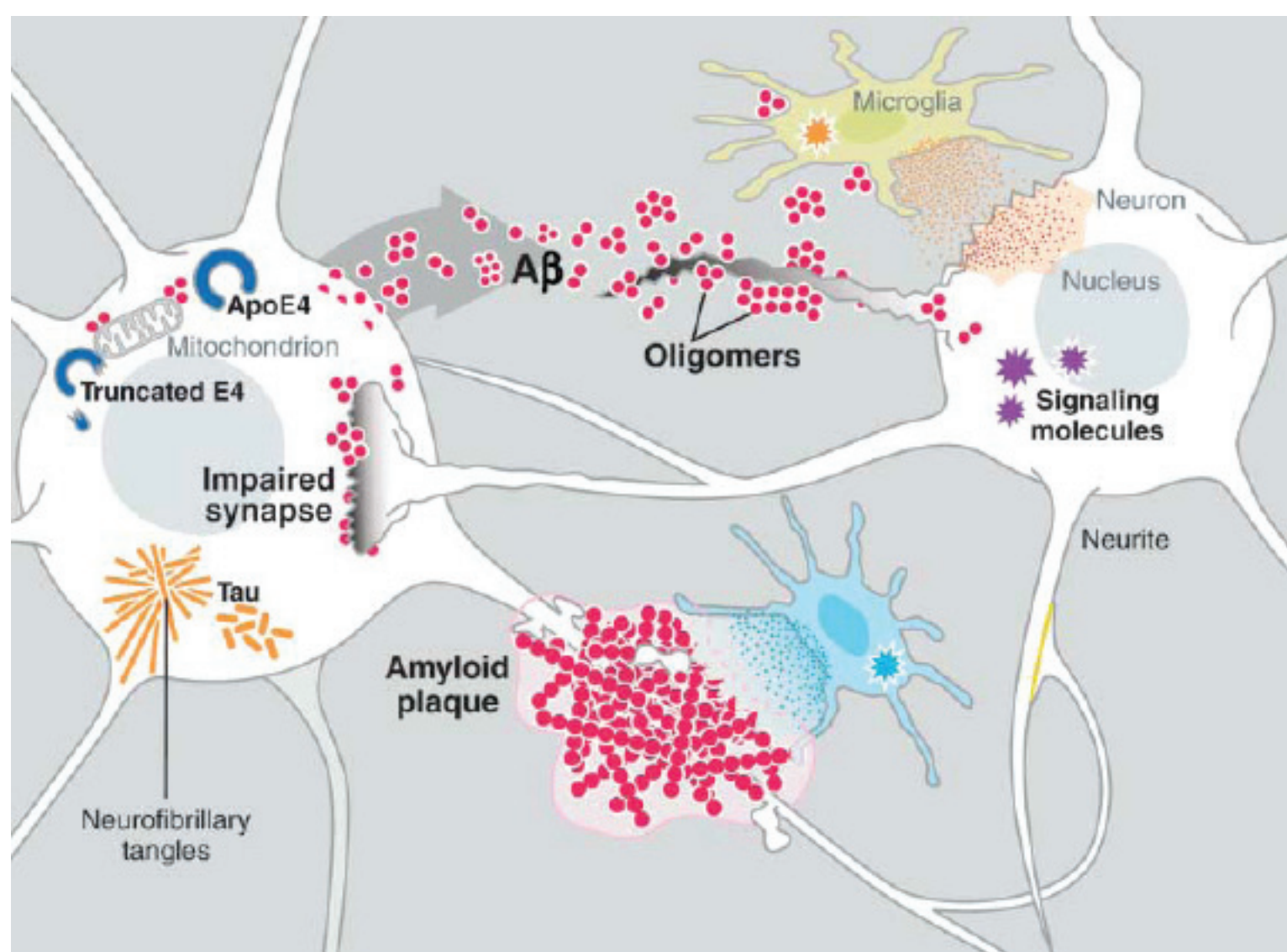


# ATHEROSCLEROTIC SERUM LIPOPROTEIN PROFILES PREDISPOSE TO ALZHEIMER'S DISEASE – A PILOT STUDY BY <sup>1</sup>H NMR METABONOMICS

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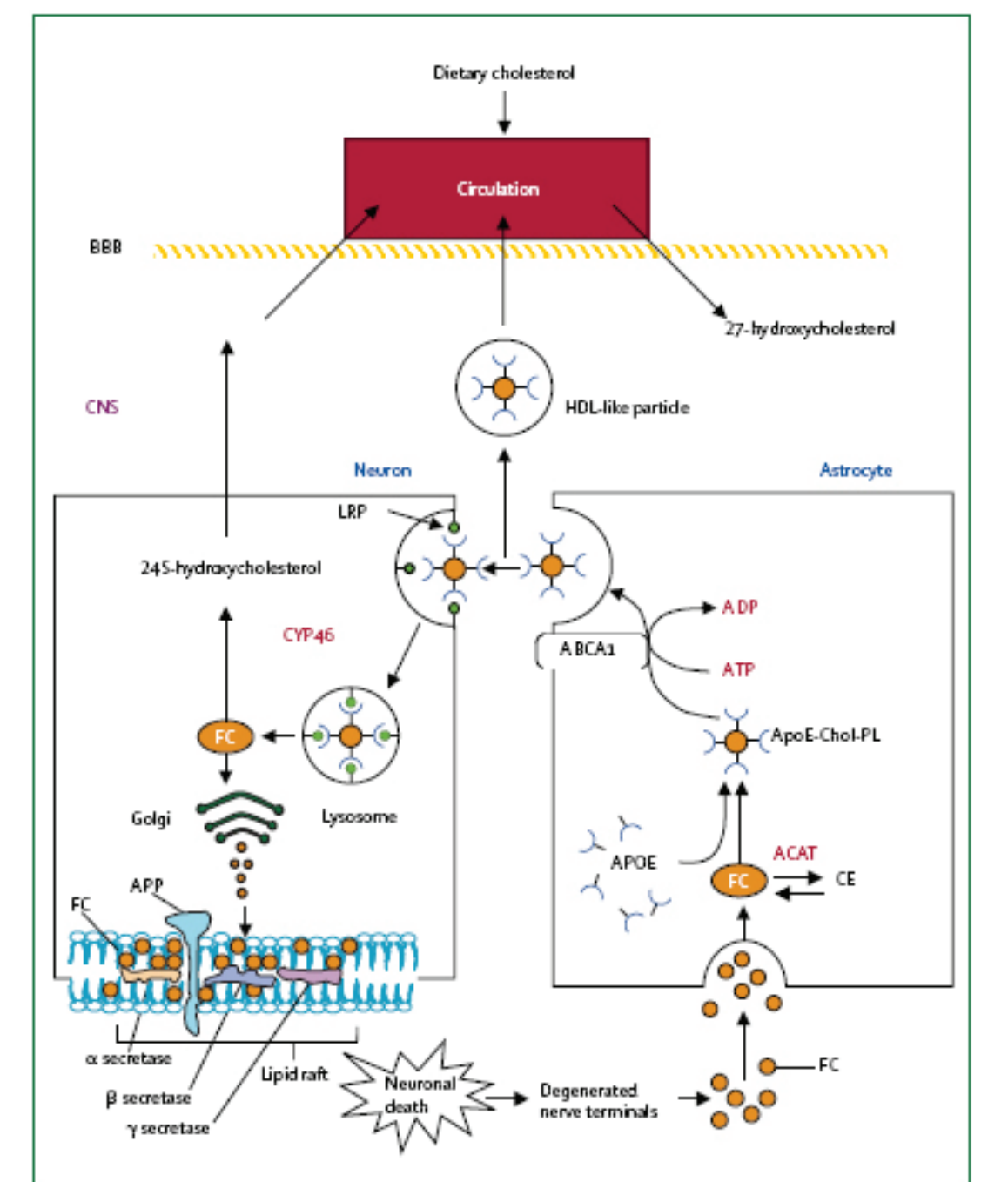
Robertson E, Mucle L. 100 Years and counting: Prospects for defeating Alzheimer's disease. Science 2006 Nov;314:781-784

The initiation and development of Alzheimer's disease (AD) are poorly understood and there are no distinct biomarkers allowing for early detection and preventive treatment. The major focus in AD research has traditionally been in proteomics but in recent years there has been an increasing interest in the association of serum cholesterol (TC) and lipoproteins with the development of AD.

