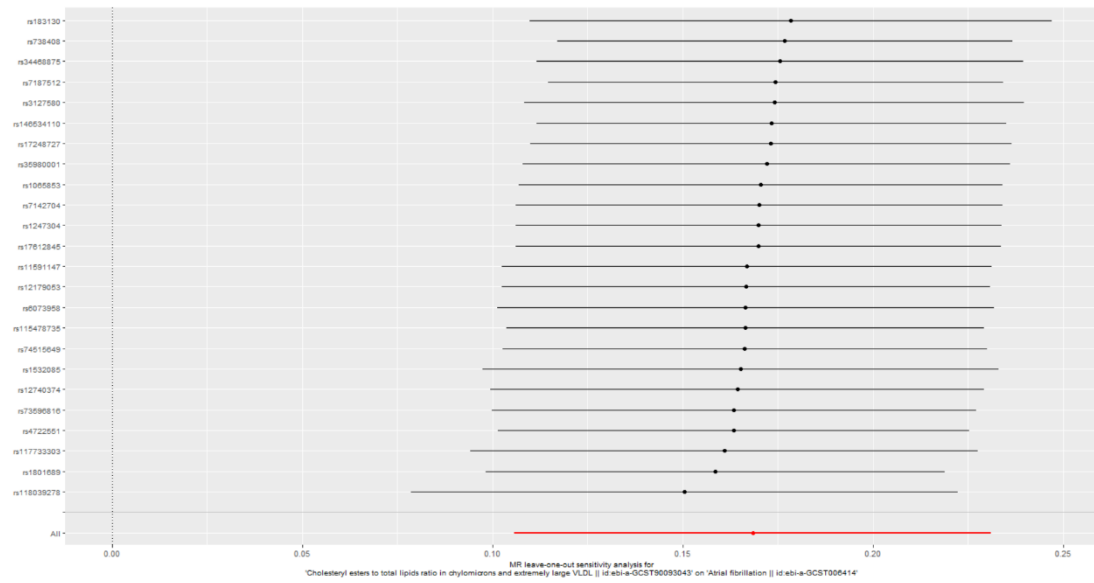
9) Cholesteryl esters to total lipids ratio in large VLDL and AF



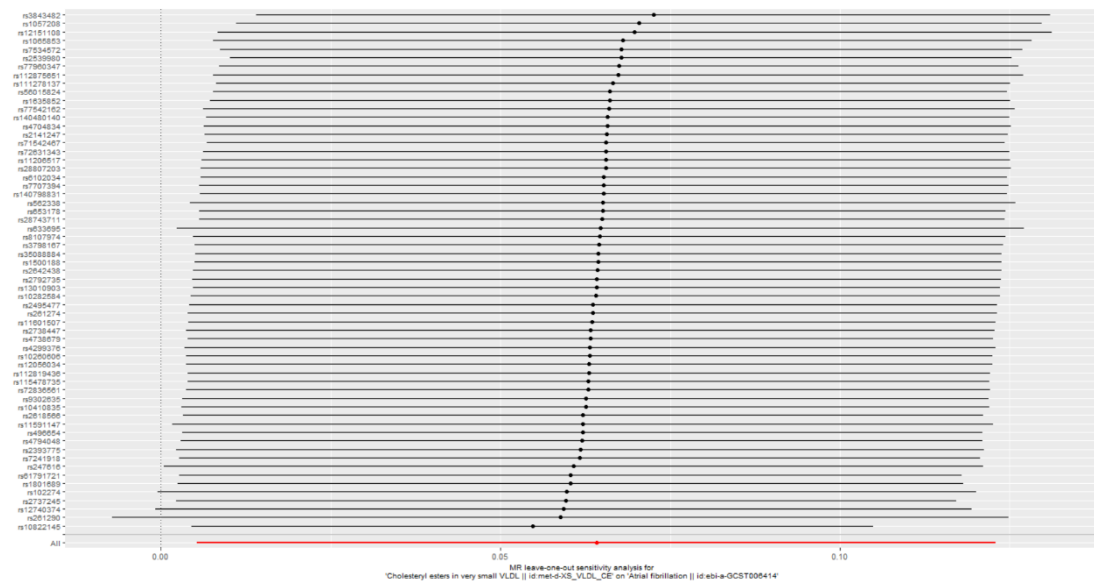
10) Cholesteryl esters to total lipids ratio in very large VLDL and AF



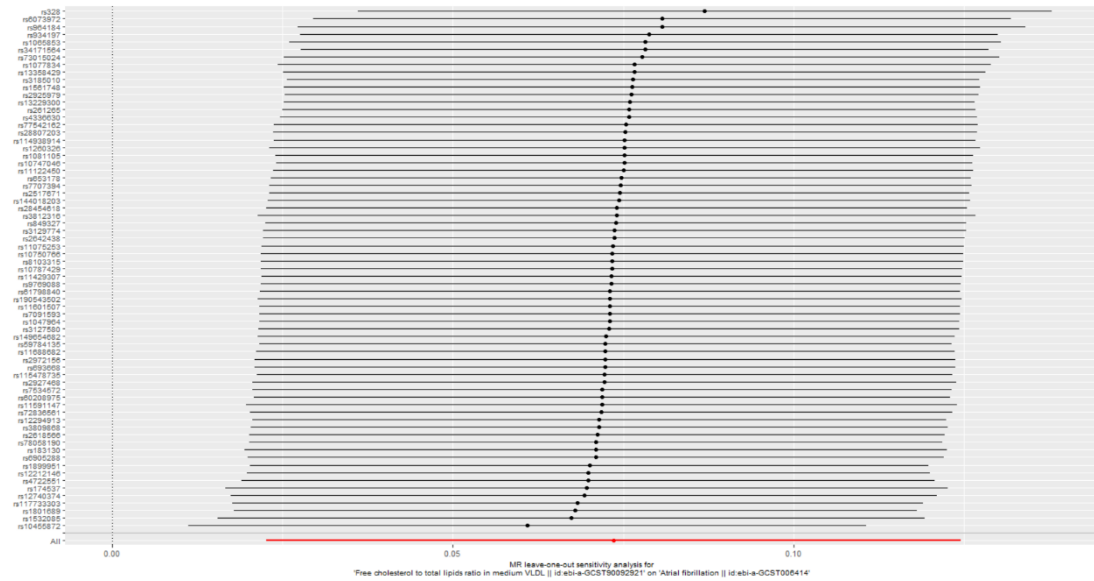
11) Cholesteryl esters to total lipids ratio in chylomicrons and extremely large VLDL and AF



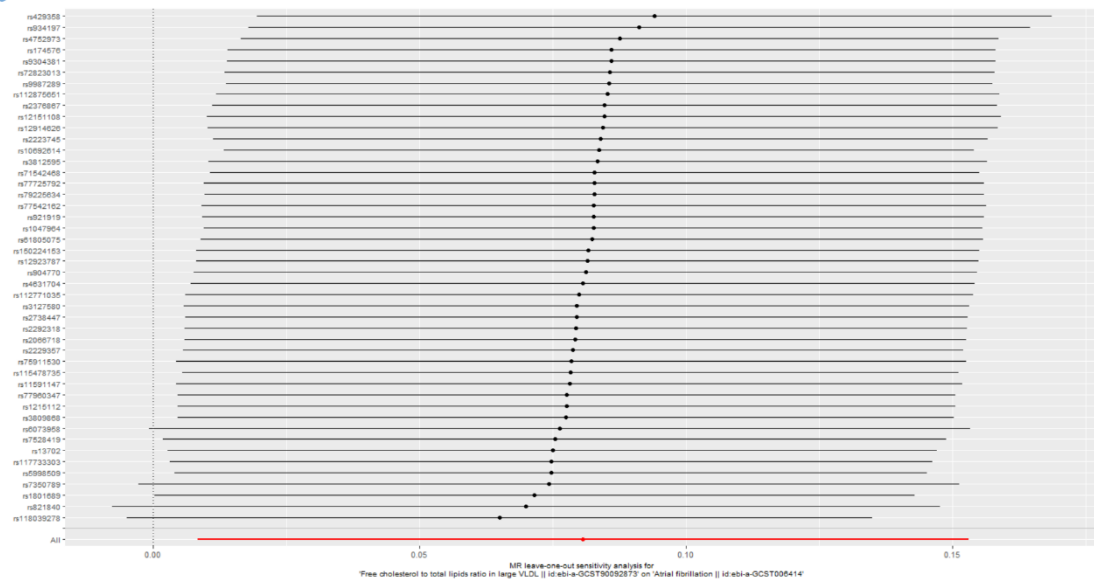
12) Cholesteryl esters in very small VLDL and AF



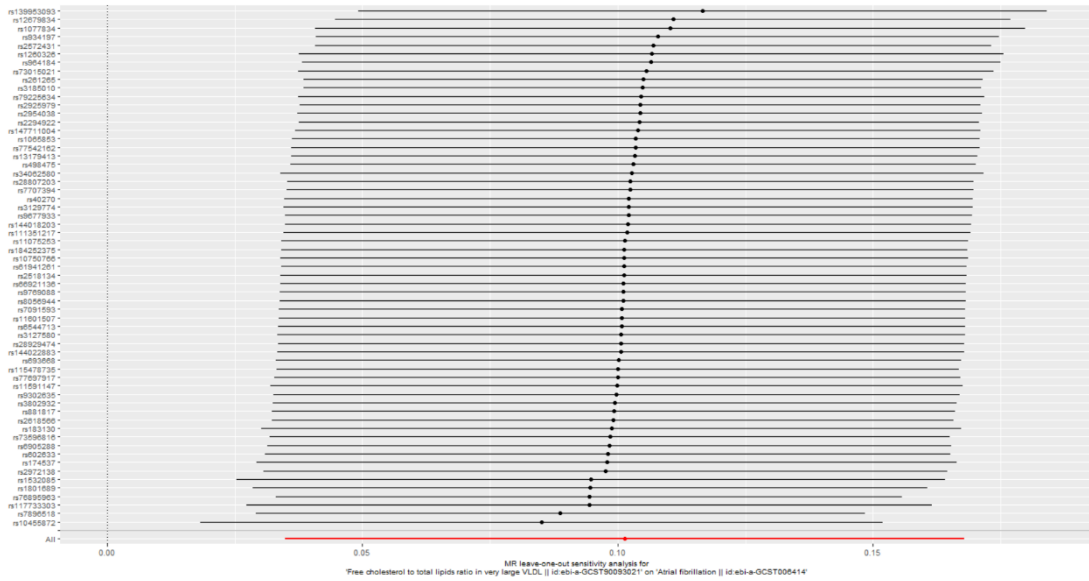
13) Free cholesterol to total lipids ratio in medium VLDL and AF



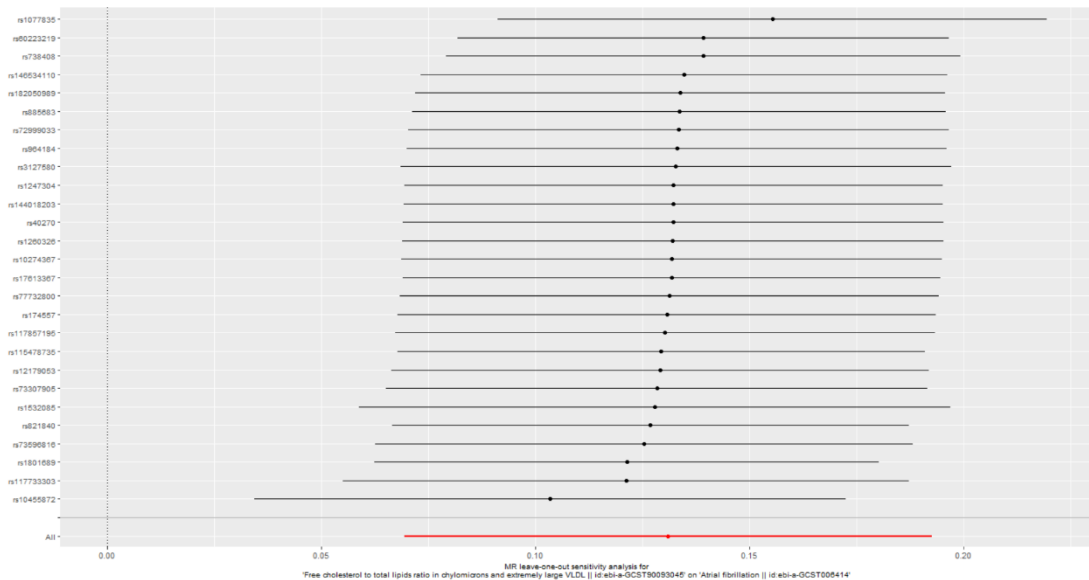
14) Free cholesterol to total lipids ratio in large VLDL and AF



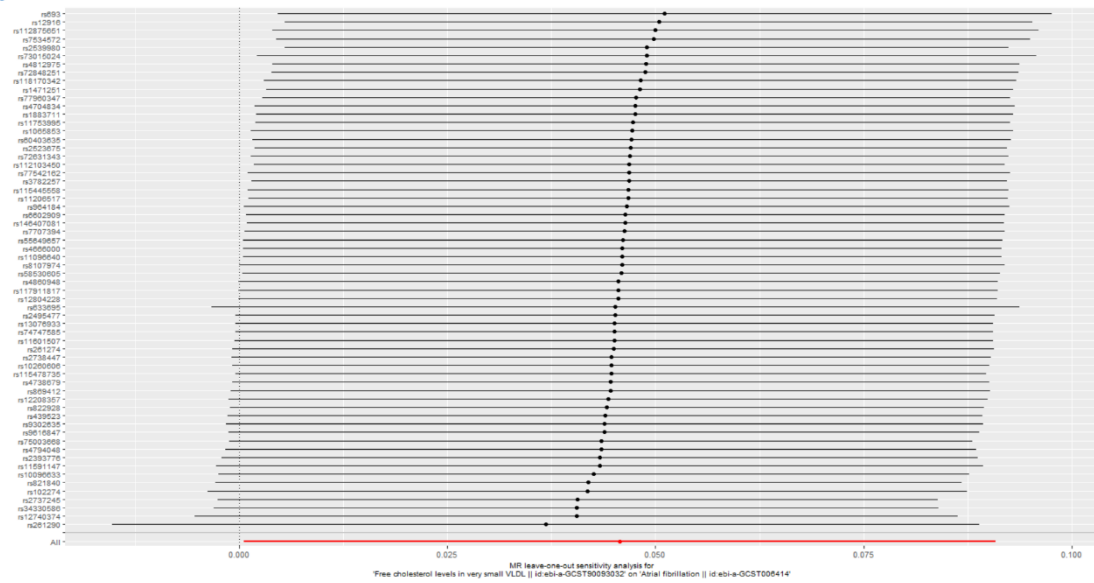
15) Free cholesterol to total lipids ratio in very large VLDL and AF



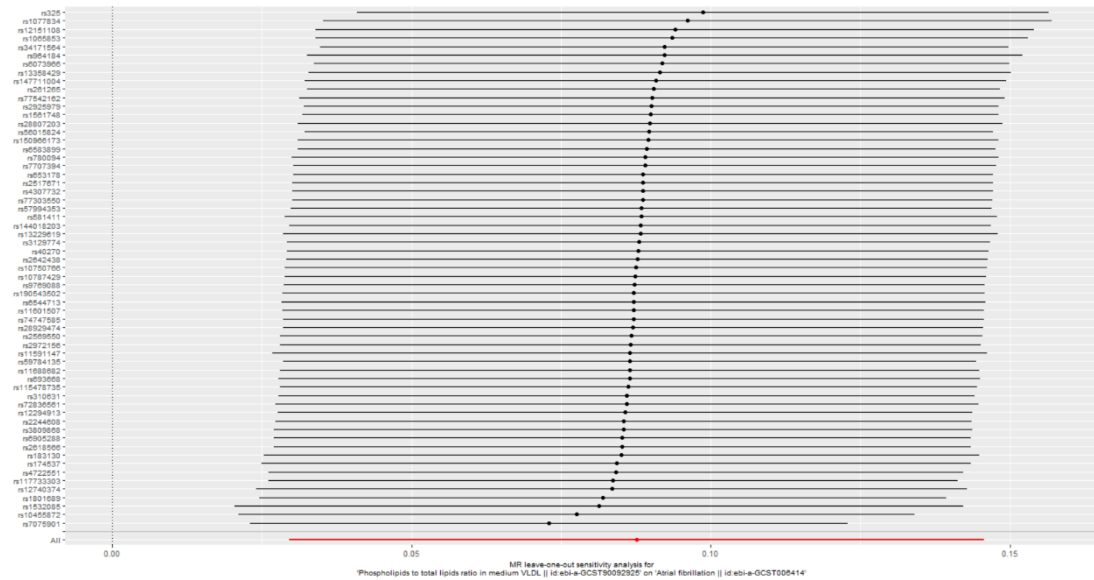
16) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL and AF



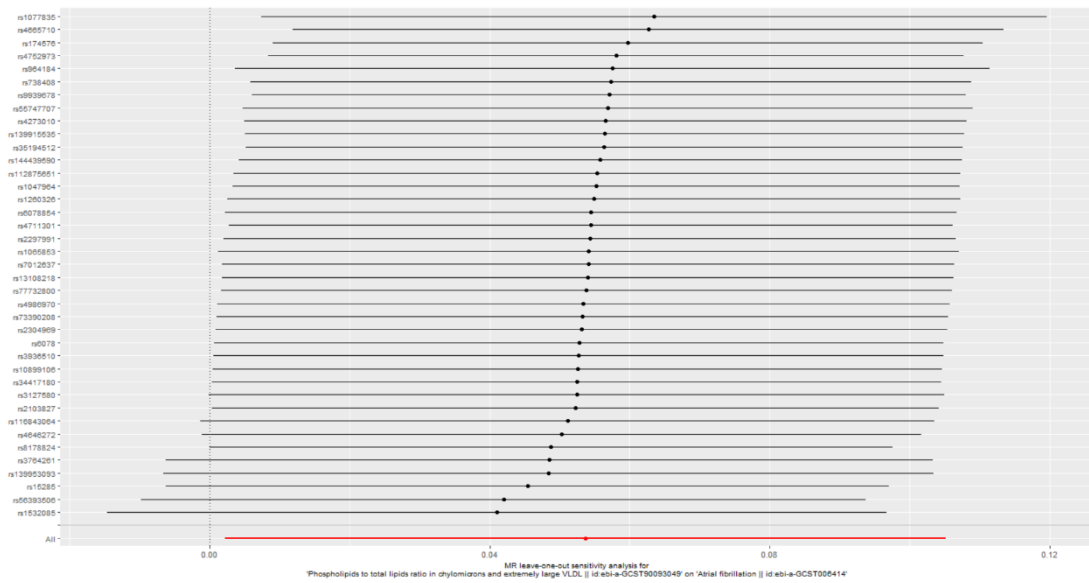
17) Free cholesterol levels in very small VLDL and AF



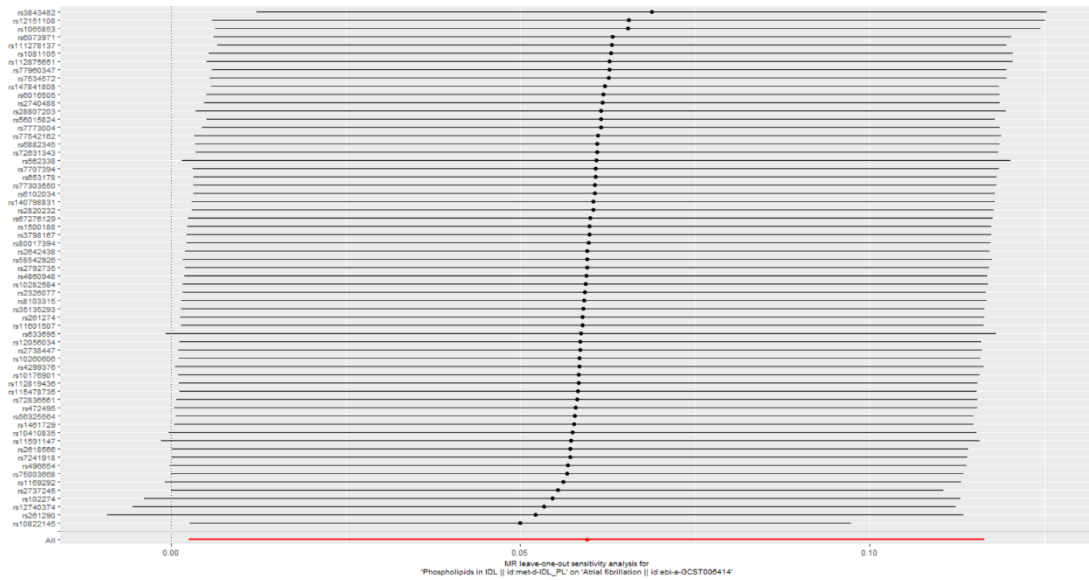
18) Phospholipids to total lipids ratio in medium VLDL and AF



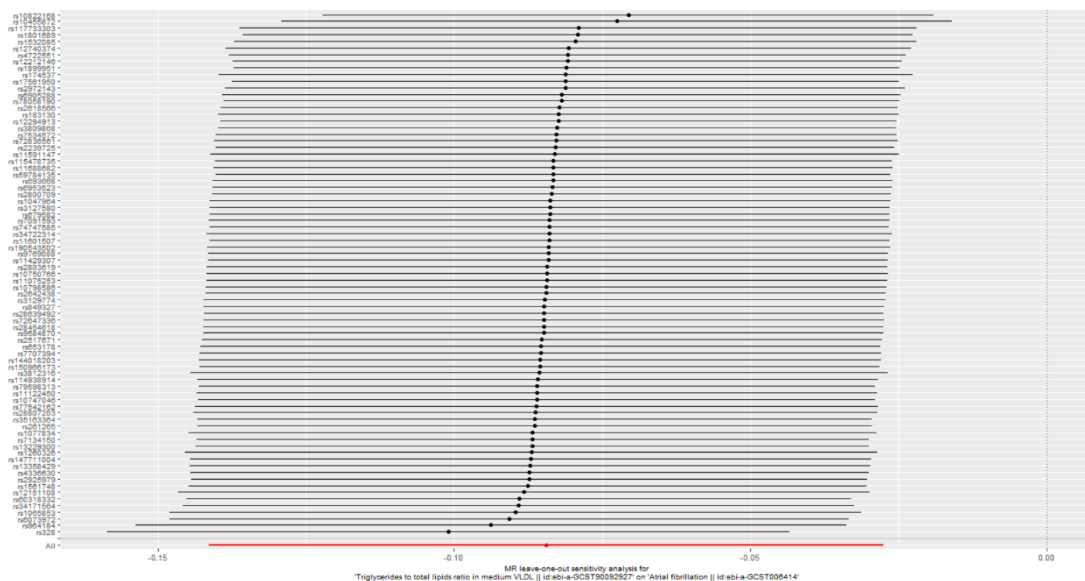
19) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL and AF



