

The incremental yield of CMA over karyotype in fetal ventriculomegaly: a systematic review and meta-analysis

Ioakeim Sapantzoglou | Zacharias Fasoulakis | Konstantinos Tasiias | Angeliki Rouvali | Afroditi Pegkou | Marianna Theodora | Georgios Daskalakis | Panagiotis Antsaklis
1st Department of Obstetrics and Gynecology, Alexandra Hospital, National and Kapodistrian University of Athens, Athens, Greece

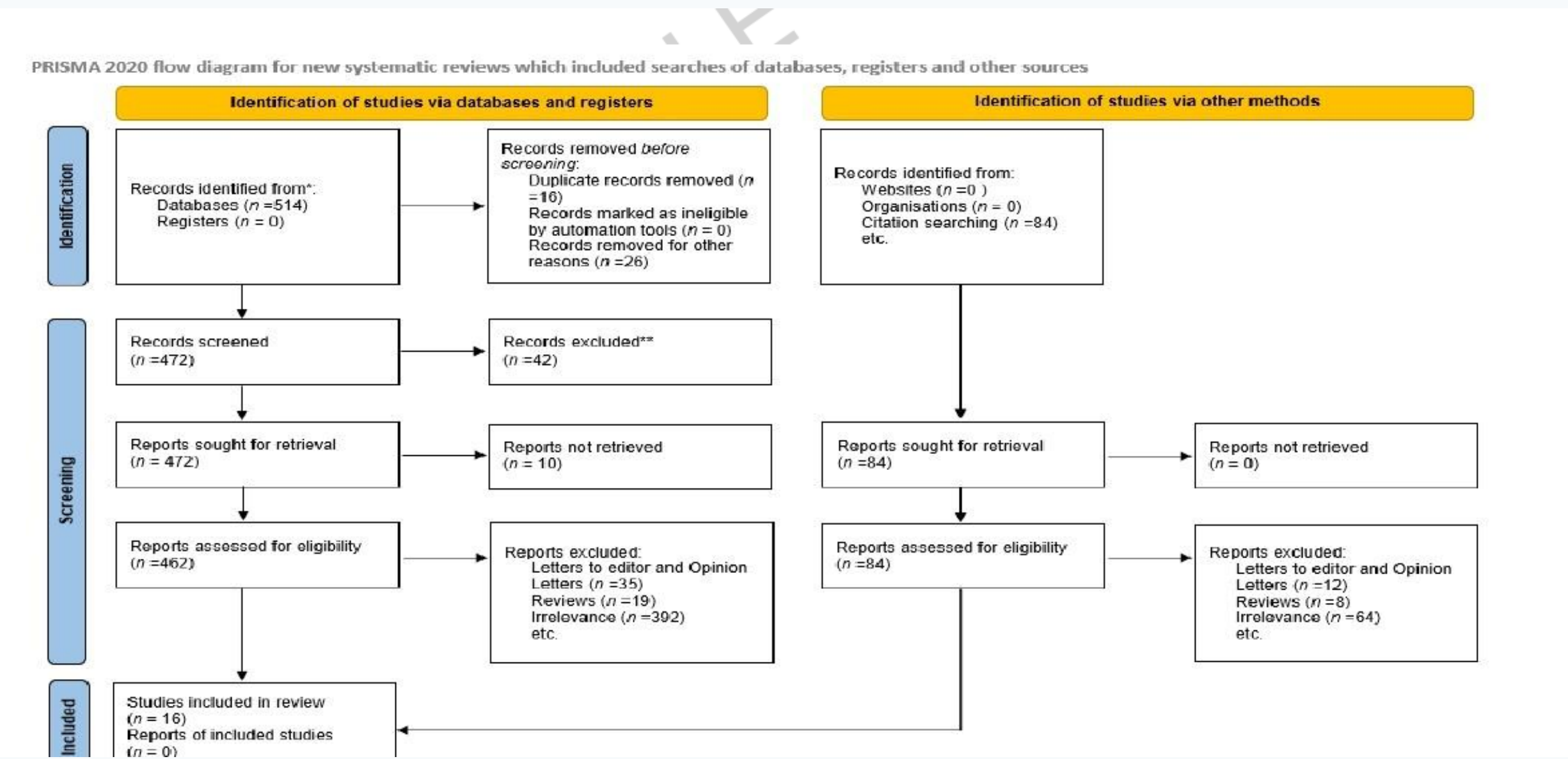


Key message
CMA provides clinically relevant incremental diagnostic yield after normal karyotype, with the greatest yield when ventriculomegaly is non-isolated.

STUDY FRAME

16 retrospective cohorts 2,137 fetuses

Meta-analysis of chromosomal microarray analysis after normal karyotyping in fetal ventriculomegaly.



PRISMA flow: 514 records identified; 16 studies included.