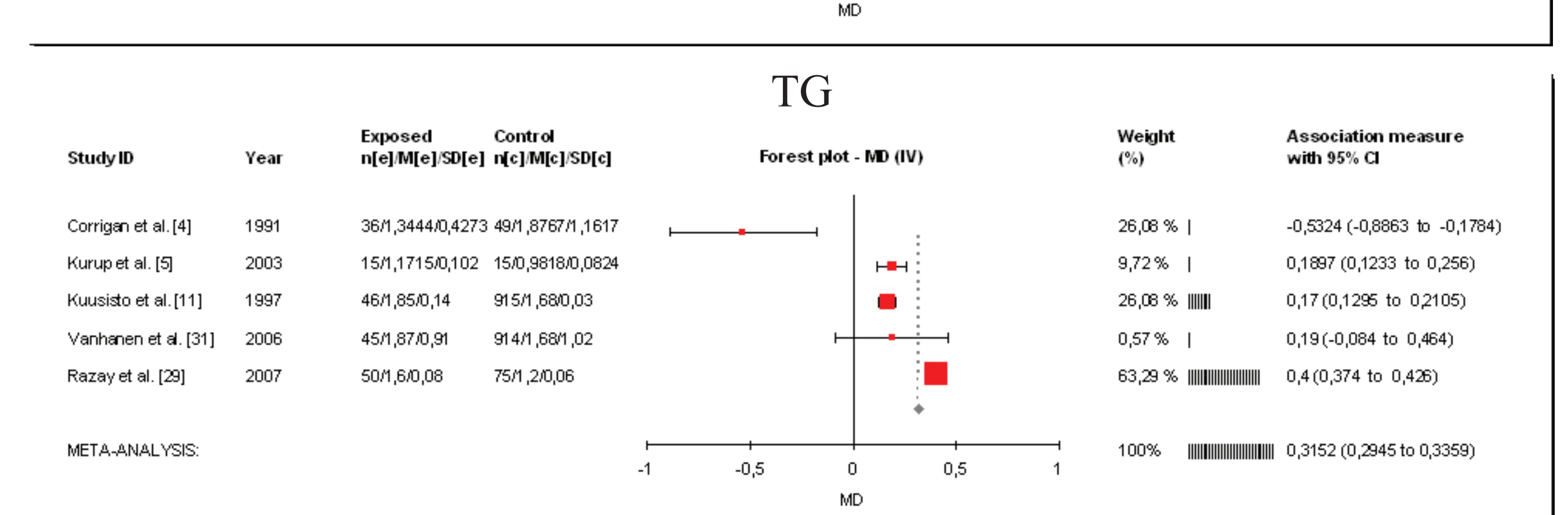
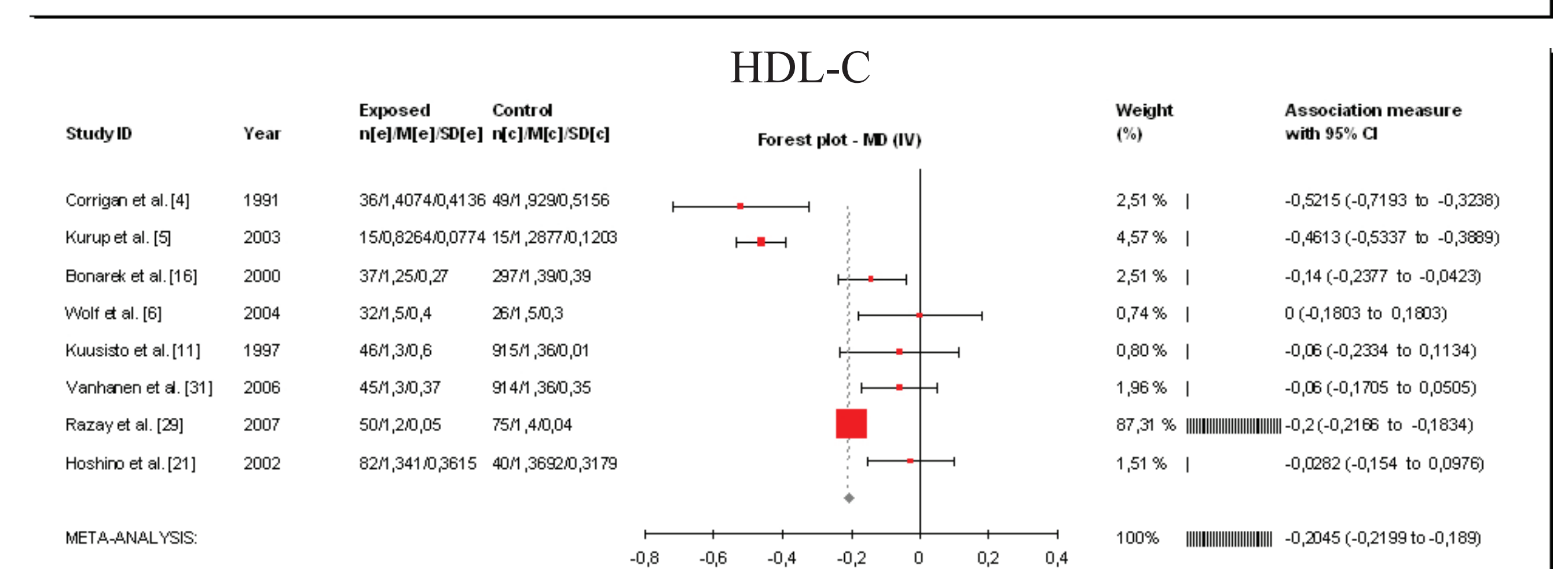
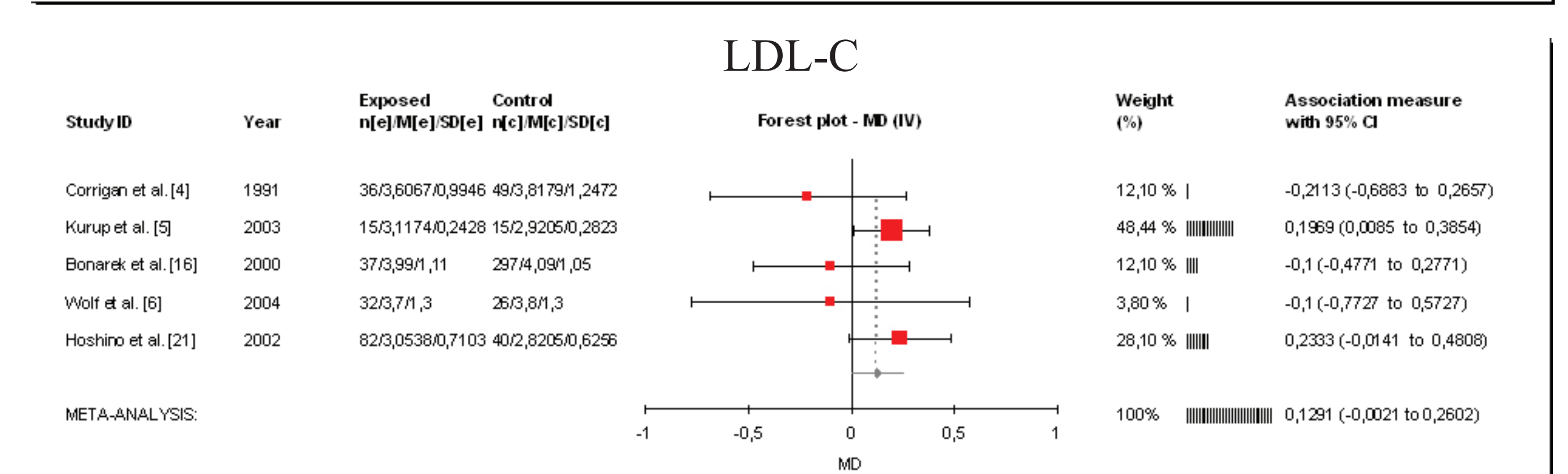
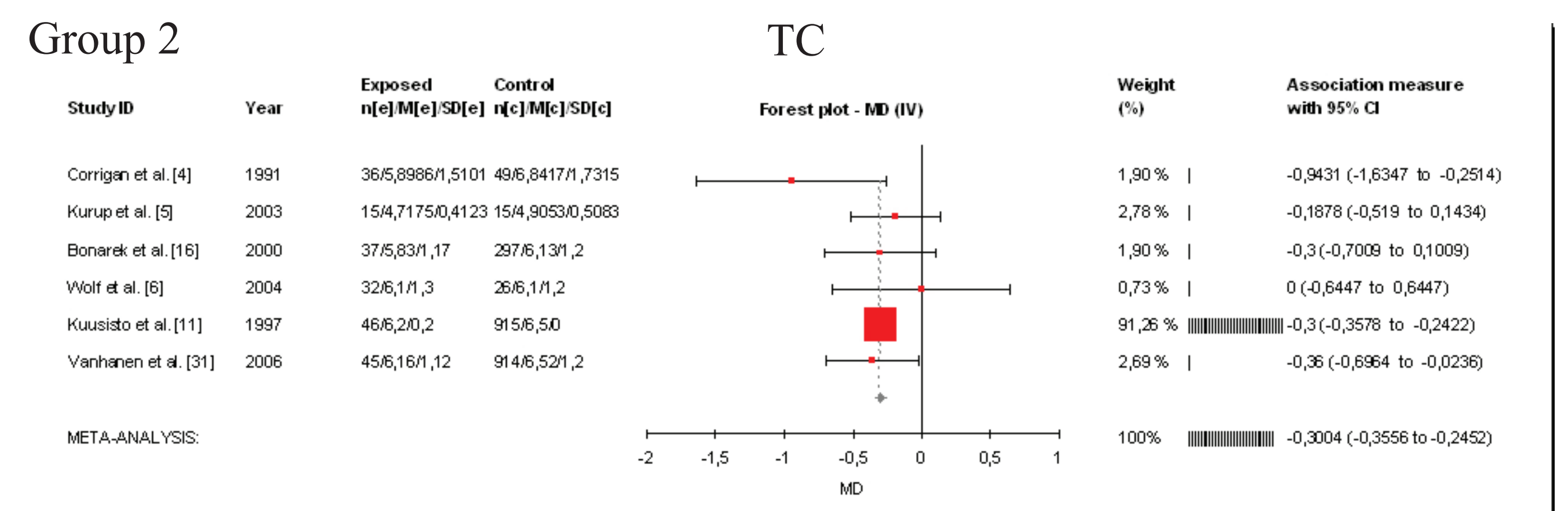
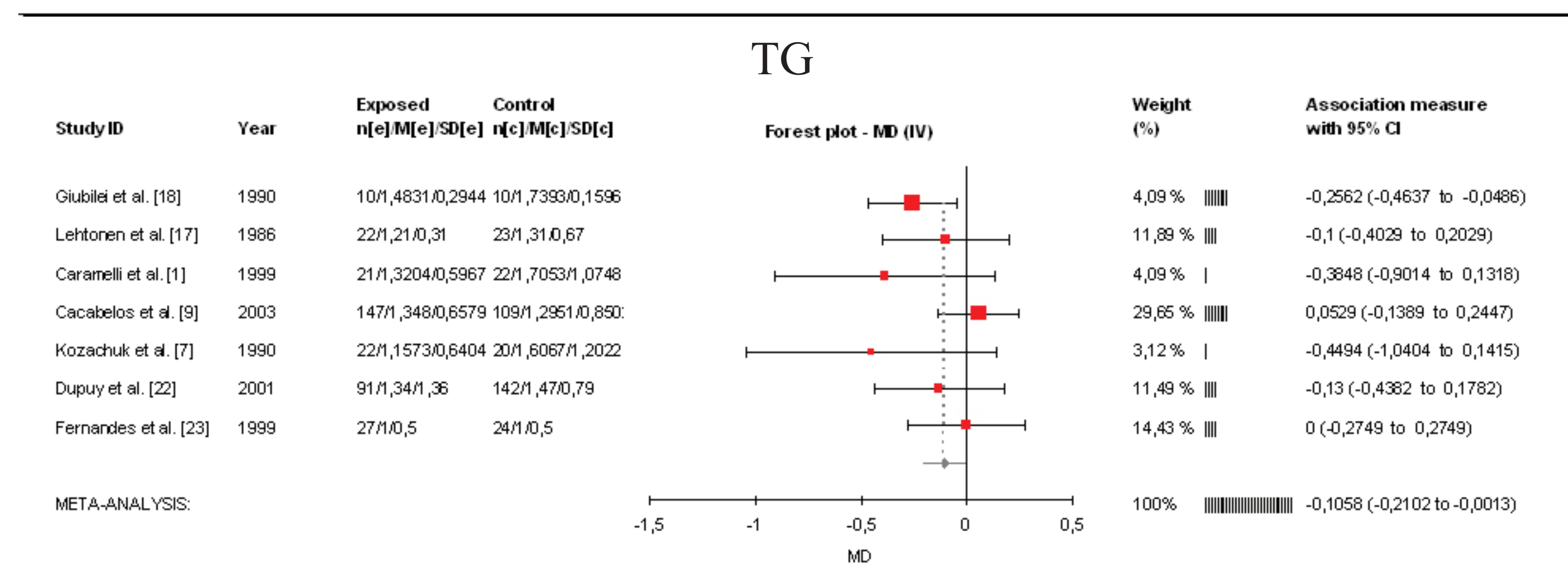
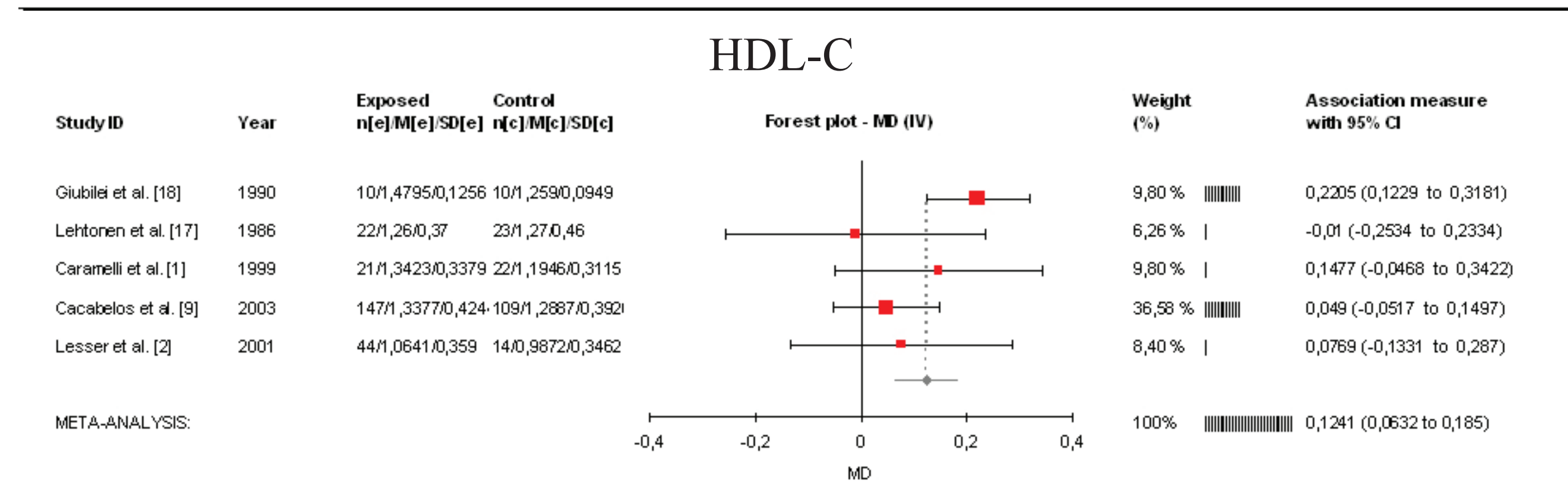
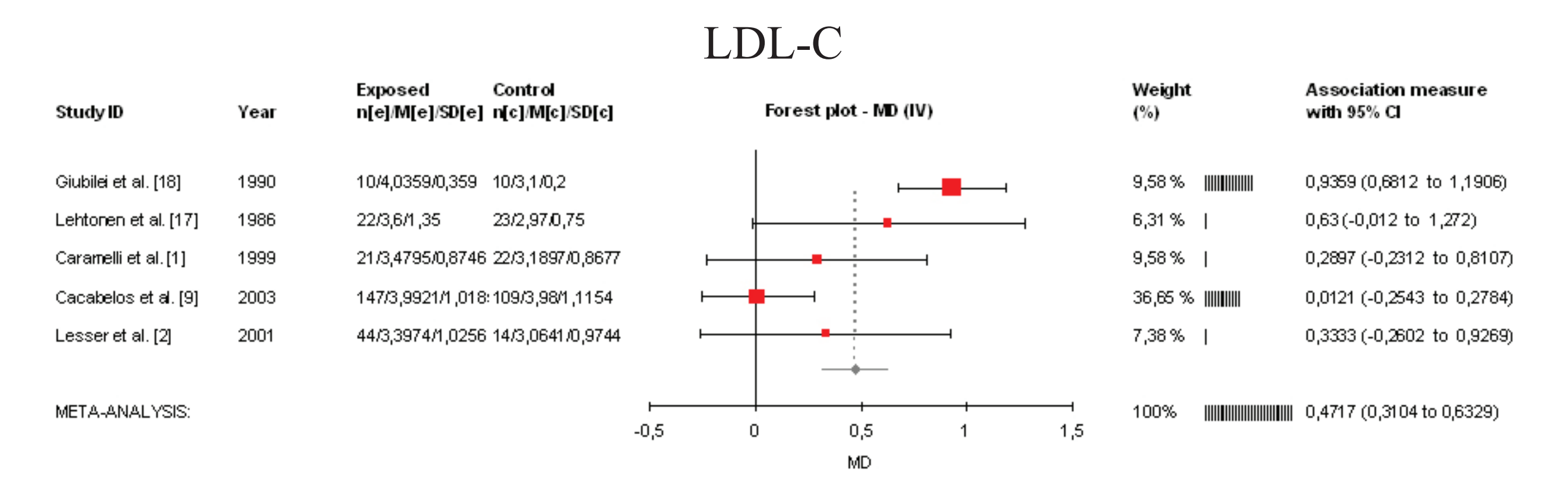
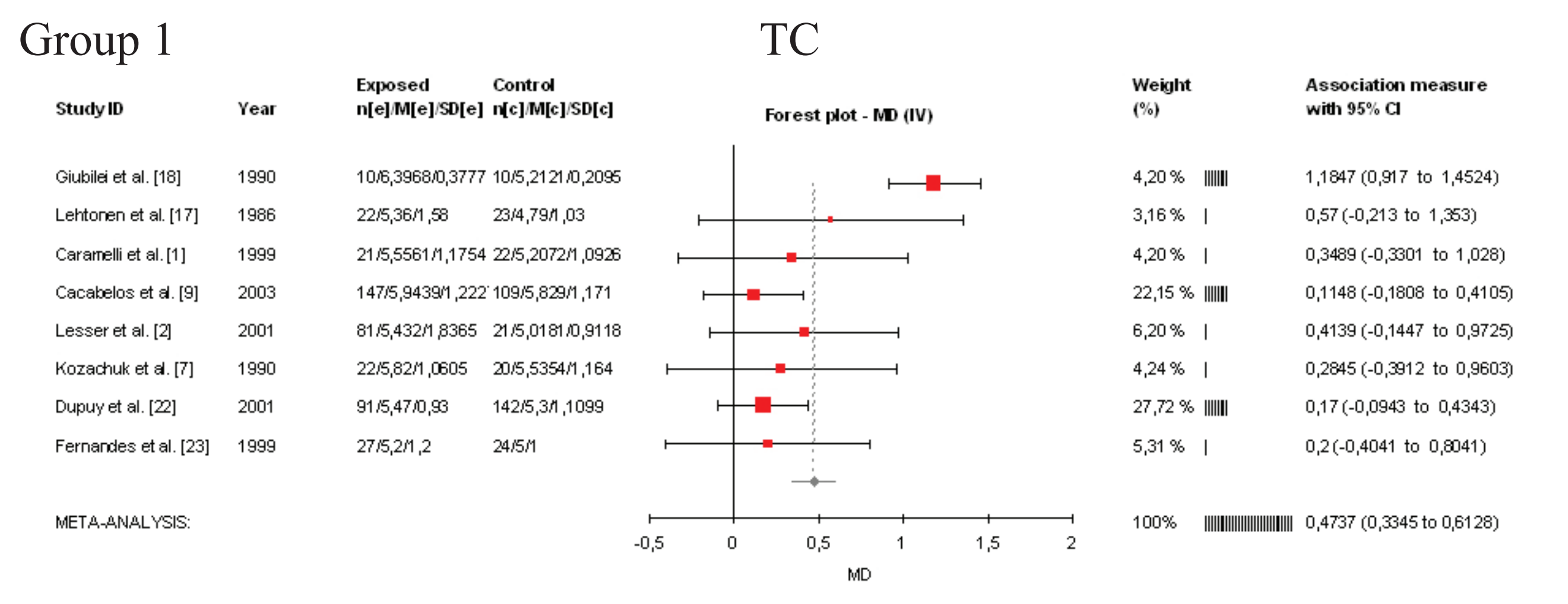
**On the left:** Alzheimer's disease is the most common dementia in the world. AD leads to nerve cell death and