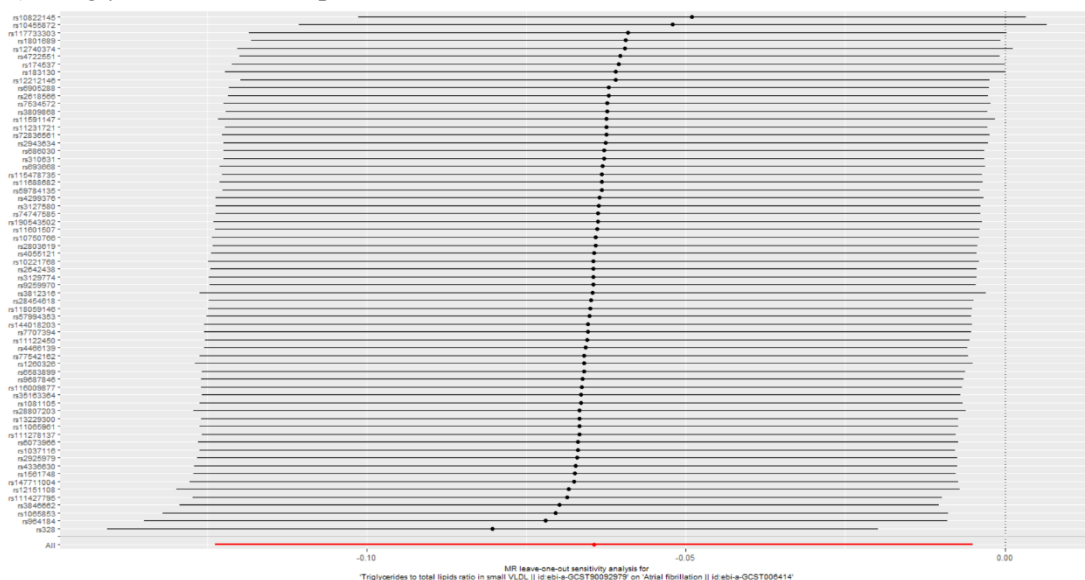
20) Phospholipids in IDL and AF



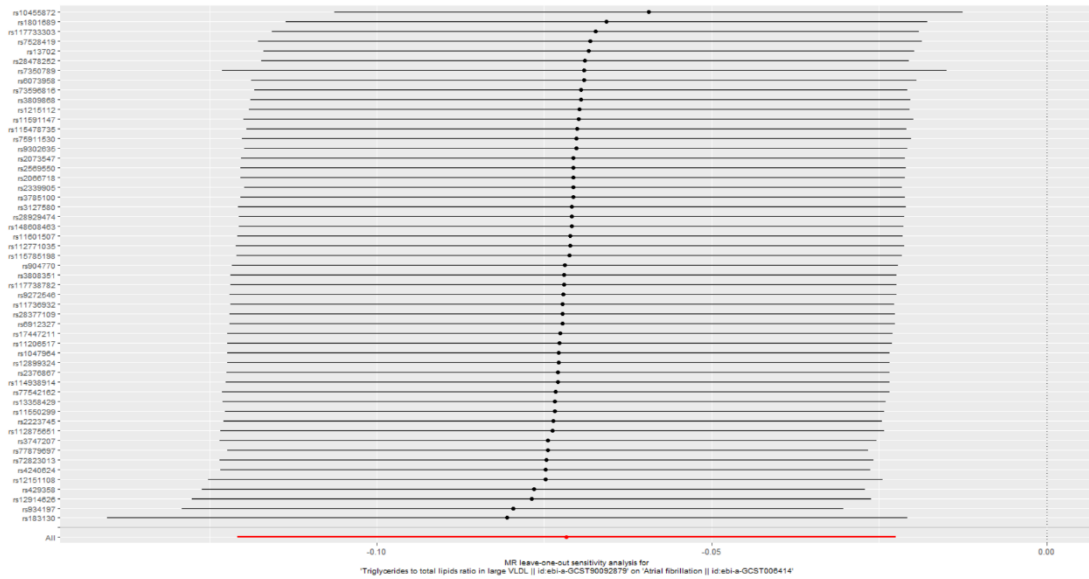
21) Triglycerides to total lipids ratio in medium VLDL and AF



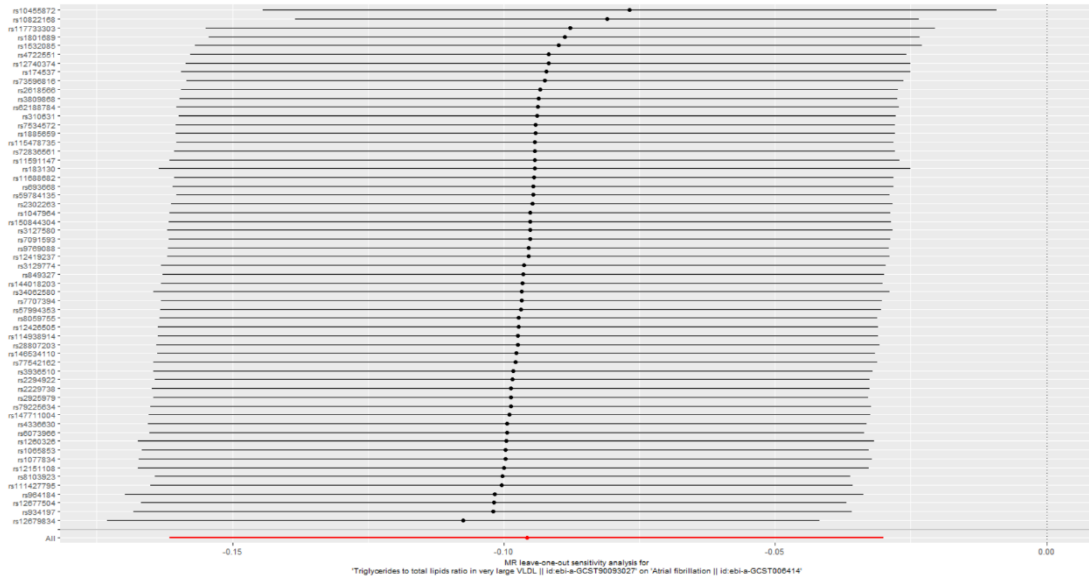
22) Triglycerides to total lipids ratio in small VLDL and AF



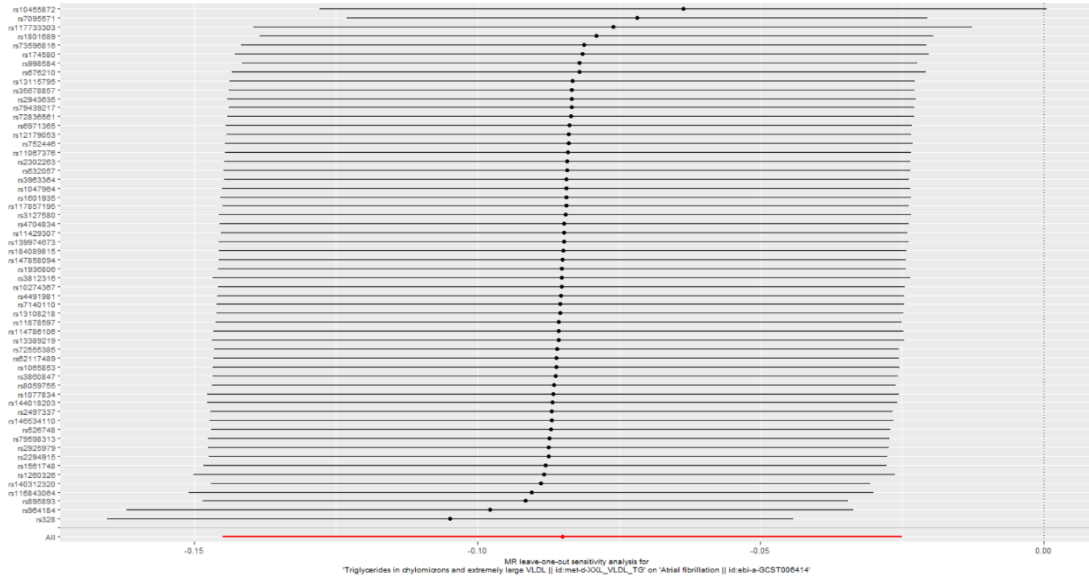
23) Triglycerides to total lipids ratio in large VLDL and AF



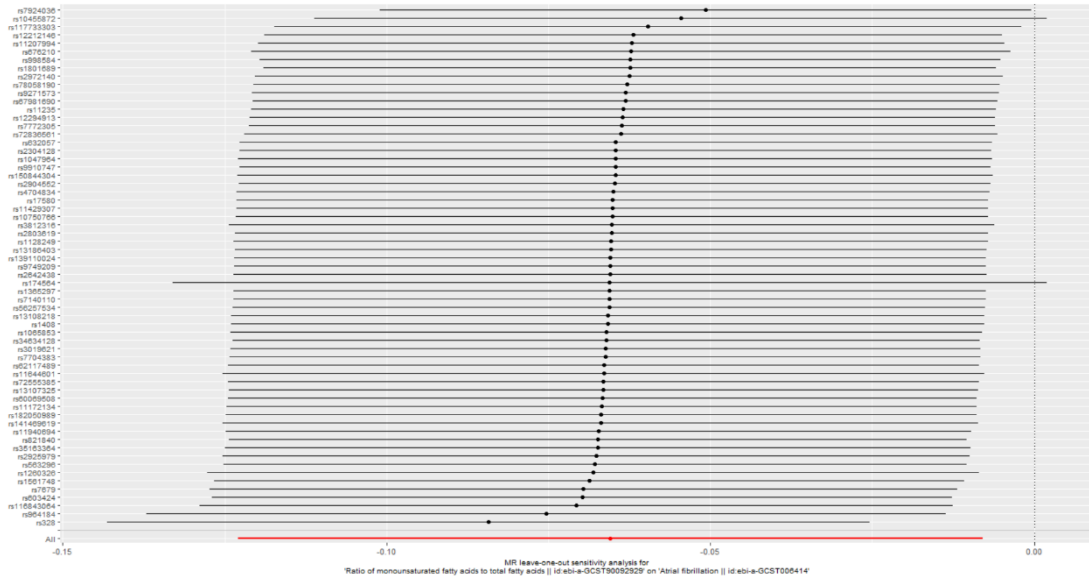
24) Triglycerides to total lipids ratio in very large VLDL and AF



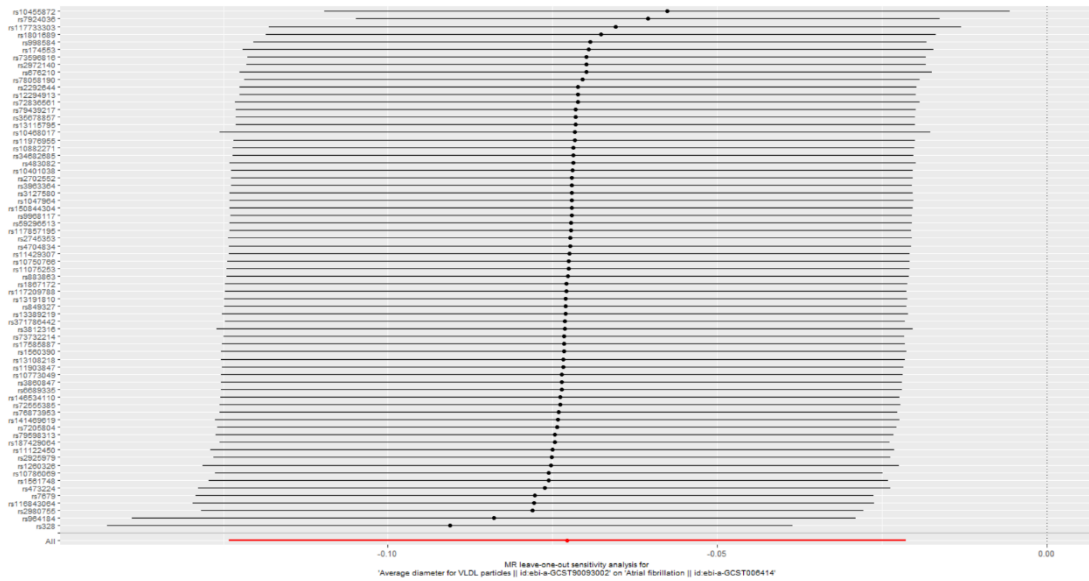
25) Triglycerides in chylomicrons and extremely large VLDL and AF



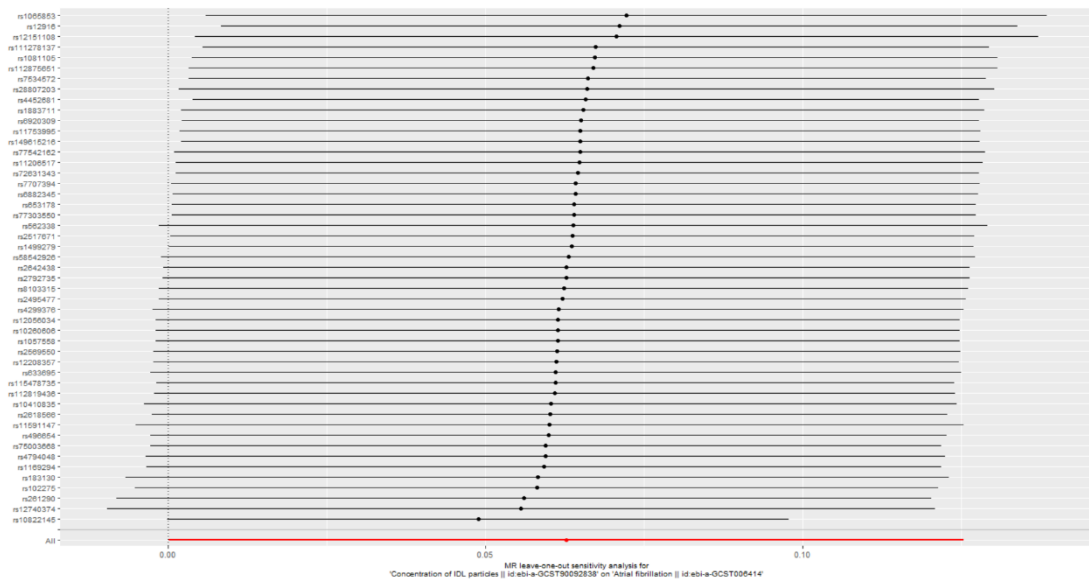
26) Ratio of monounsaturated fatty acids to total fatty acids and AF



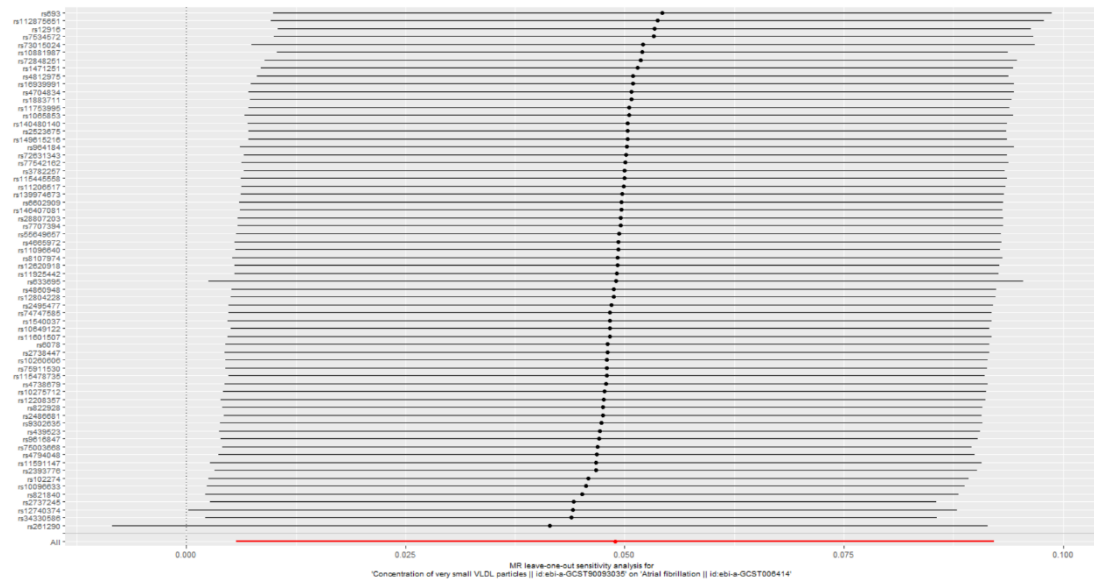
27) Average diameter for VLDL particles and AF



28) Concentration of IDL particles and AF



29) Concentration of very small VLDL particles and AF



30) Total lipids in chylomicrons and extremely large VLDL and AF

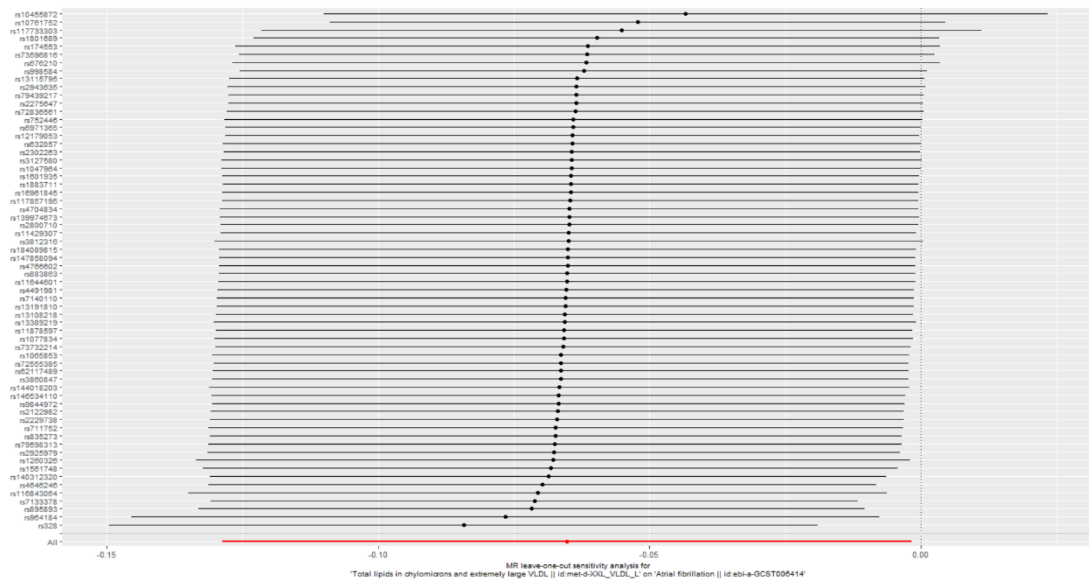
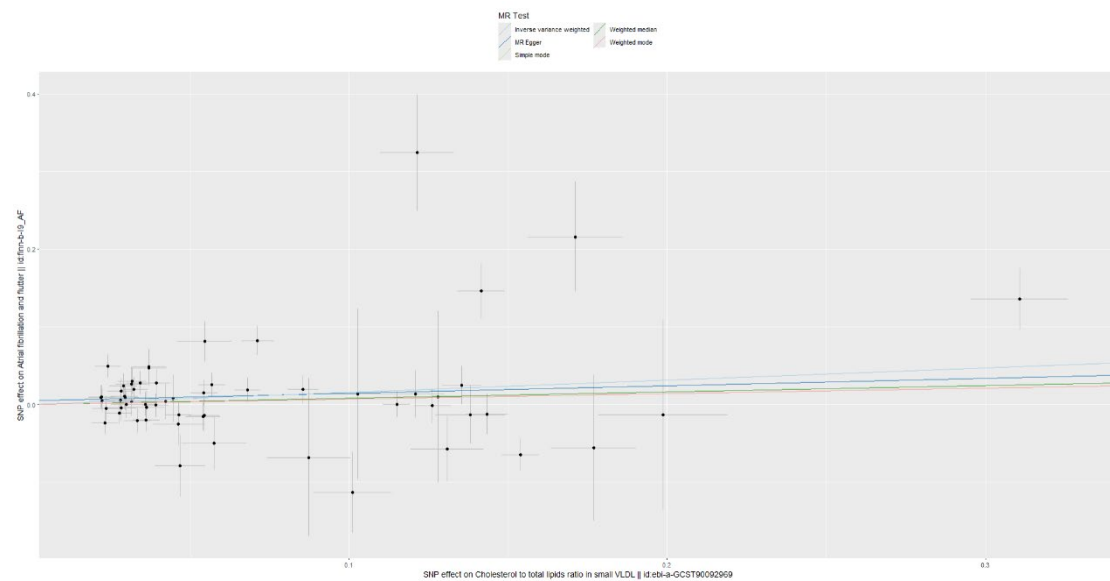
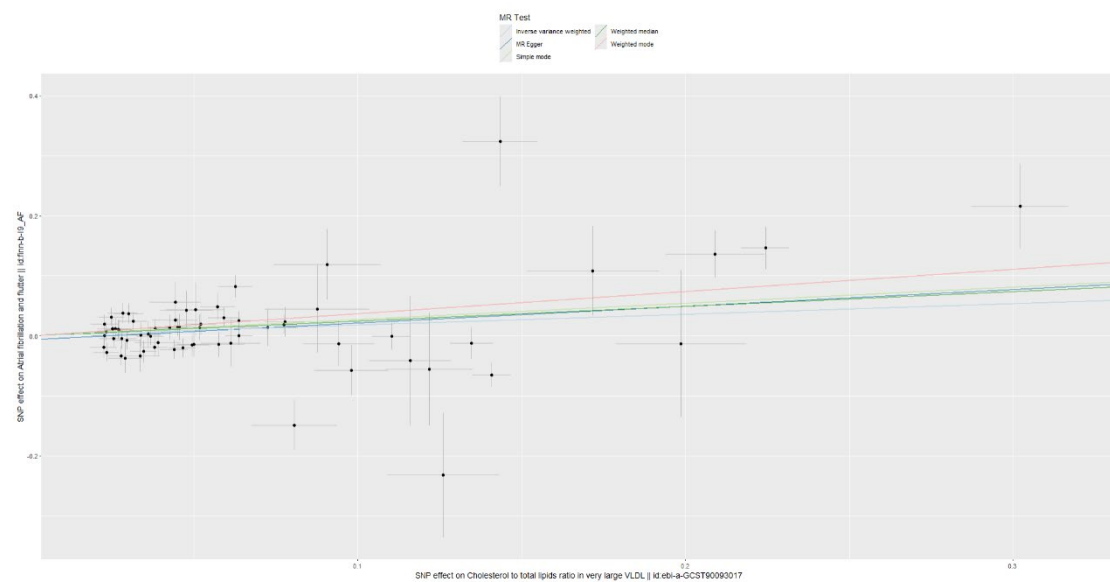