tissue loss throughout the brain. Plaques and tangles are prime suspects. Plaques form between nerve cells when Amyloid beta (Abeta) peptides clump together. Tangles are formed inside the cell by phosphorylation of protein named tau, which is promoted by Abeta.

**On the right:** Cholesterol is a key component of cell membranes and exists in myelin sheath of nerve cell axons. Cholesterol affects the formation of the Abeta and thus modulates the production of plaques and tangles.

**Both higher and lower TC levels have been indicated to associate with the development of AD.** However, only limited data are available on the associated serum lipoprotein profiles of the AD patients. We present here results from comprehensive meta-analyses of the TC studies in this field during 1986-2007 (n ~ 9000 individuals).



Shobab LA, Hsiung GY, Feldman HH. Cholesterol in Alzheimer's disease. Lancet Neurol. 2005 Dec;4(12):841-52. Review



**Above:** Our results reveal that the opposite findings concerning the role of TC and the development of AD can be explained by two distinct lipoprotein profiles: a "conventional" atherosclerotic risk profile (with high TC and LDL-C) and a profile associated with the metabolic syndrome (decreased TC and HDL-C plus elevated triglycerides). **On the right:** These new findings that relate lipoprotein (subclass) profiles to the risk of AD also support the use of <sup>1</sup>H NMR spectroscopy of serum for early risk detection.

The <sup>1</sup>H NMR metabolomic studies of AD are in progress in our laboratory. We have measured various <sup>1</sup>H NMR data from serum samples in a six year prospective study of 45 individuals. During the follow-up 17 patients showed symptoms of mild cognitive impairment (connected to the early state of AD) while 28 remained cognitively normal. The <sup>1</sup>H NMR data provide a novel approach to study various molecular and metabolic entities potentially connected to the development of cognitive impairment and the initiation of AD. **Please note the talk by Tukiainen et al.; first results from <sup>1</sup>H NMR metabolomics will be presented.**

## <sup>1</sup>H NMR metabolomics approach for holistic multi-metabolite studies