Figure S5 Scatter plot of MR effect size for causal associations between lipid traits and atrial fibrillation/Flutter

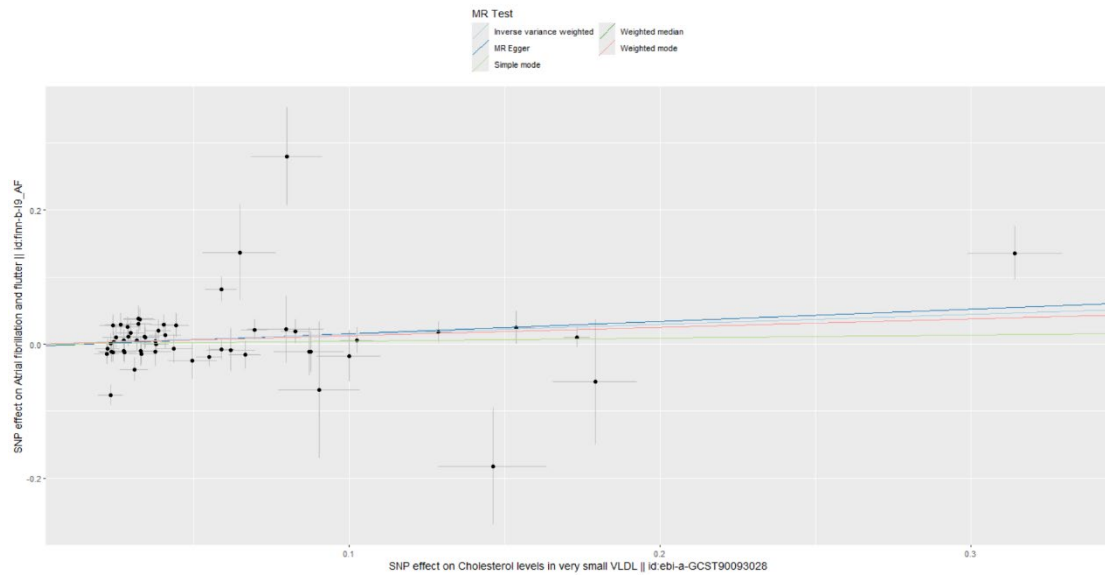
1) Cholesterol to total lipids ratio in small VLDL



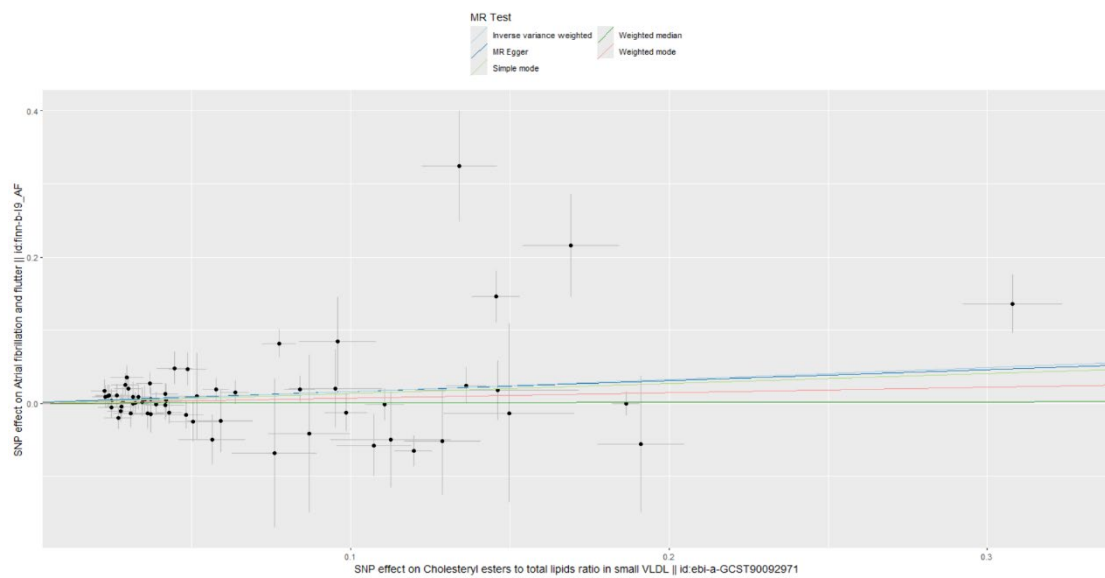
2) Cholesterol to total lipids ratio in very large VLDL



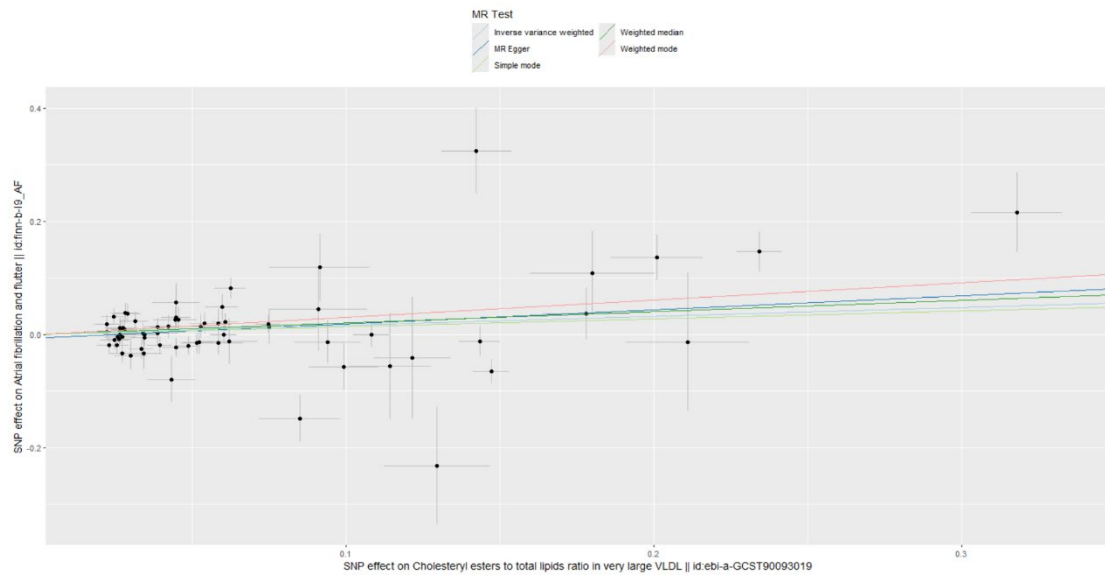
3) Cholesterol levels in very small VLDL



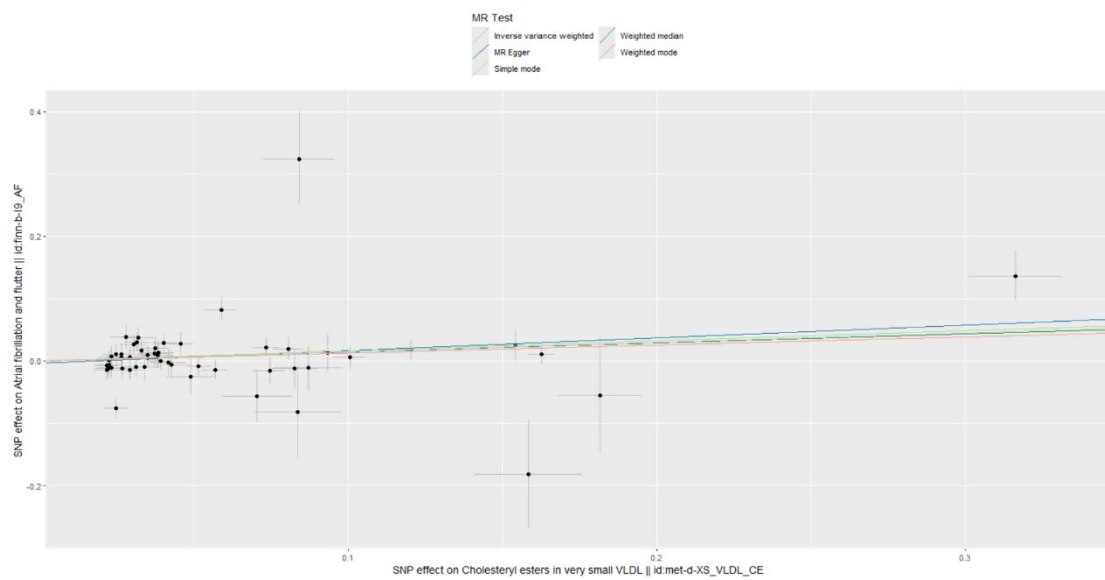
4) Cholesteryl esters to total lipids ratio in small VLDL



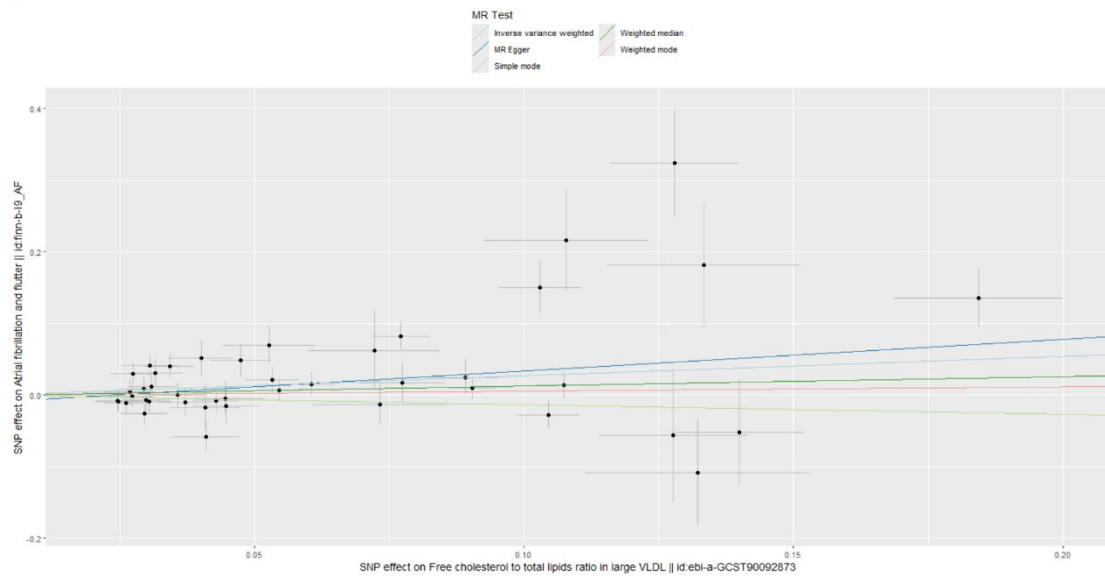
5) Cholesteryl esters to total lipids ratio in very large VLDL



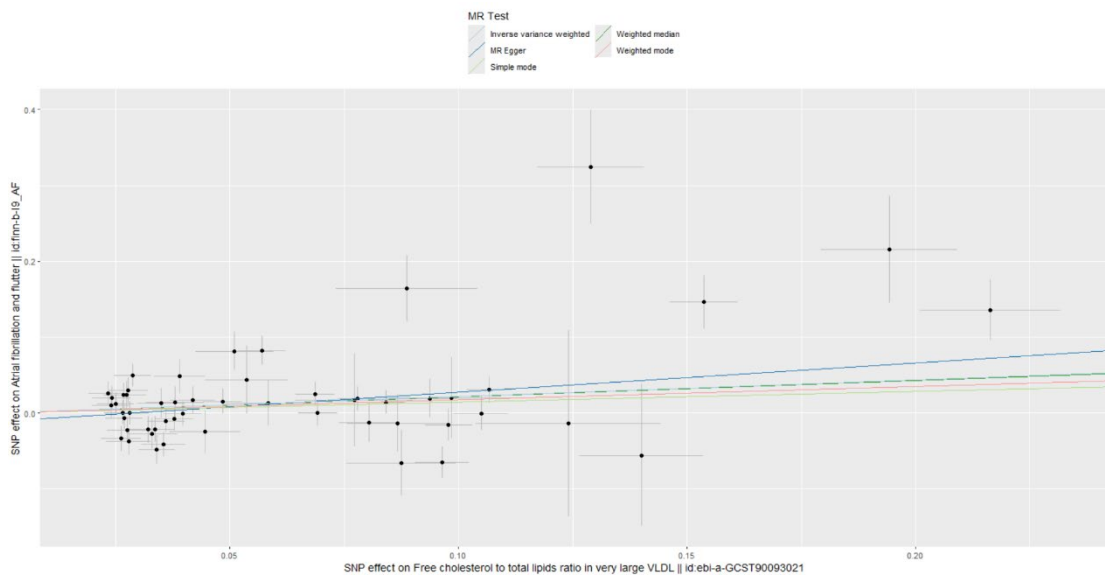
6) Cholesteryl esters in very small VLDL



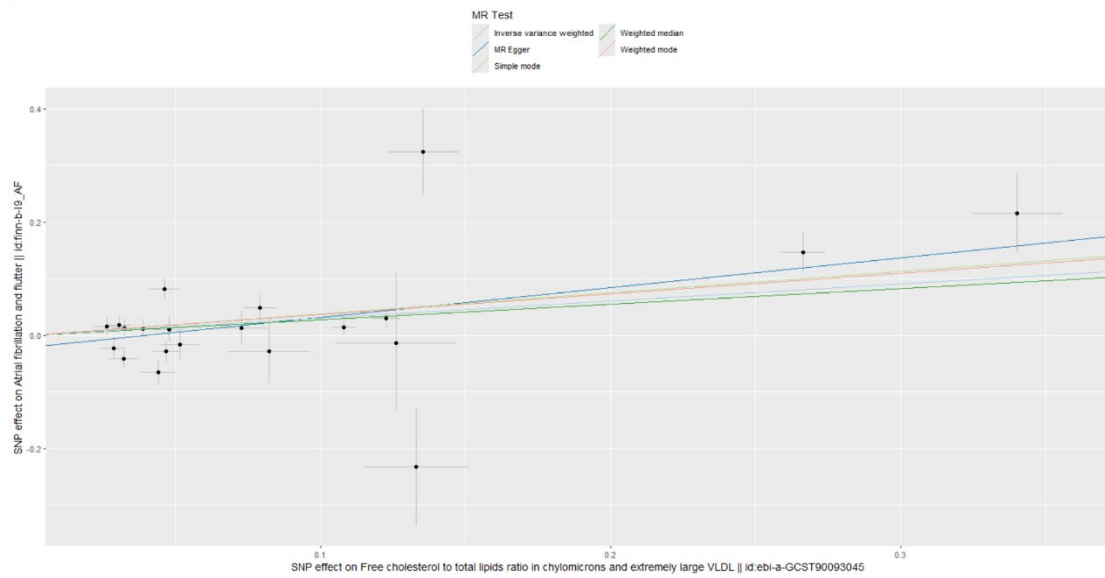
7) Free cholesterol to total lipids ratio in large VLDL



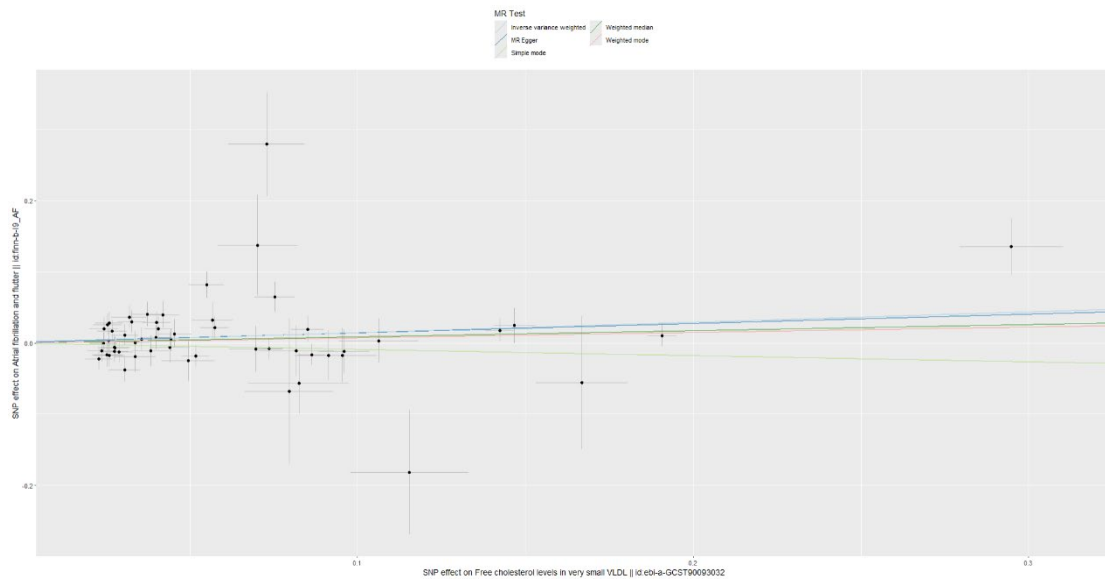
8) Free cholesterol to total lipids ratio in very large VLDL



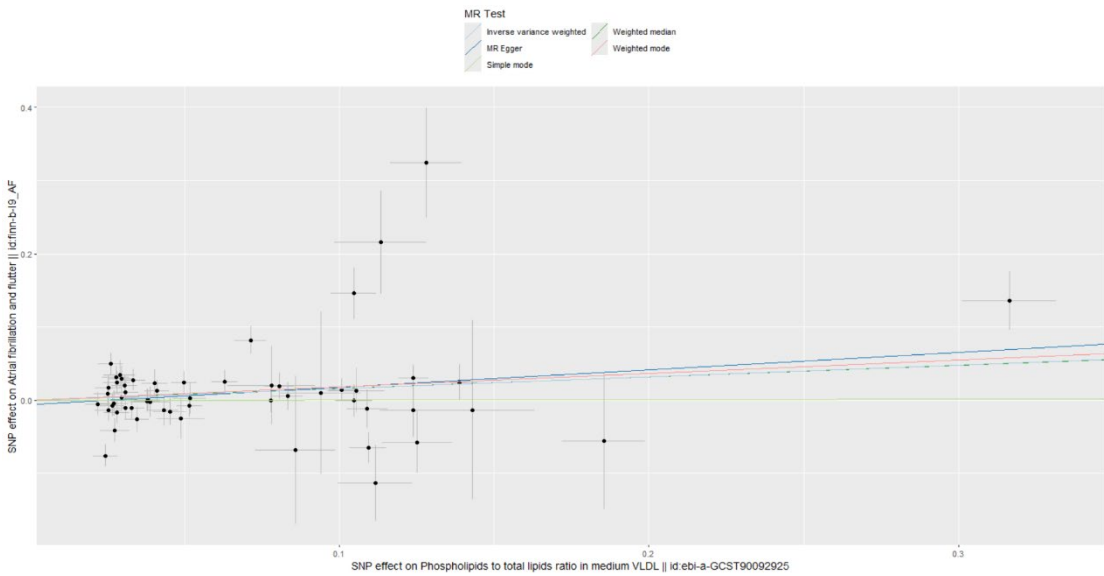
9) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL



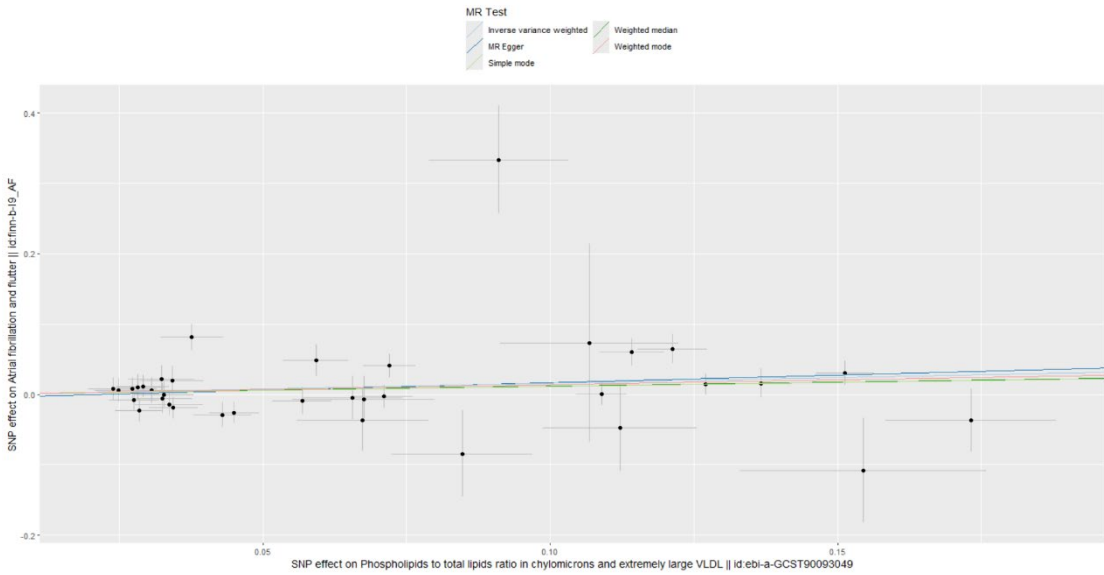
10) Free cholesterol levels in very small VLDL



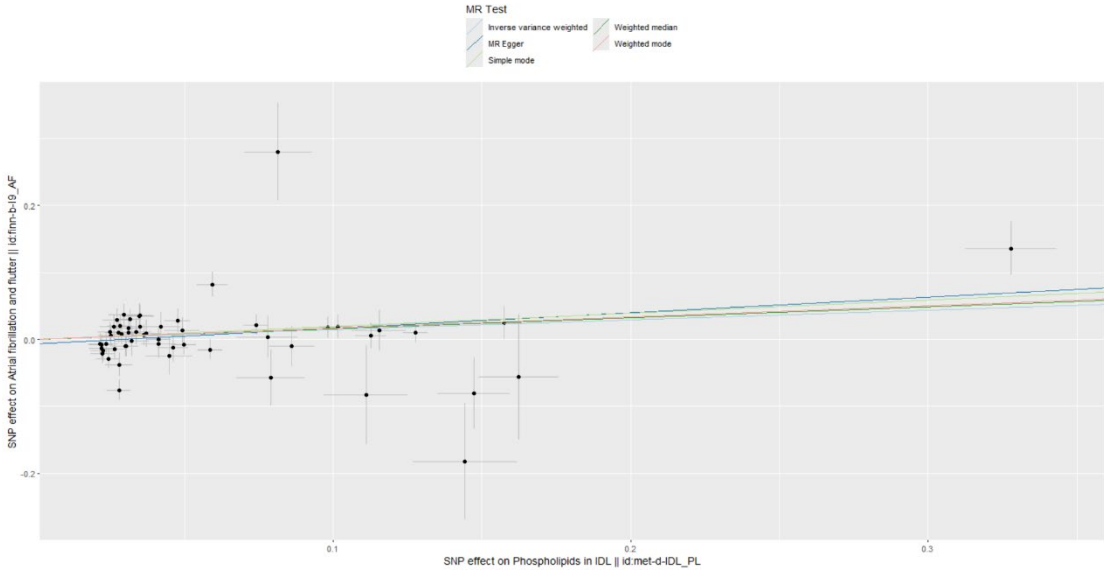
11) Phospholipids to total lipids ratio in medium VLDL



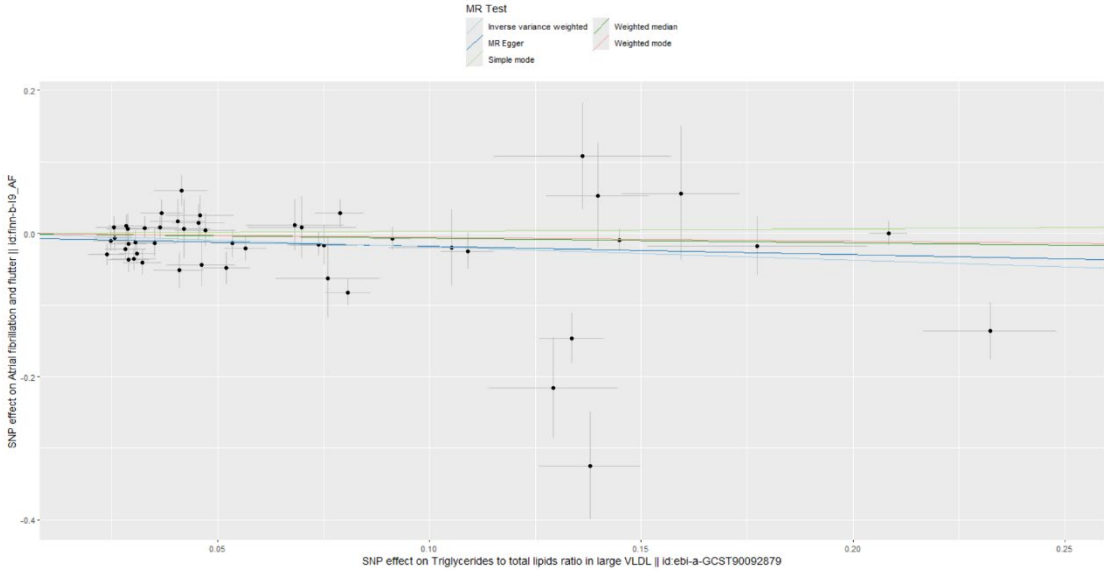
12) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL



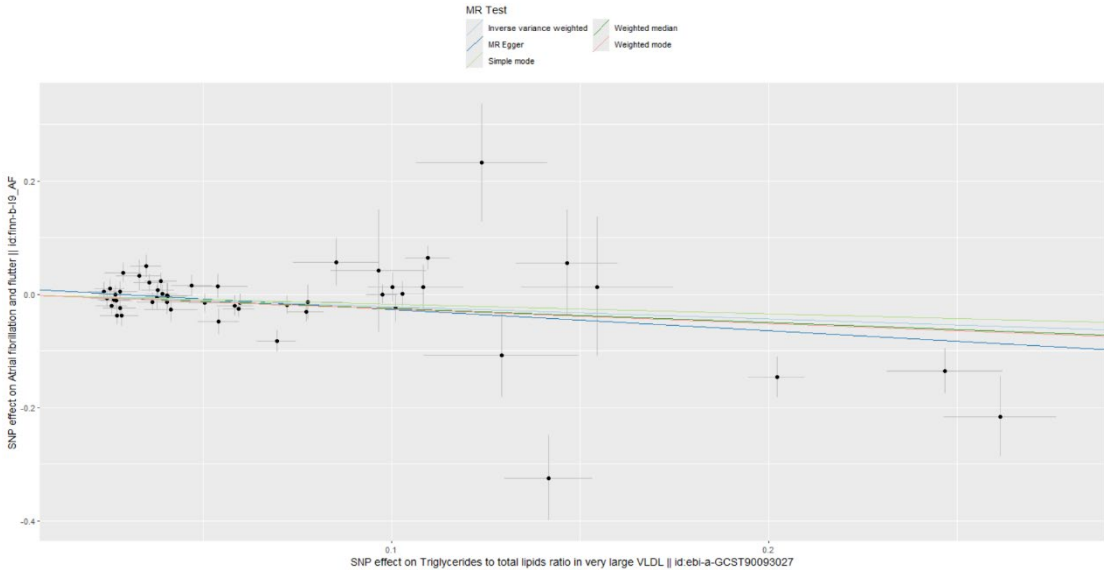
13) Phospholipids in IDL



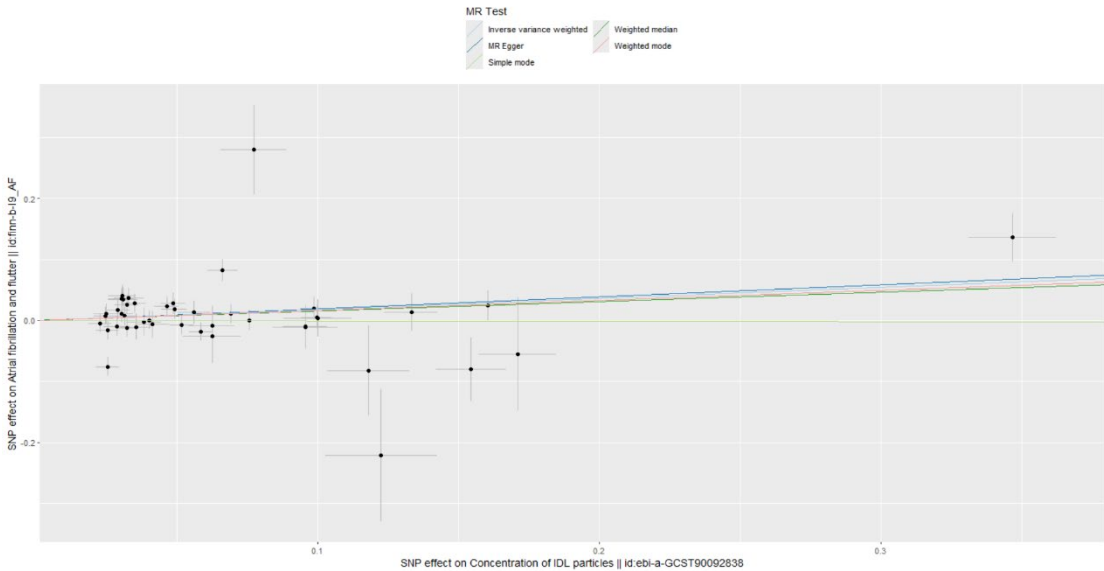
14) Triglycerides to total lipids ratio in large VLDL



15) Triglycerides to total lipids ratio in very large VLDL



16) Concentration of IDL particles



17) Concentration of very small VLDL particles

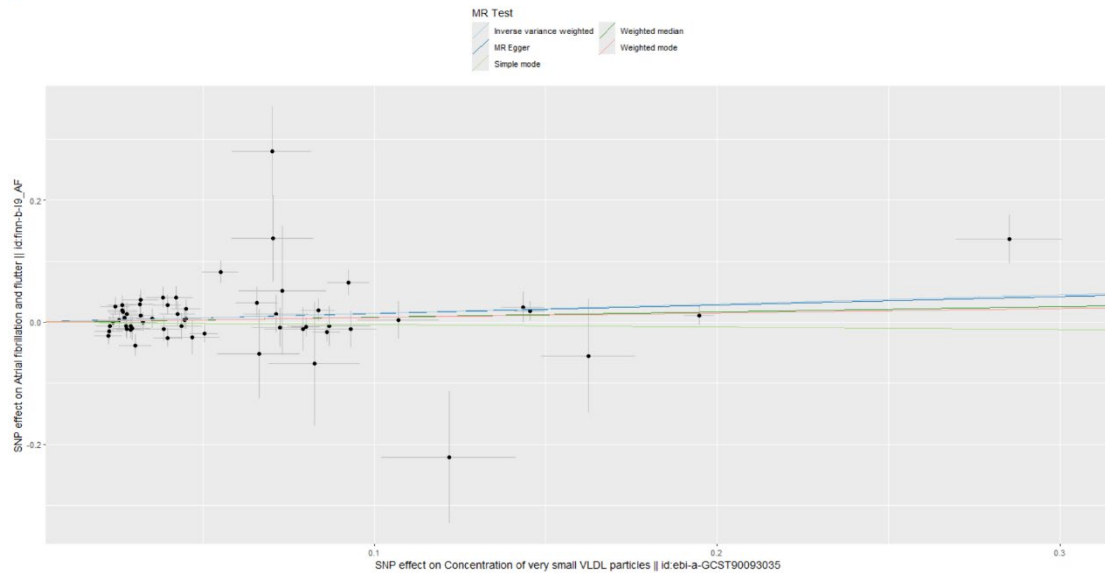
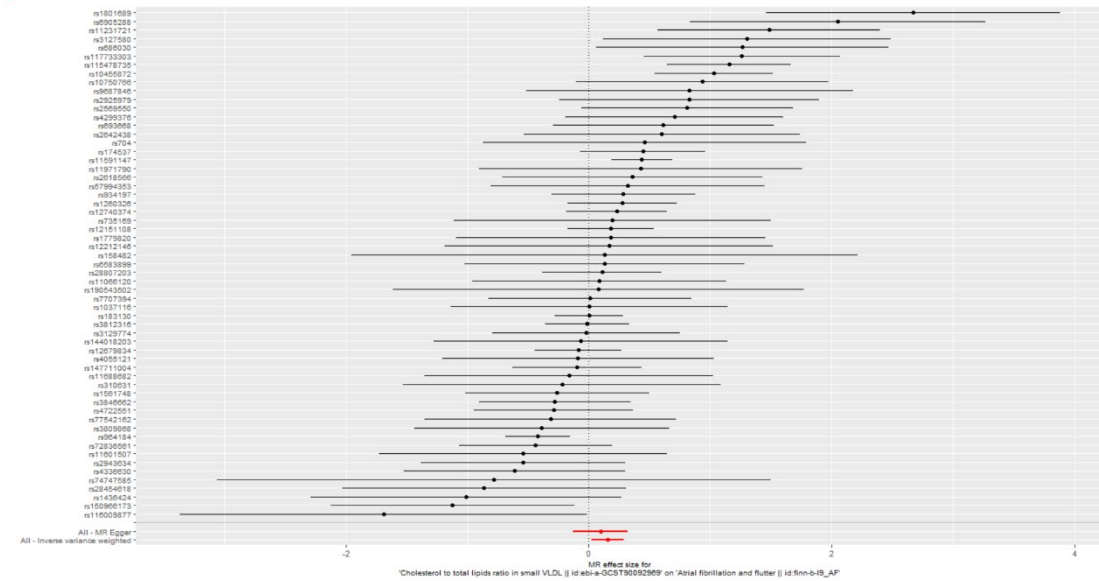
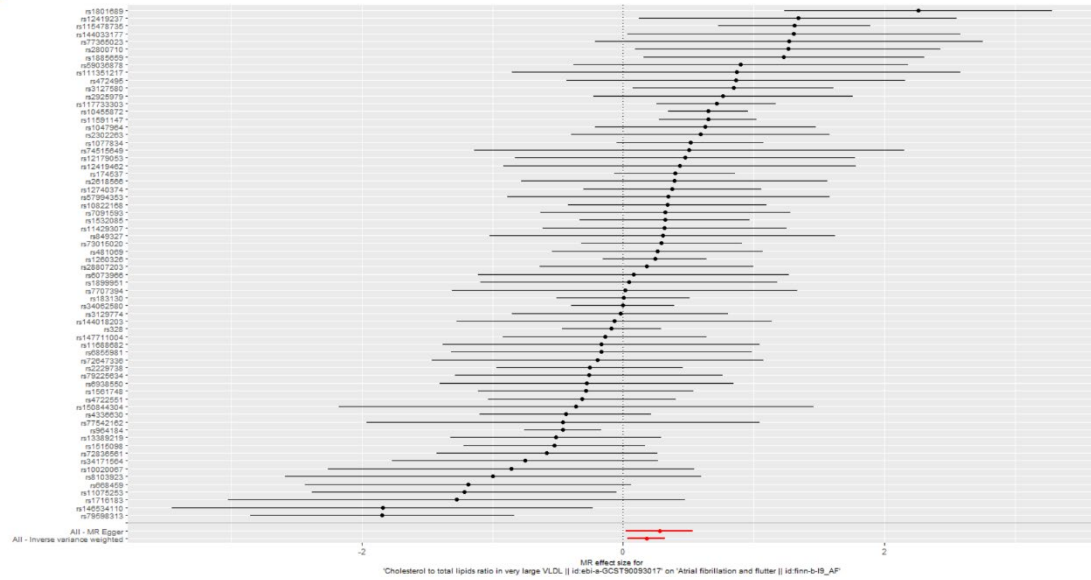


Figure S6 Forest plot of MR effect size using IVW methods for causal associations between lipid traits and atrial fibrillation/Flutter.

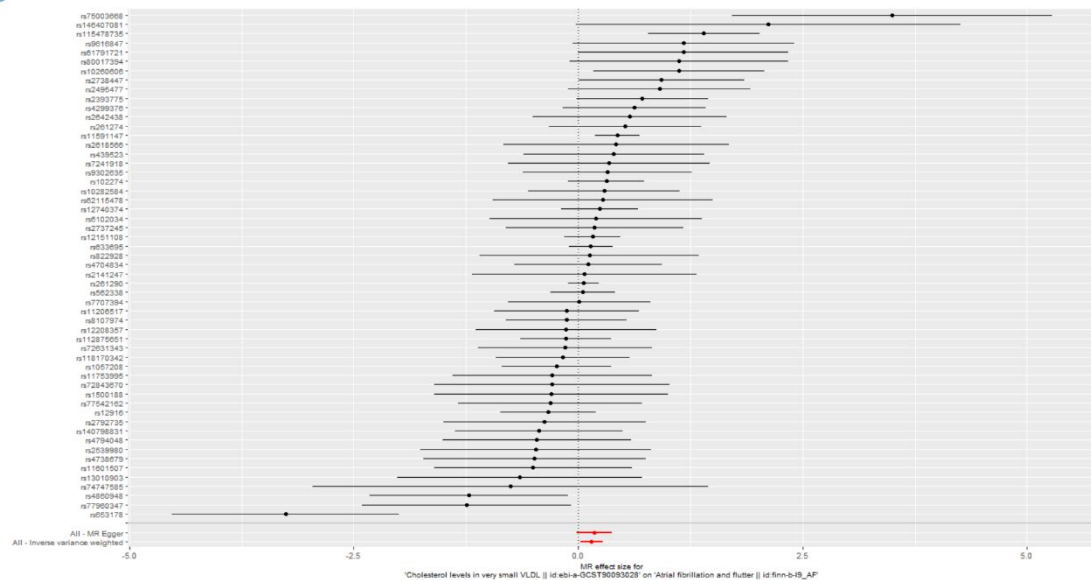
1) Cholesterol to total lipids ratio in small VLDL



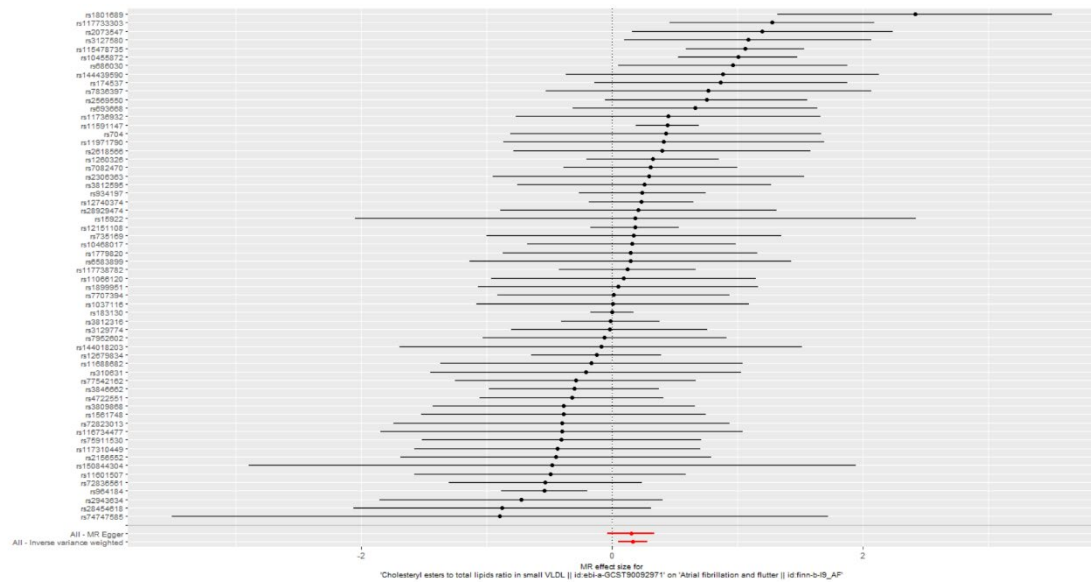
2) Cholesterol to total lipids ratio in very large VLDL



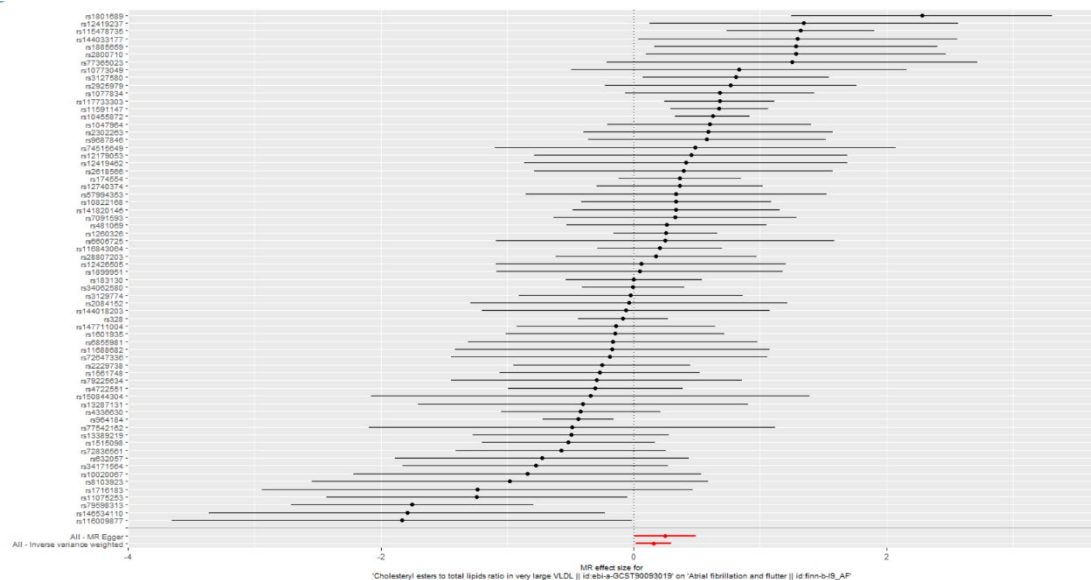
3) Cholesterol levels in very small VLDL



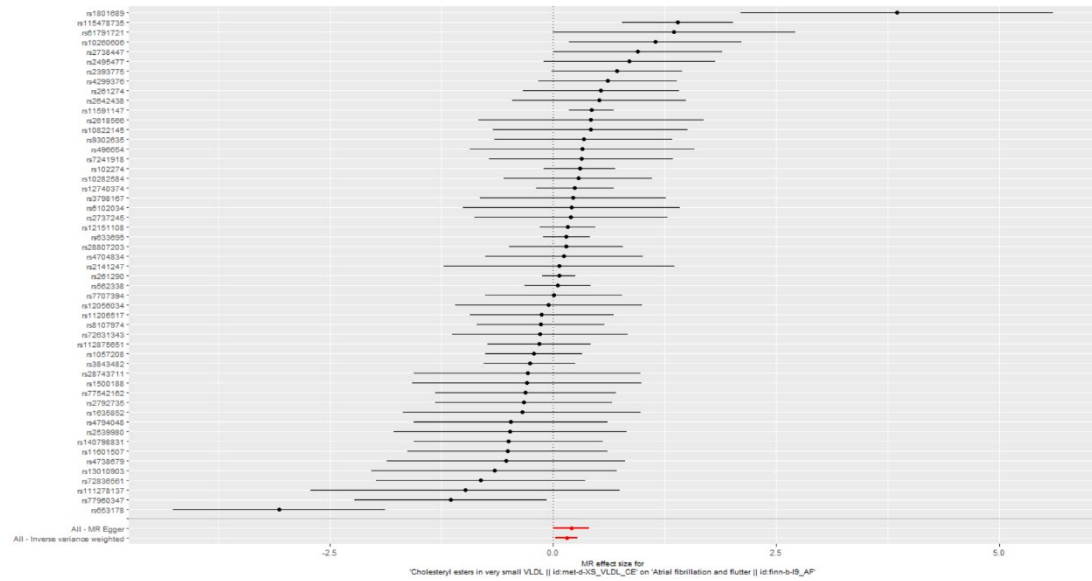
4) Cholesteryl esters to total lipids ratio in small VLDL



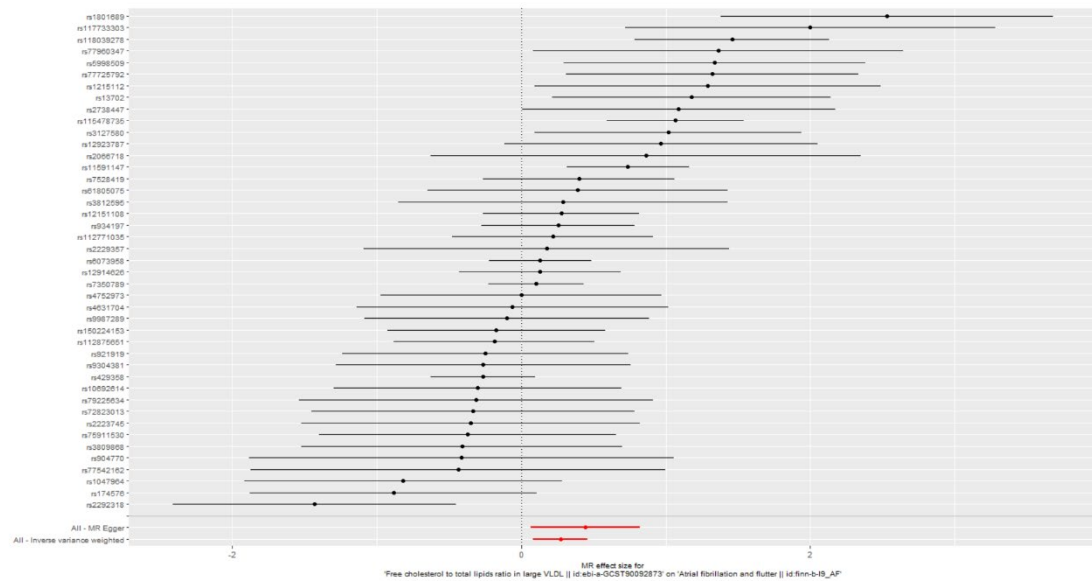
5) Cholesteryl esters to total lipids ratio in very large VLDL



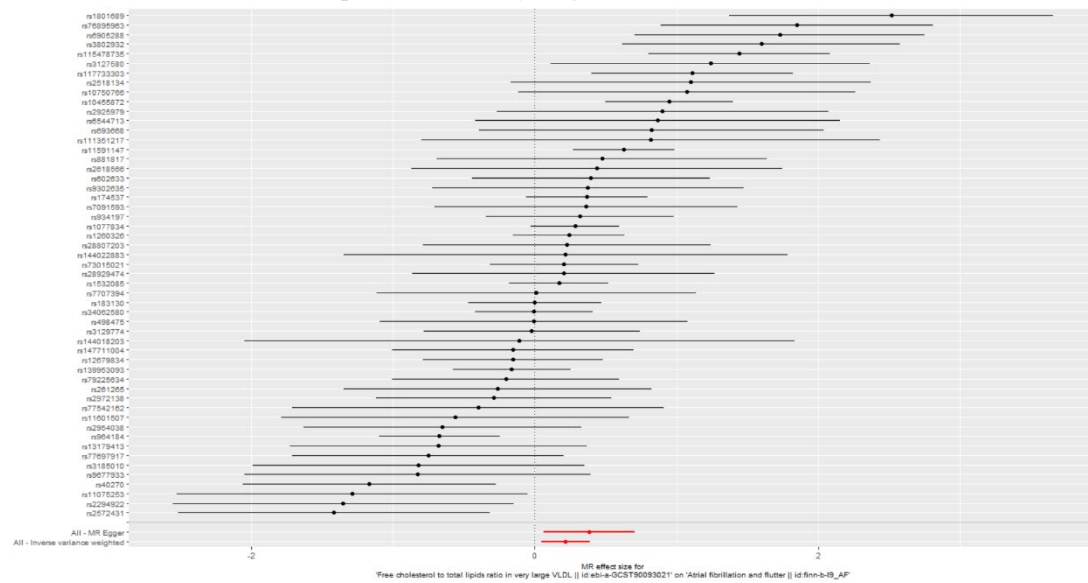
6) Cholesteryl esters in very small VLDL



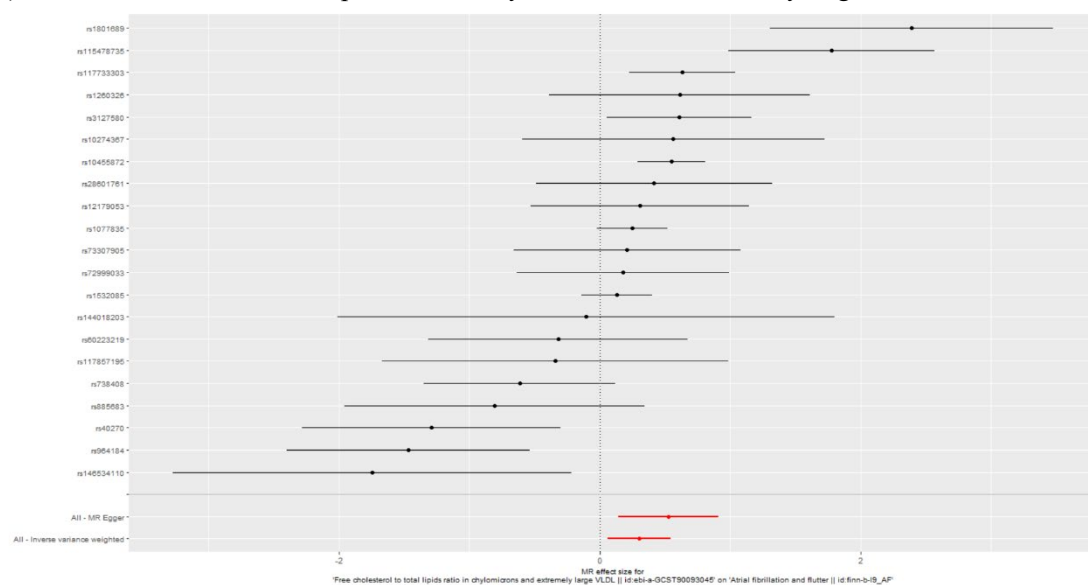
7) Free cholesterol to total lipids ratio in large VLDL



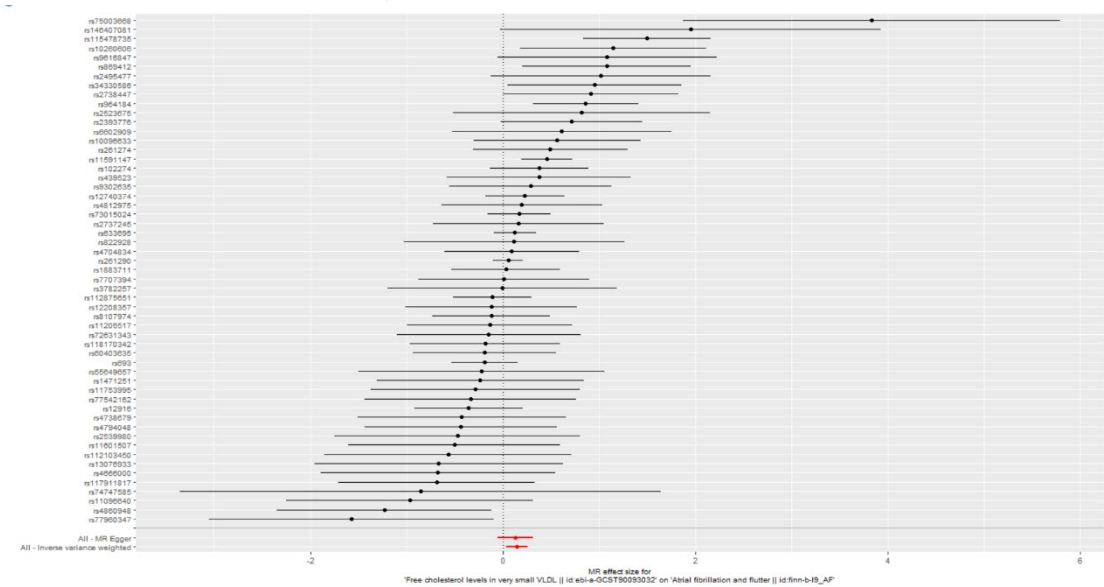
8) Free cholesterol to total lipids ratio in very large VLDL



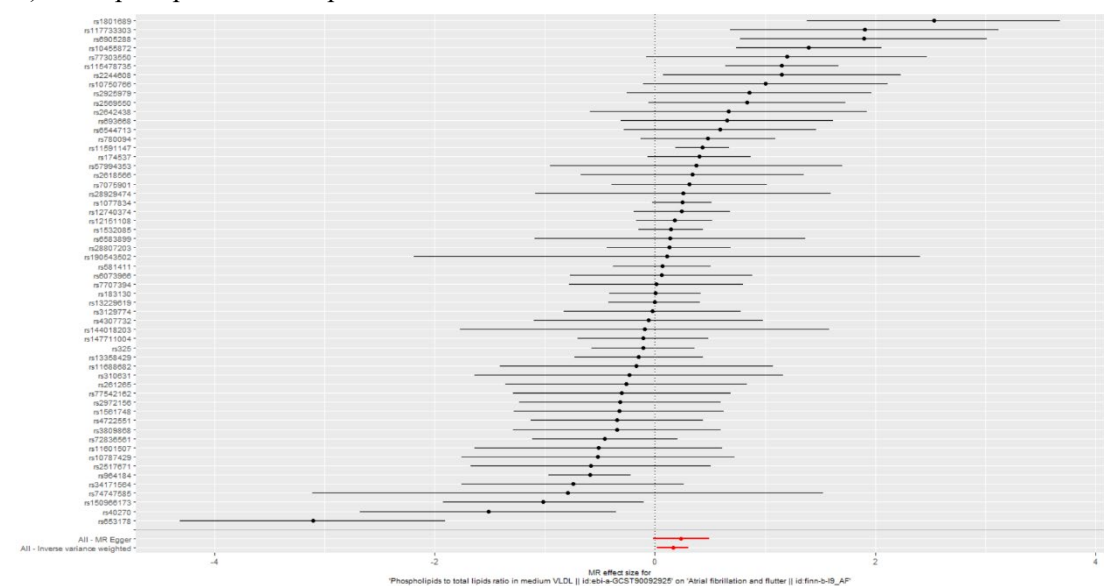
9) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL



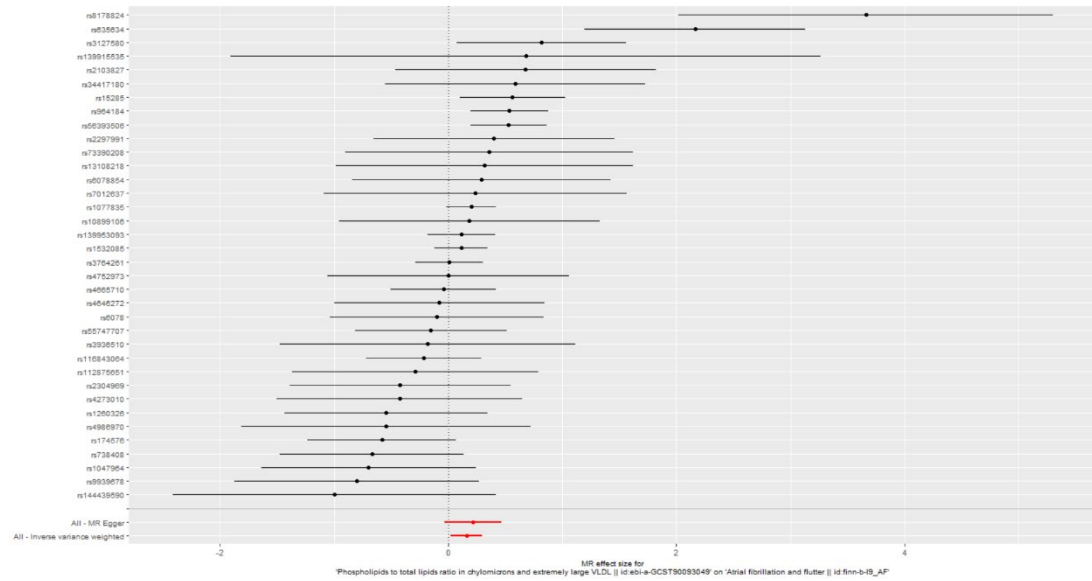
10) Free cholesterol levels in very small VLDL



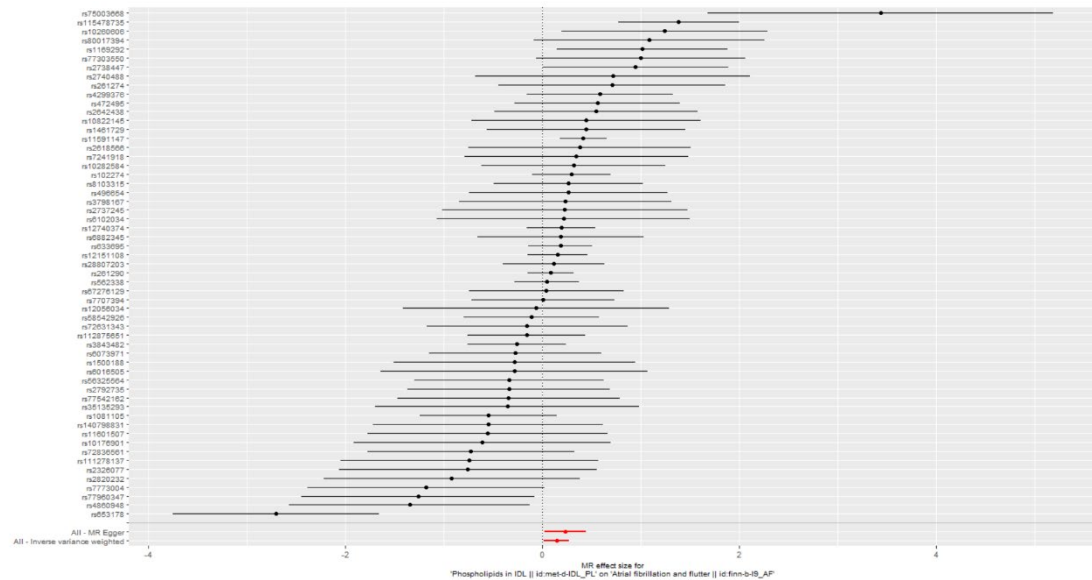
11) Phospholipids to total lipids ratio in medium VLDL



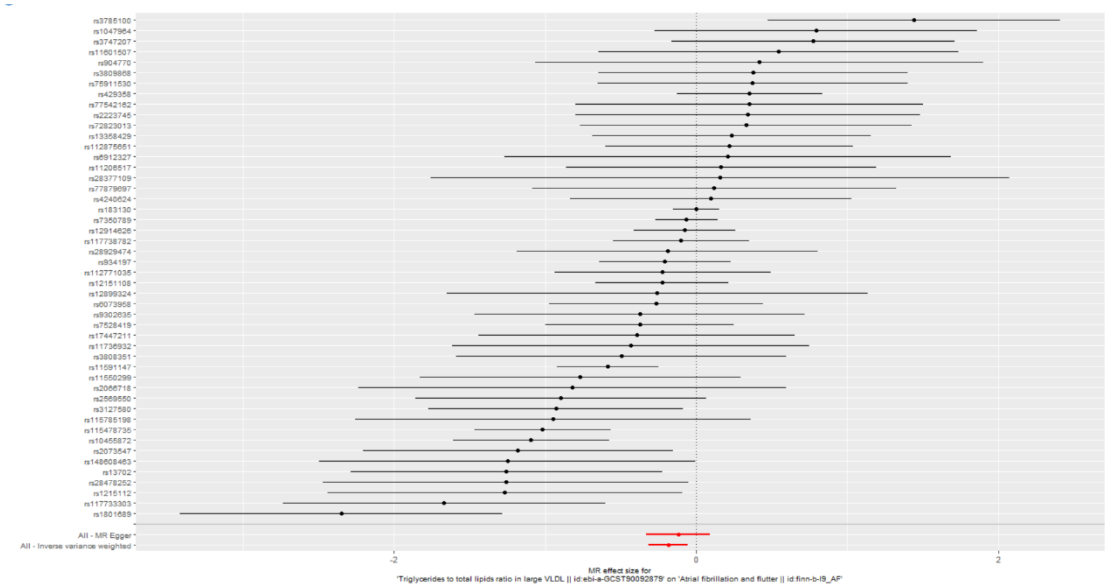
12) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL



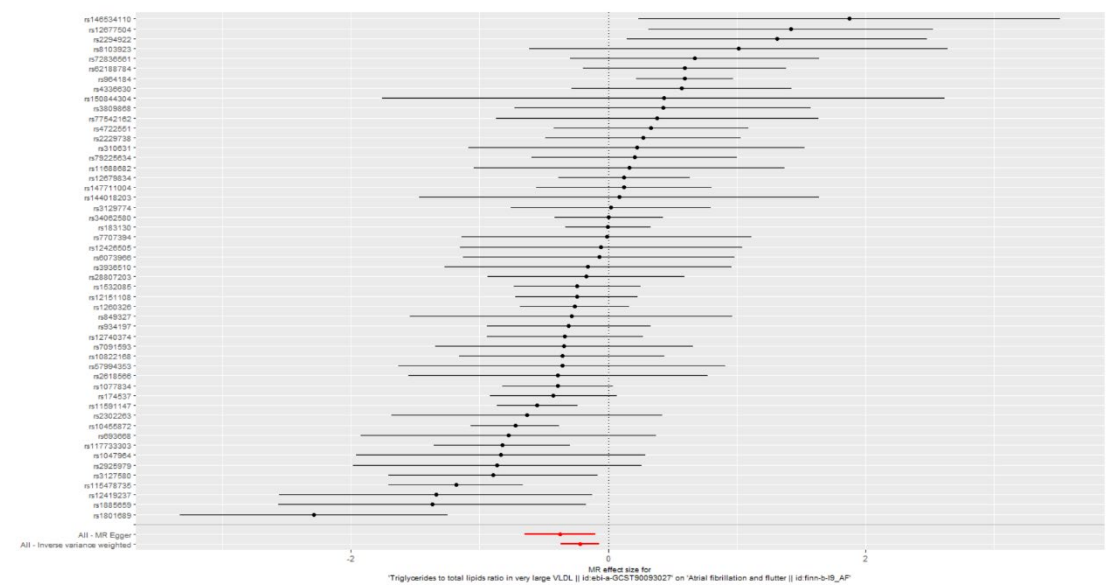
13) Phospholipids in IDL



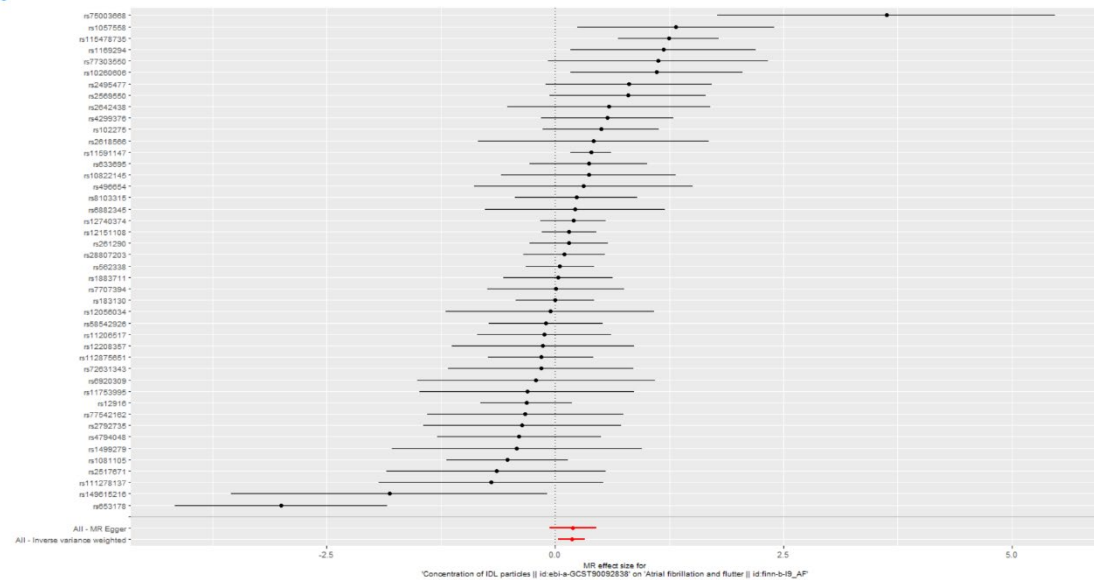
14) Triglycerides to total lipids ratio in large VLDL



15) Triglycerides to total lipids ratio in very large VLDL



16) Concentration of IDL particles



17) Concentration of very small VLDL particles

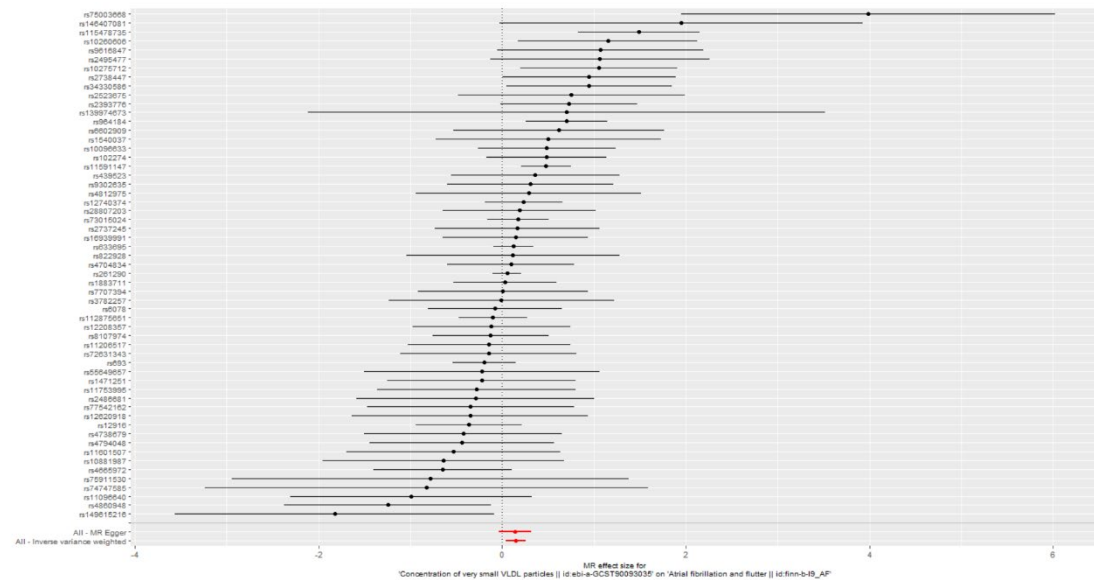
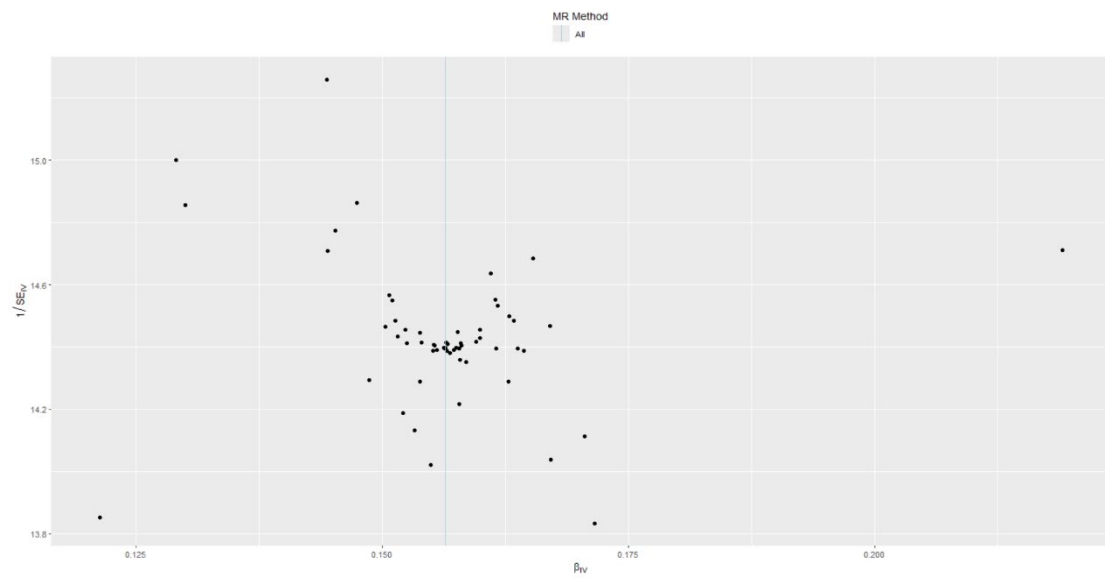
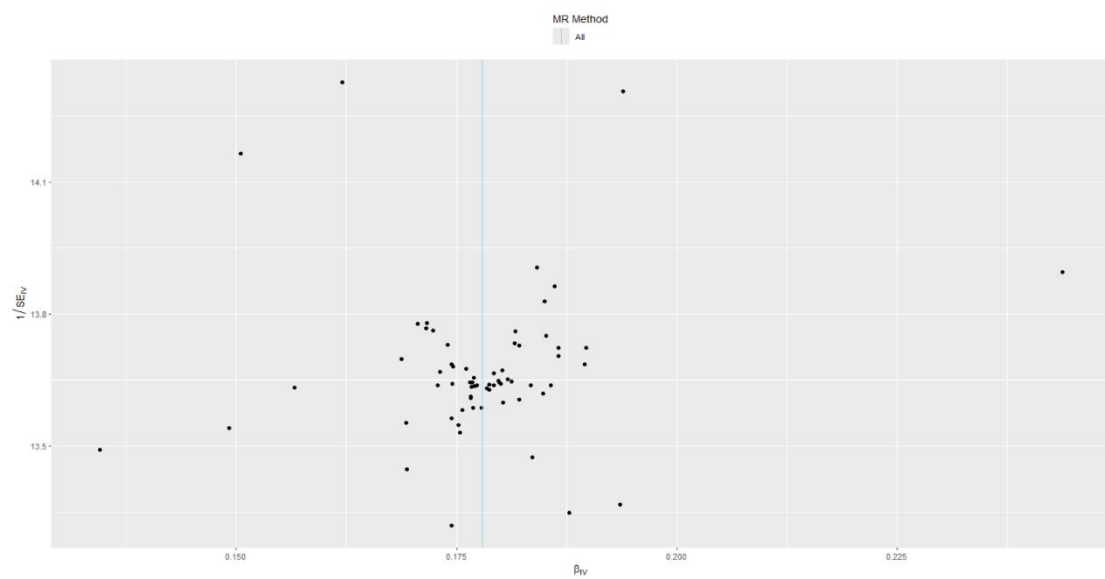


Figure S7 Funnel plot of causal associations between lipid traits and atrial fibrillation/Flutter.

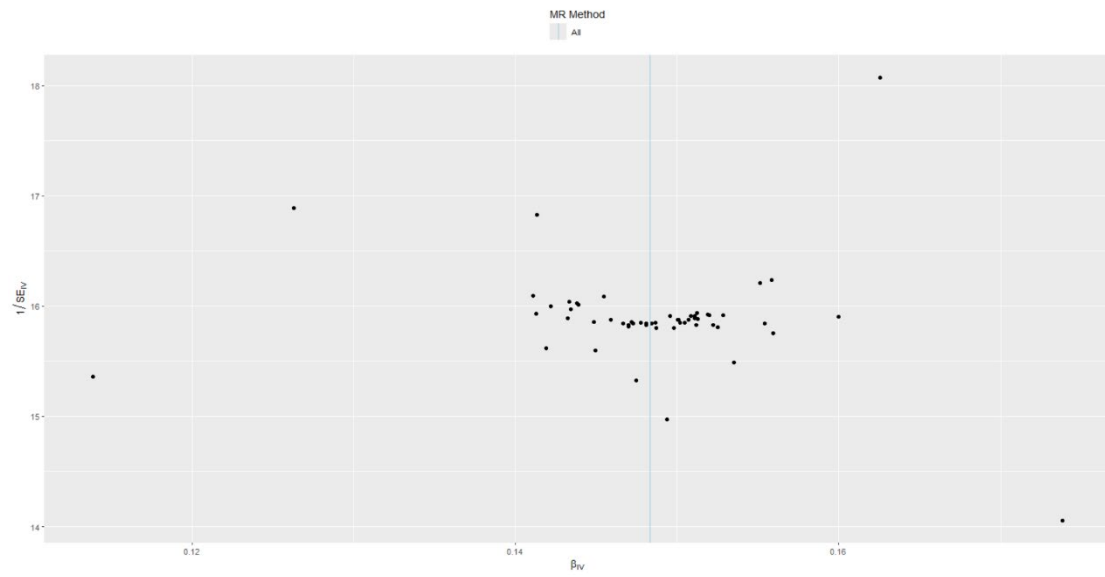
1) Cholesterol to total lipids ratio in small VLDL



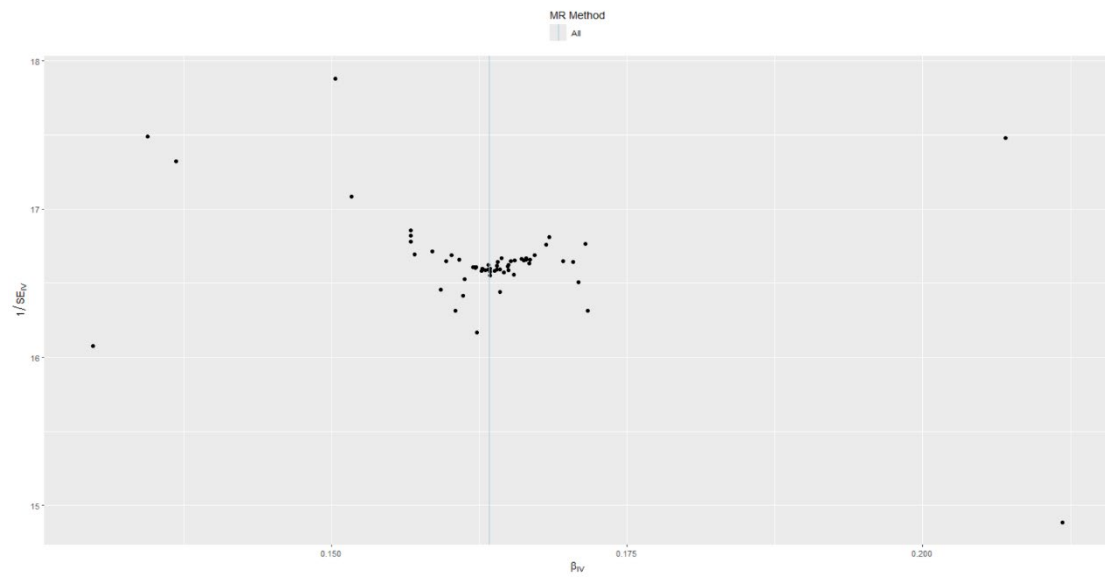
2) Cholesterol to total lipids ratio in very large VLDL



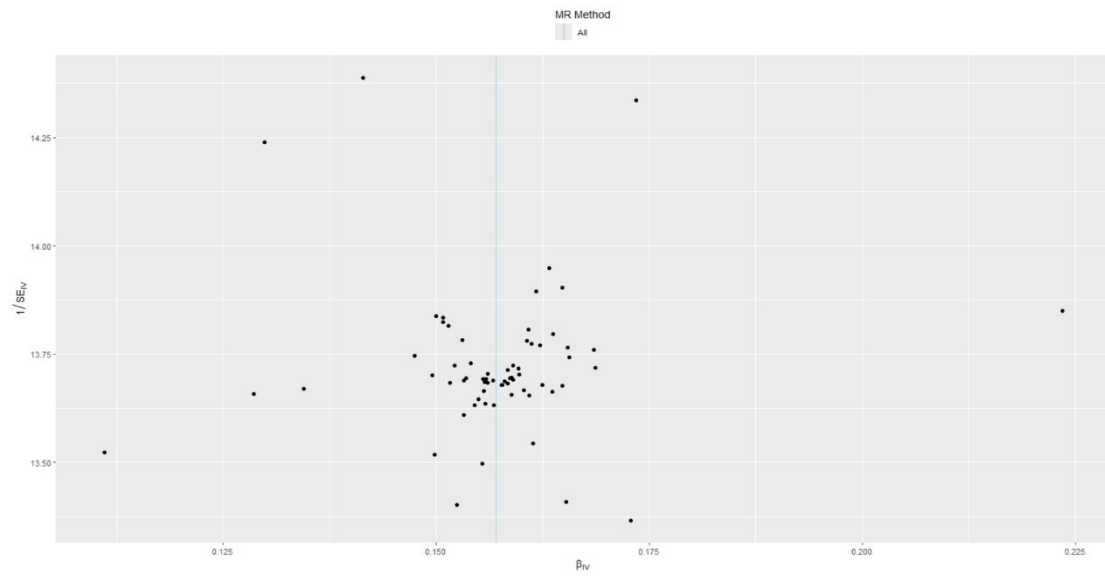
3) Cholesterol levels in very small VLDL



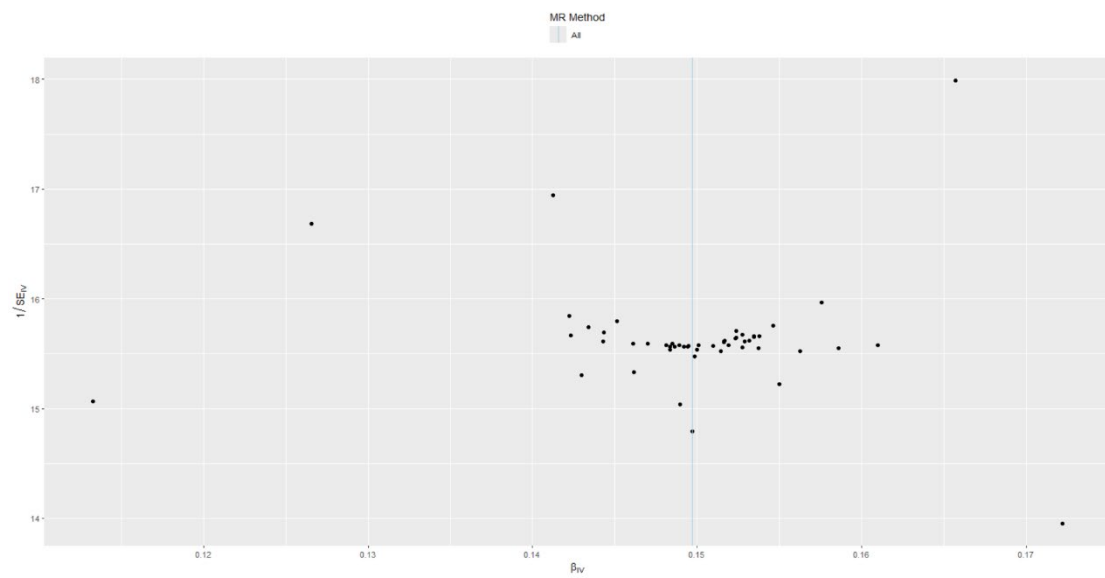
4) Cholesteryl esters to total lipids ratio in small VLDL



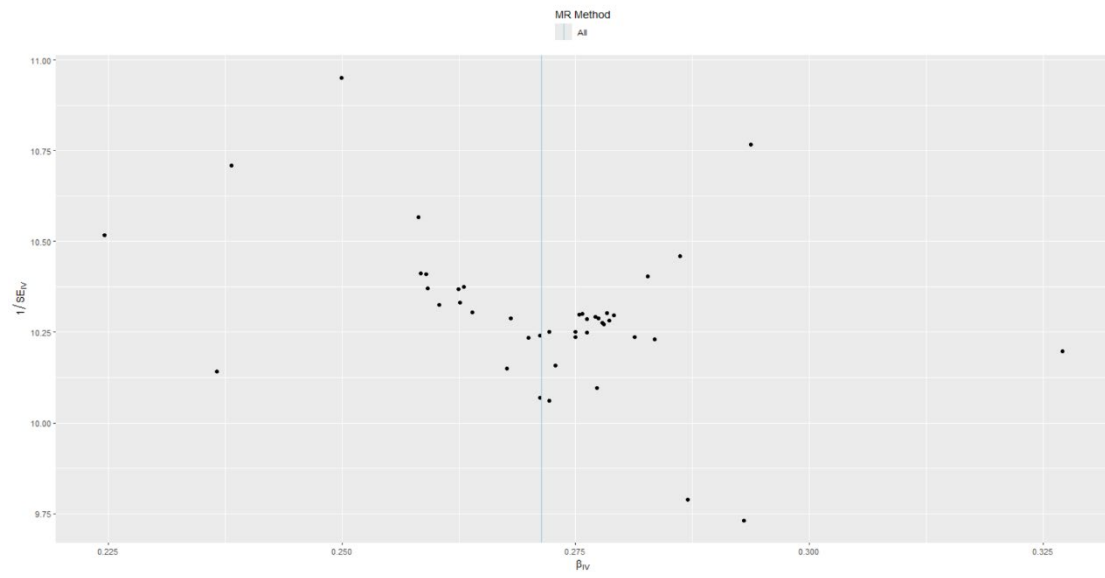
5) Cholesteryl esters to total lipids ratio in very large VLDL



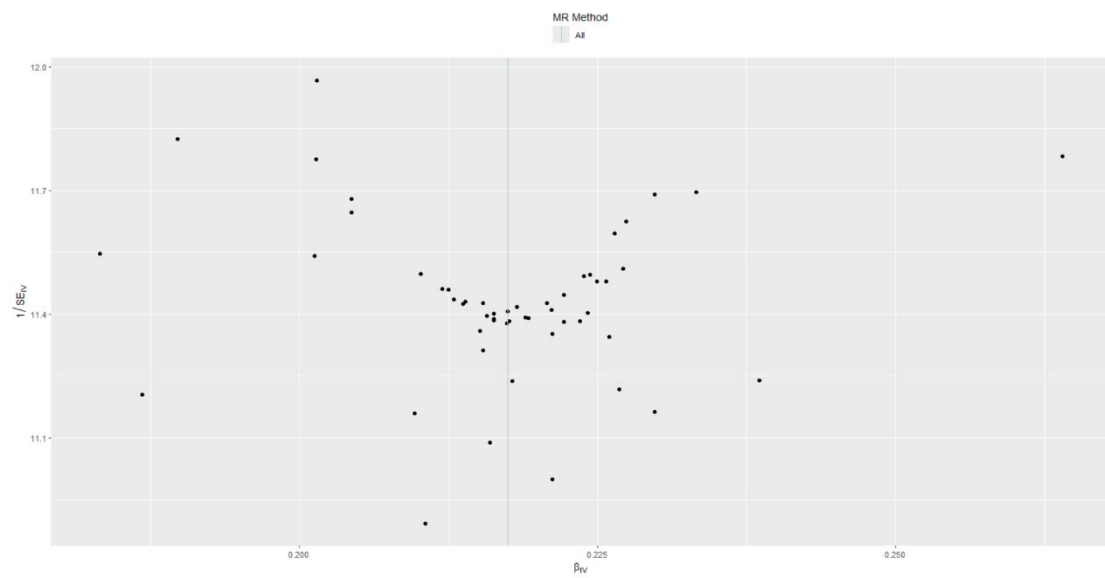
6) Cholesteryl esters in very small VLDL



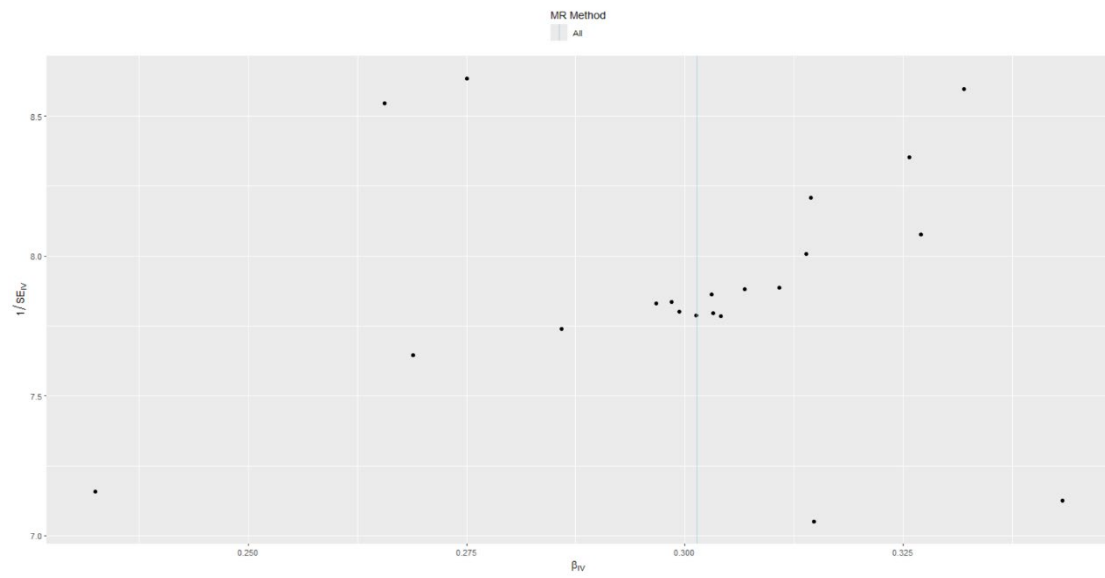
7) Free cholesterol to total lipids ratio in large VLDL



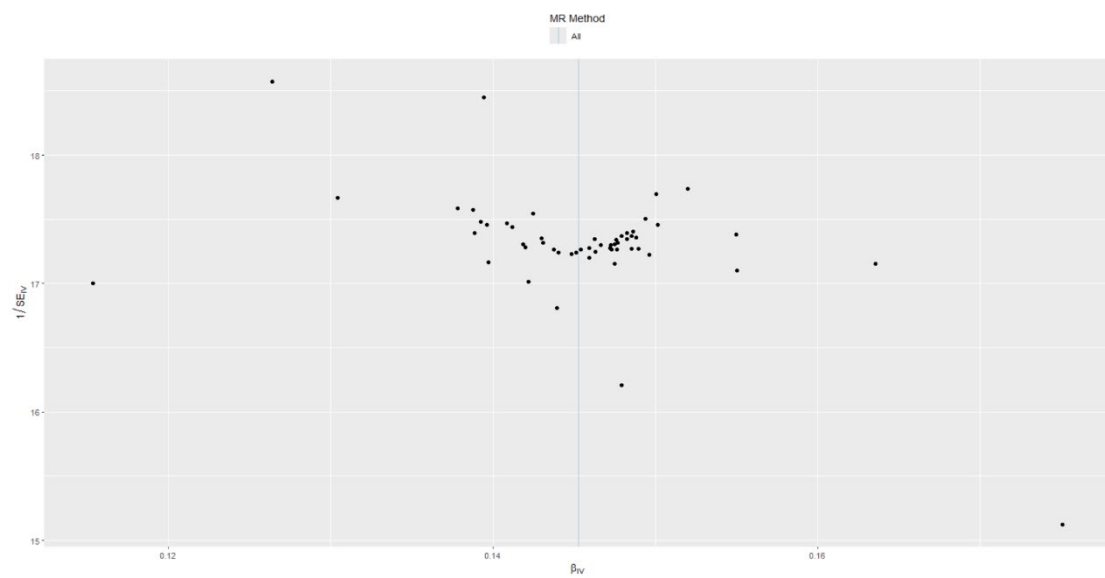
8) Free cholesterol to total lipids ratio in very large VLDL



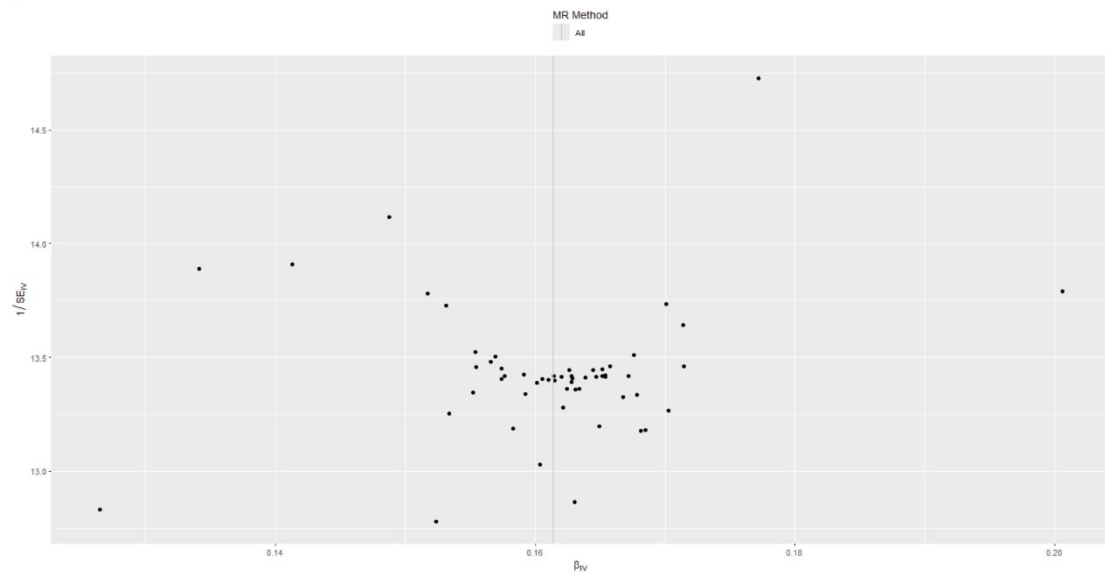
9) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL



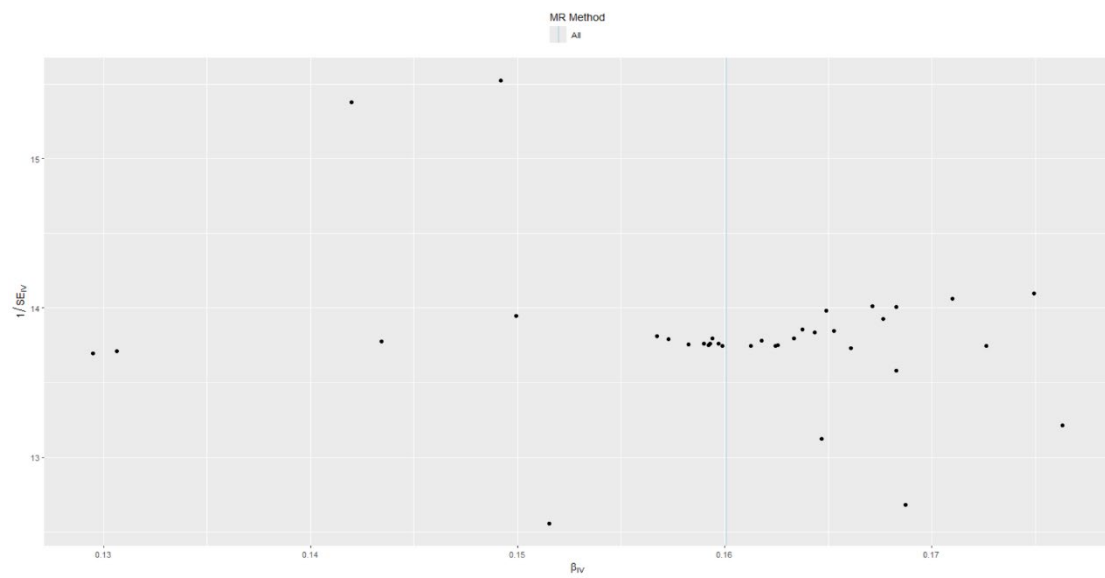
10) Free cholesterol levels in very small VLDL



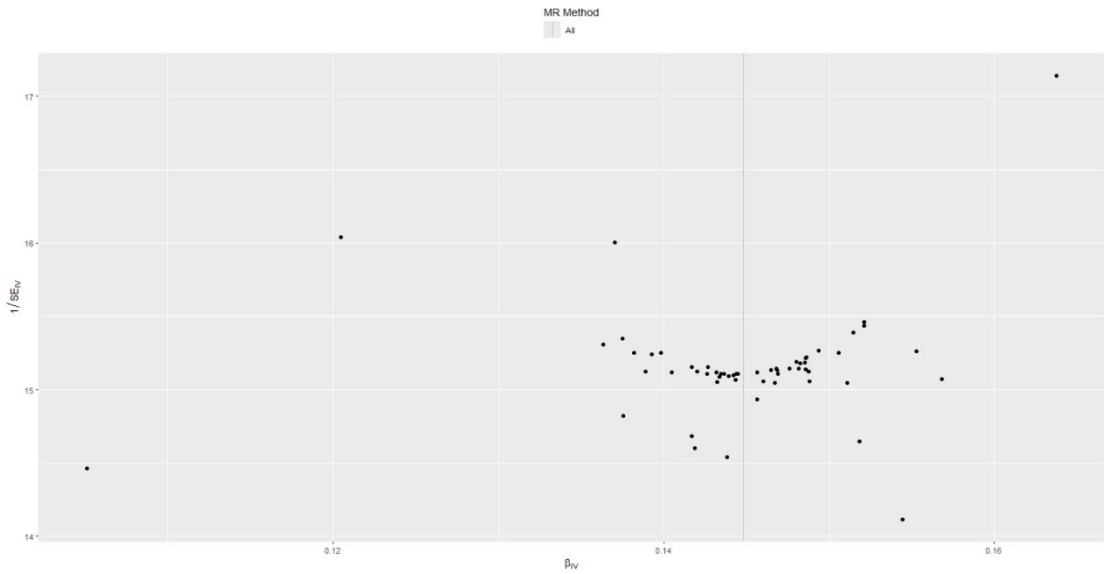
11) Phospholipids to total lipids ratio in medium VLDL



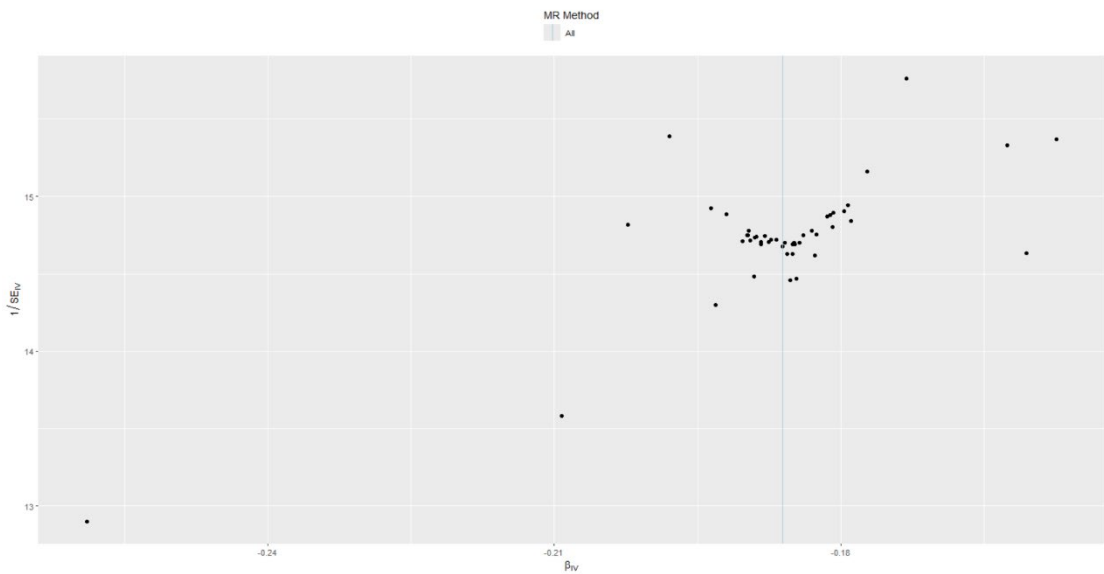
12) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL



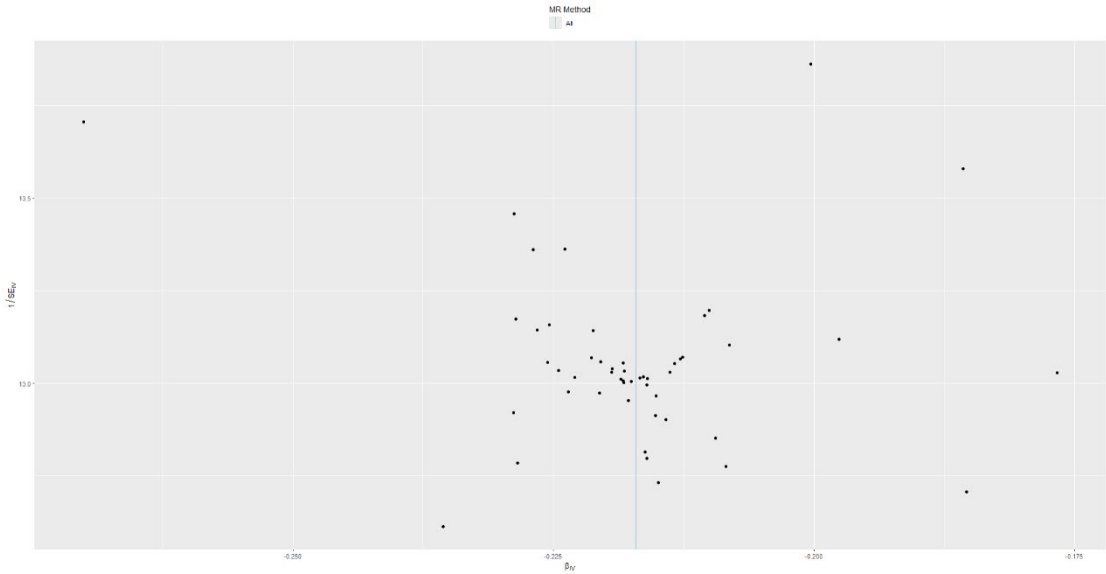
13) Phospholipids in IDL



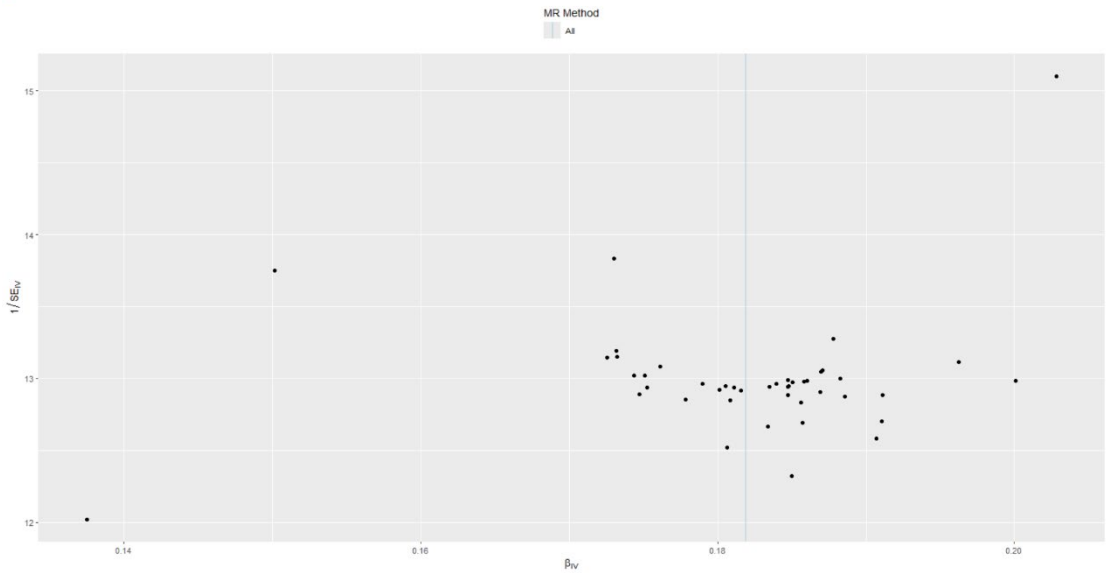
14) Triglycerides to total lipids ratio in large VLDL



15) Triglycerides to total lipids ratio in very large VLDL



16) Concentration of IDL particles



17) Concentration of very small VLDL particles

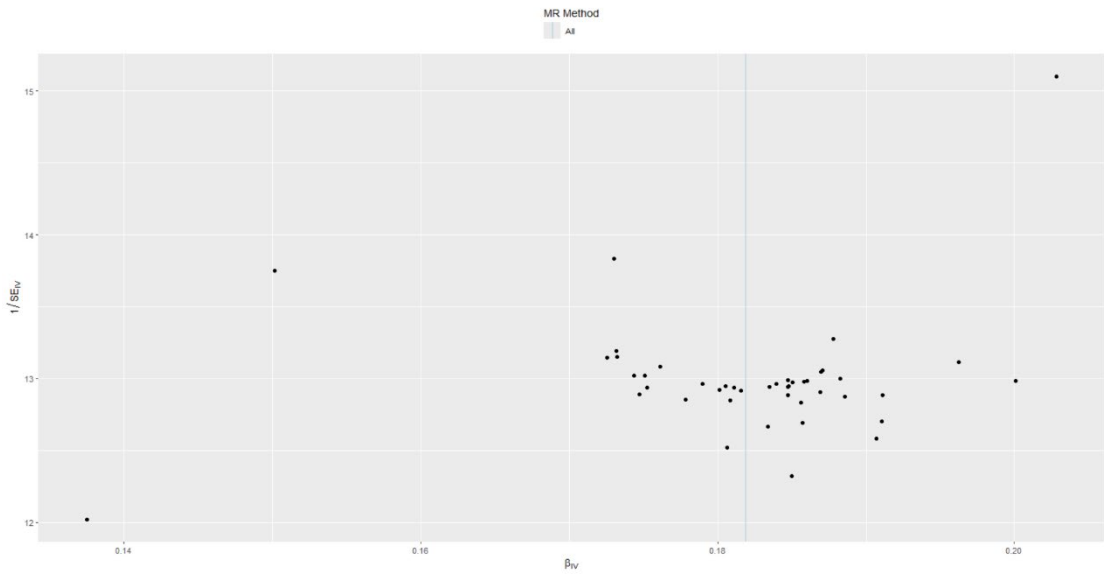
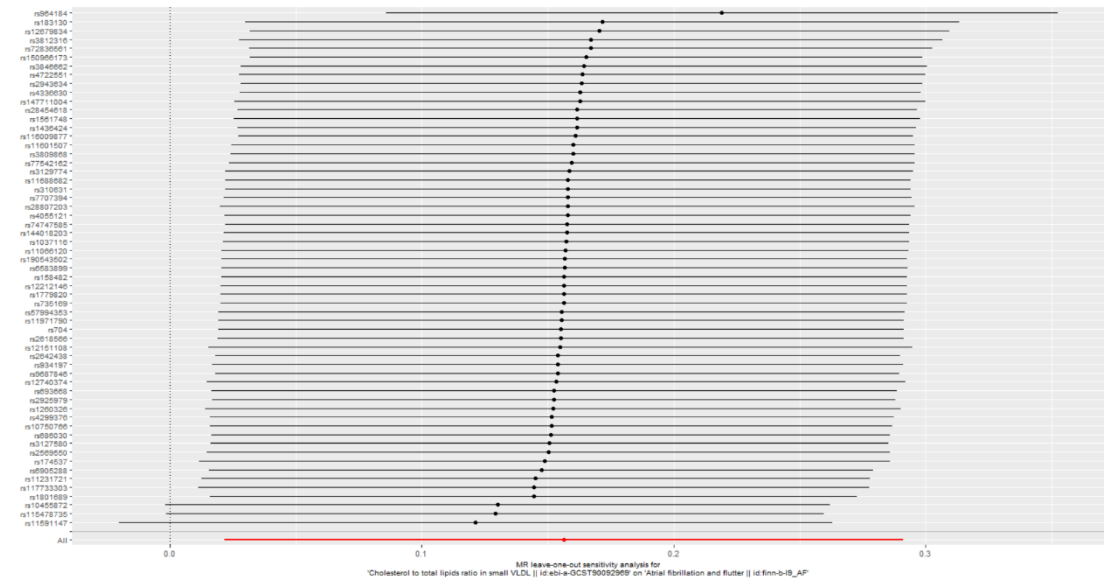
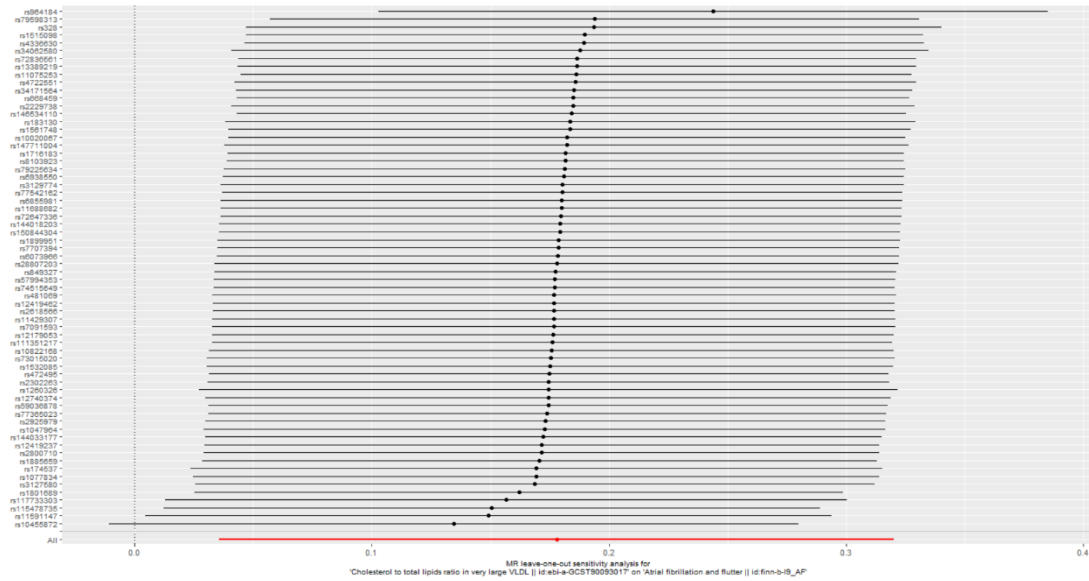


Figure S8 Leave-one-out plot to assess if a single variant is driving the association between lipid traits and atrial fibrillation/Flutter

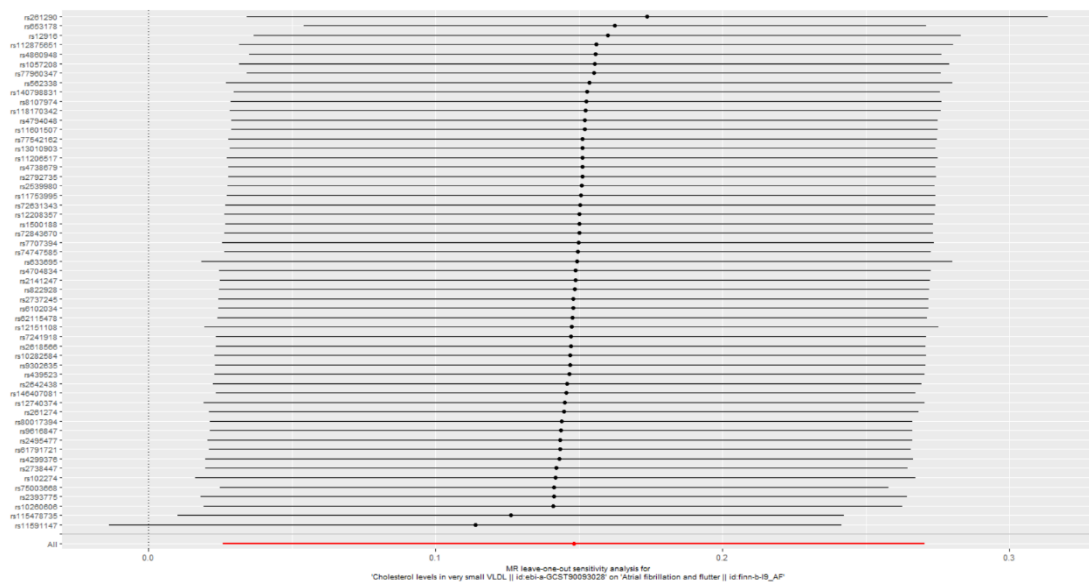
1) Cholesterol to total lipids ratio in small VLDL



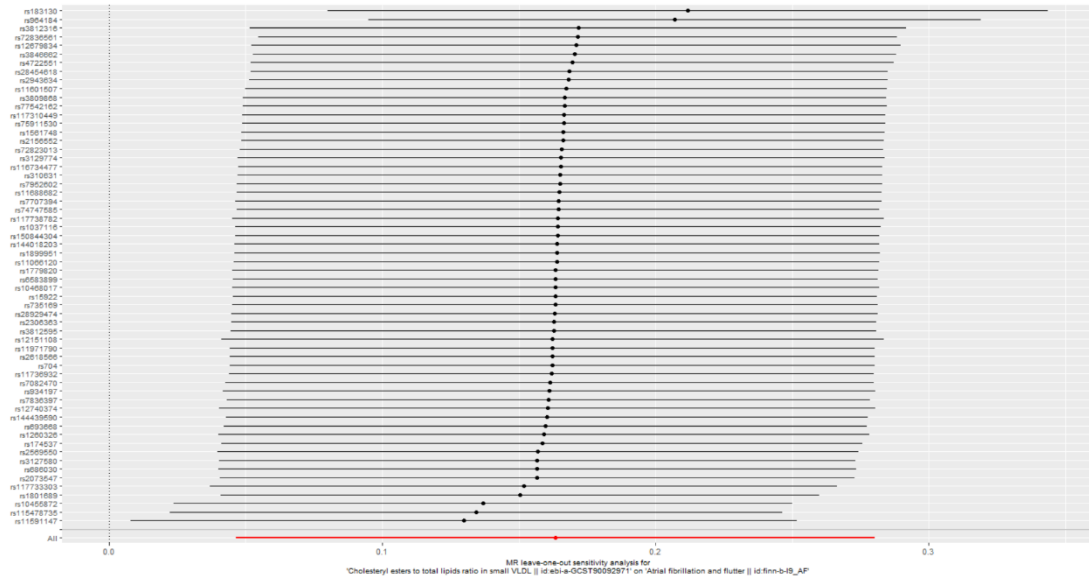
2) Cholesterol to total lipids ratio in very large VLDL



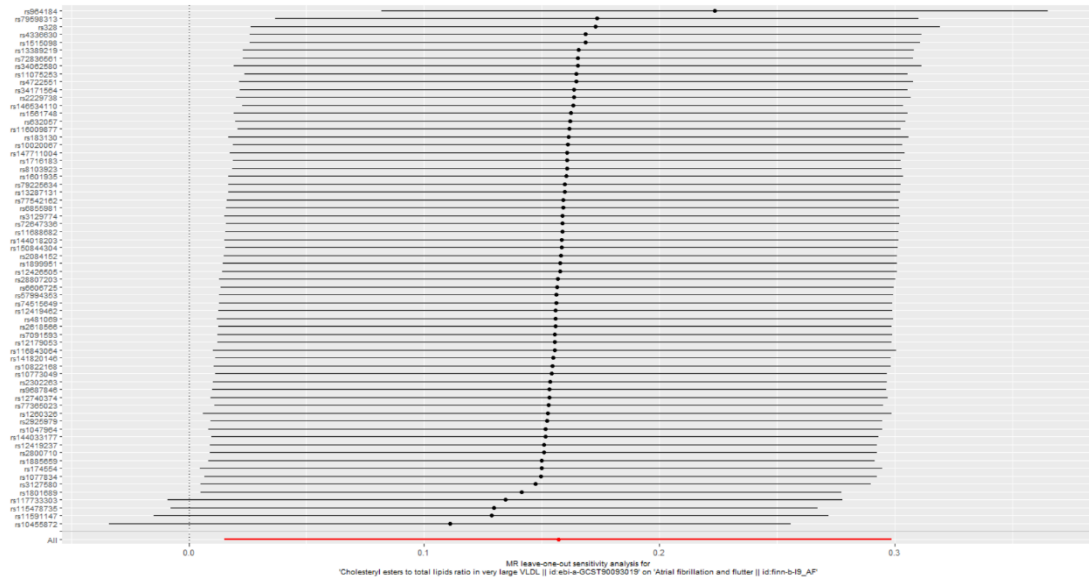
3) Cholesterol levels in very small VLDL



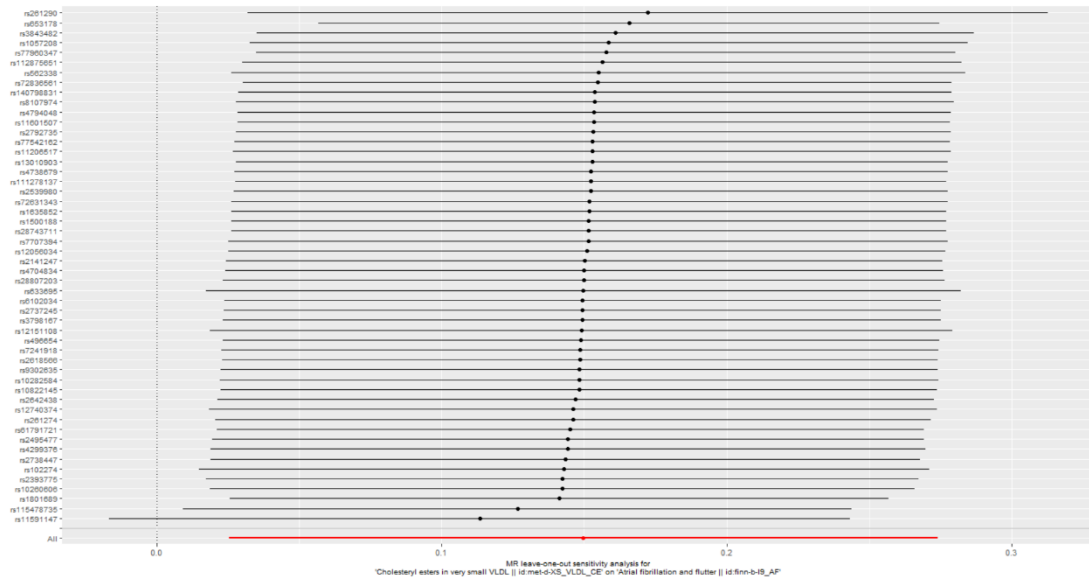
4) Cholesteryl esters to total lipids ratio in small VLDL



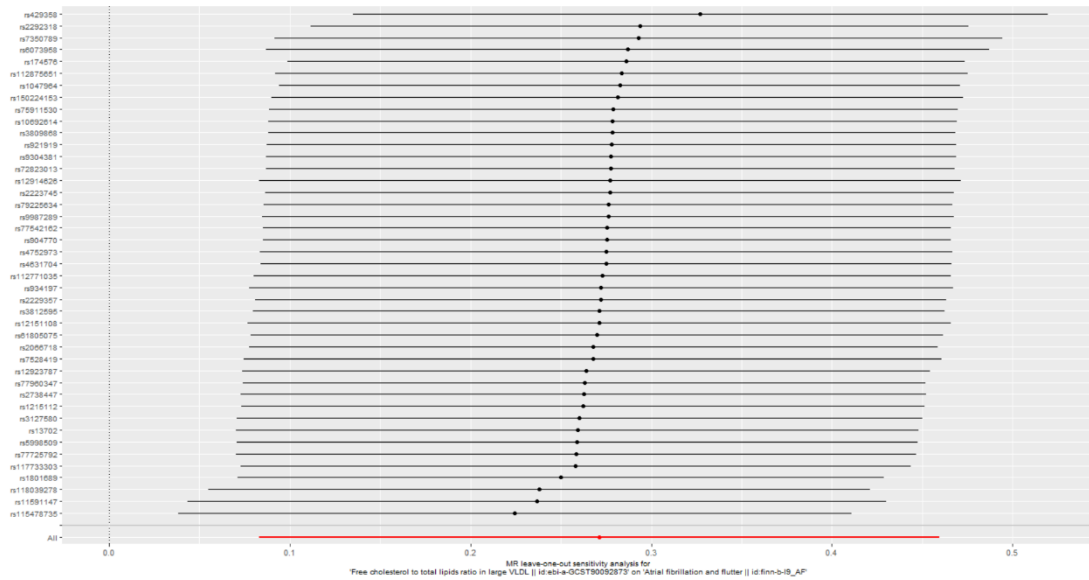
5) Cholesteryl esters to total lipids ratio in very large VLDL



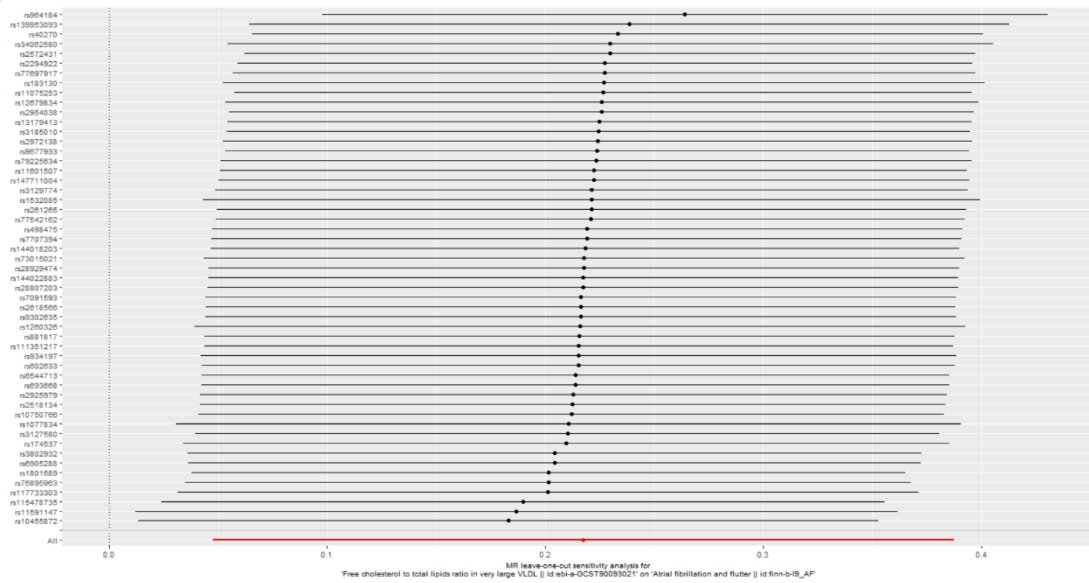
6) Cholesteryl esters in very small VLDL



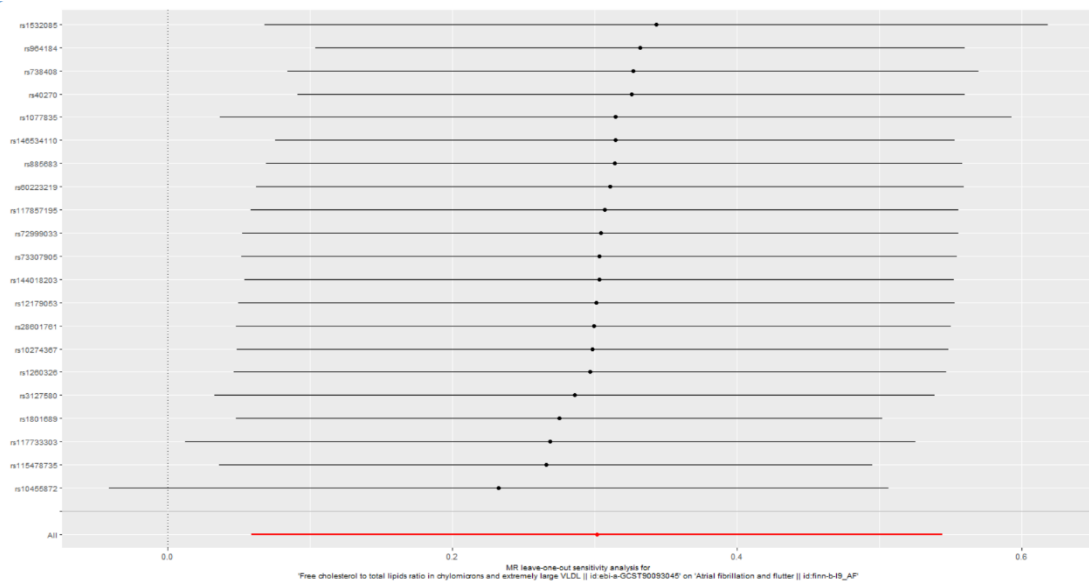
7) Free cholesterol to total lipids ratio in large VLDL



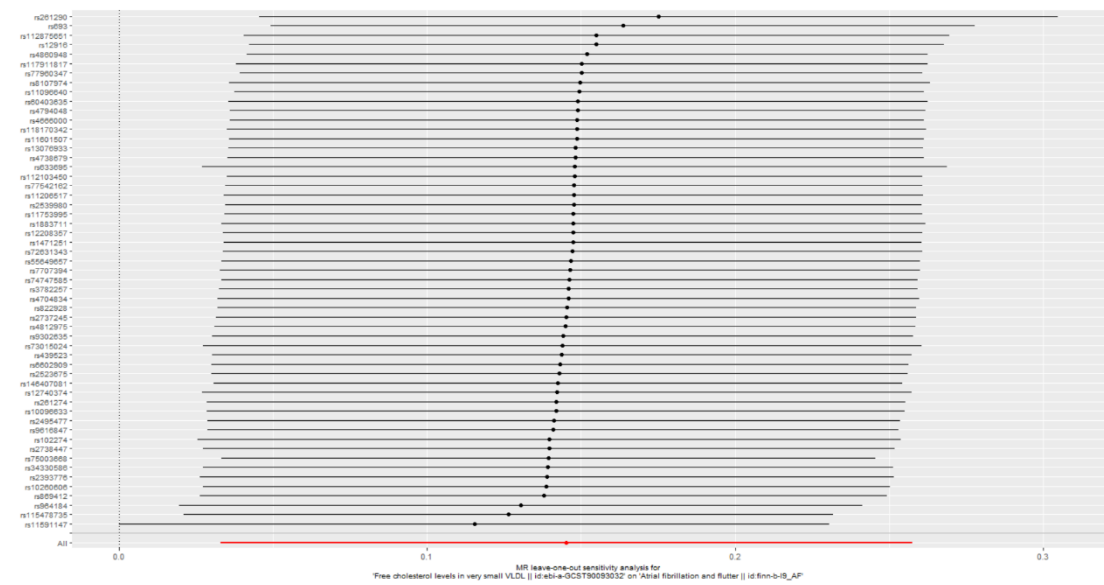
8) Free cholesterol to total lipids ratio in very large VLDL



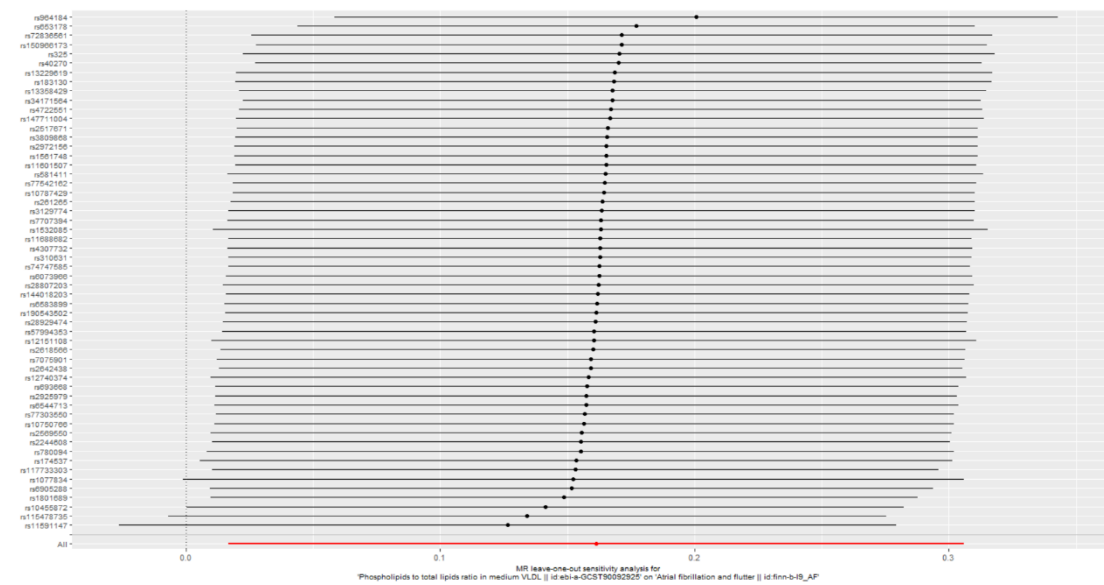
9) Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL



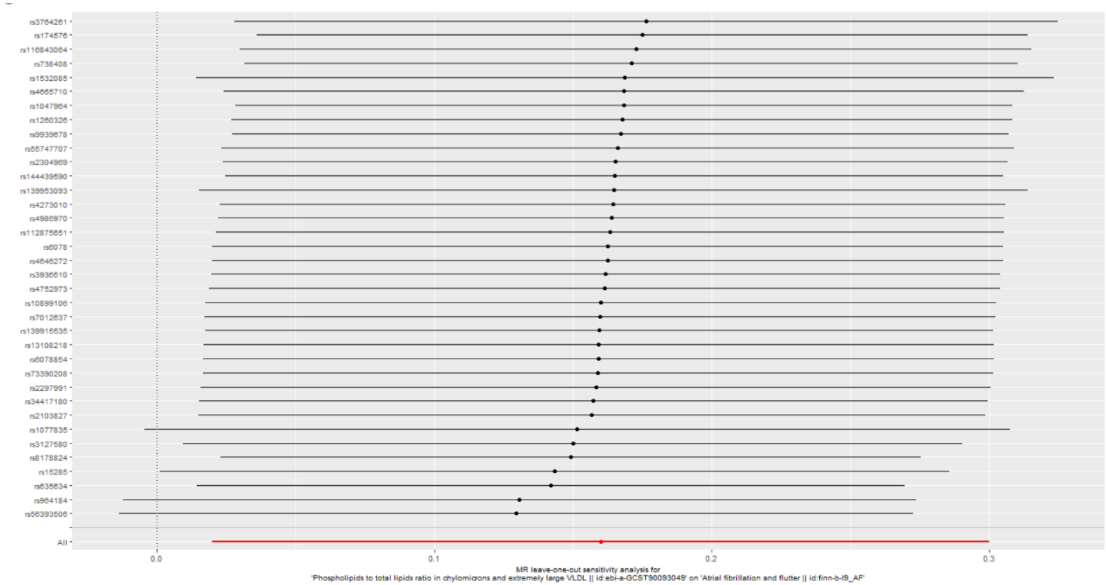
10) Free cholesterol levels in very small VLDL



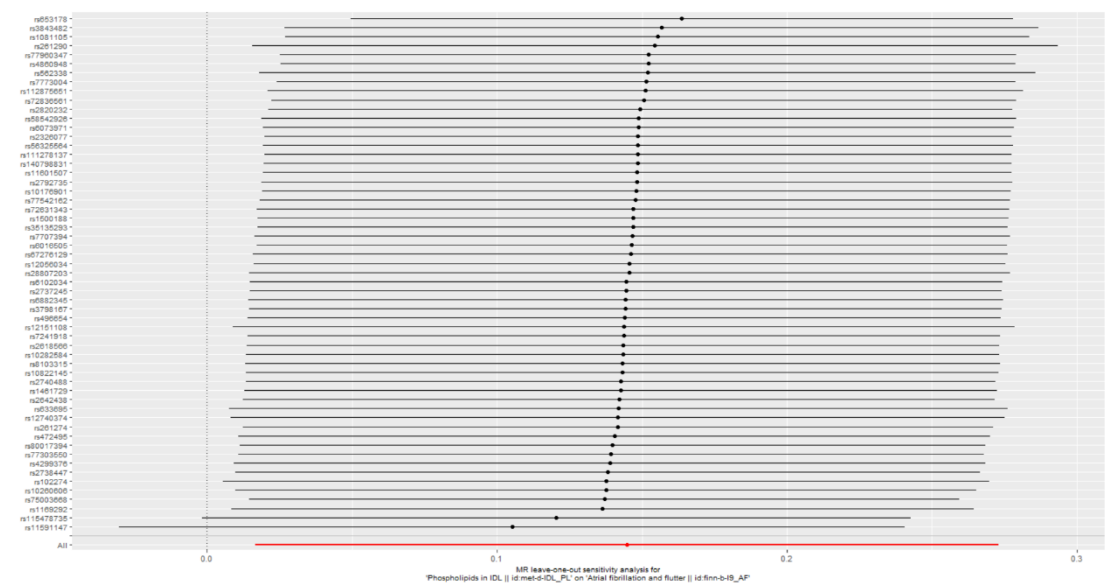
11) Phospholipids to total lipids ratio in medium VLDL



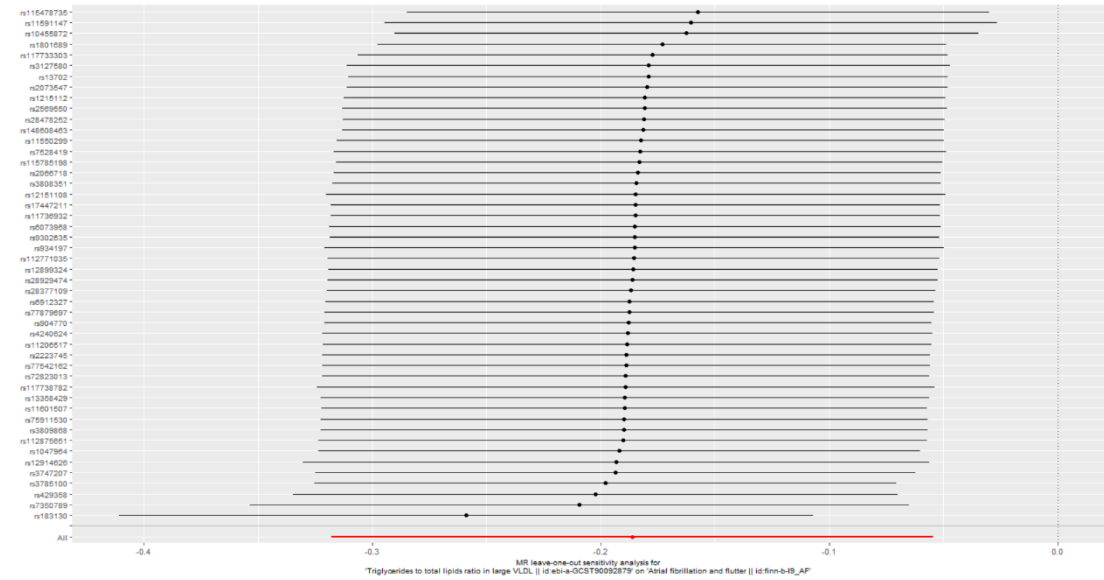
12) Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL



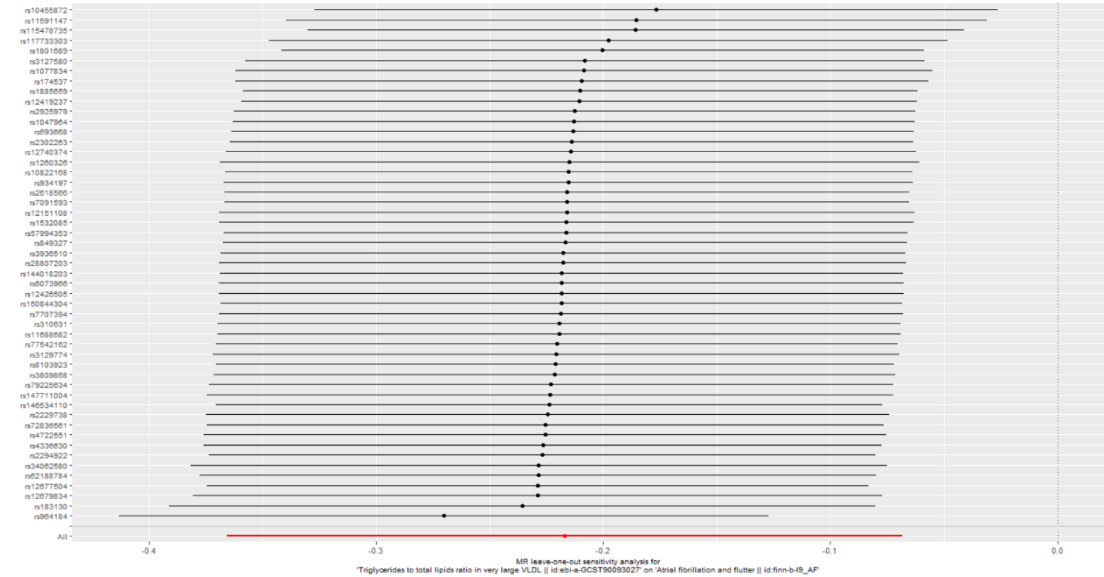
13) Phospholipids in IDL



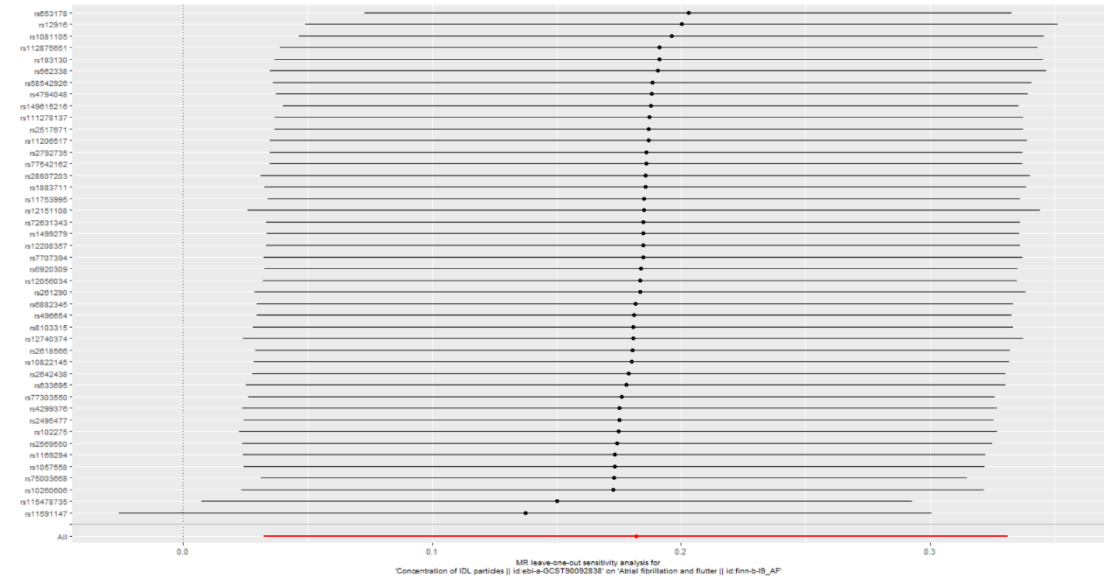
14) Triglycerides to total lipids ratio in large VLDL



15) Triglycerides to total lipids ratio in very large VLDL



16) Concentration of IDL particles



17) Concentration of very small VLDL particles