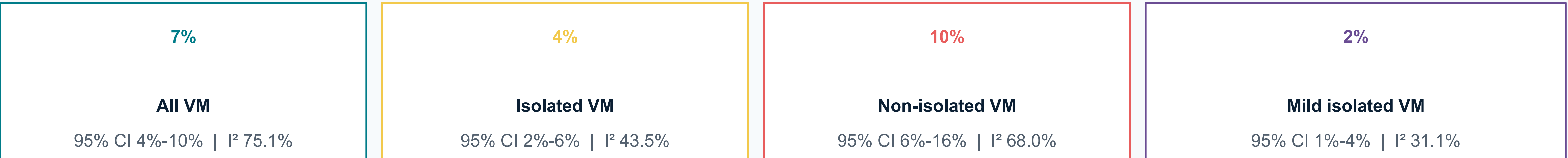
METHODS SNAPSHOT

- PRISMA/MOOSE design; PROSPERO CRD420261300651.
- Search through 30 November 2025: MEDLINE, Scopus, ClinicalTrials.gov, EMBASE, CENTRAL and Google Scholar.
- Outcome: pathogenic/likely pathogenic CNVs <10 Mb detected by CMA beyond conventional karyotyping.
- Random-effects meta-analysis of proportions; logit transformation; DerSimonian-Laird heterogeneity estimator; VUS excluded.
- Meta-regression explored isolation status, year, region and sample size.

VM PHENOTYPES

- Overall VM: isolated and non-isolated cohorts.
- Isolated VM: ventriculomegaly without additional findings.
- Non-isolated VM: VM with additional structural abnormalities.
- Mild isolated VM: isolated mild ventricular dilatation subgroup.

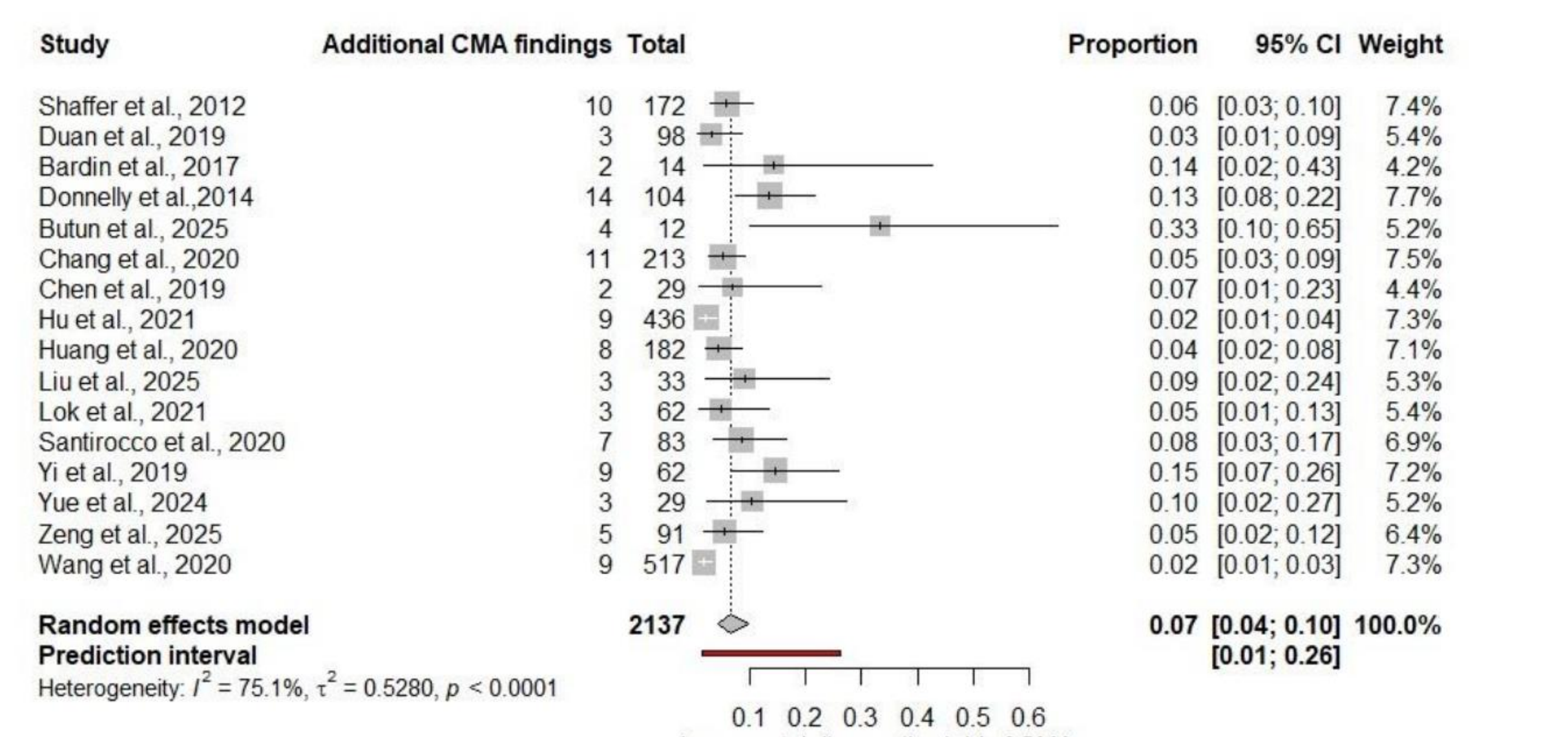
PRIMARY OUTCOME: INCREMENTAL CMA YIELD BEYOND KARYOTYPE



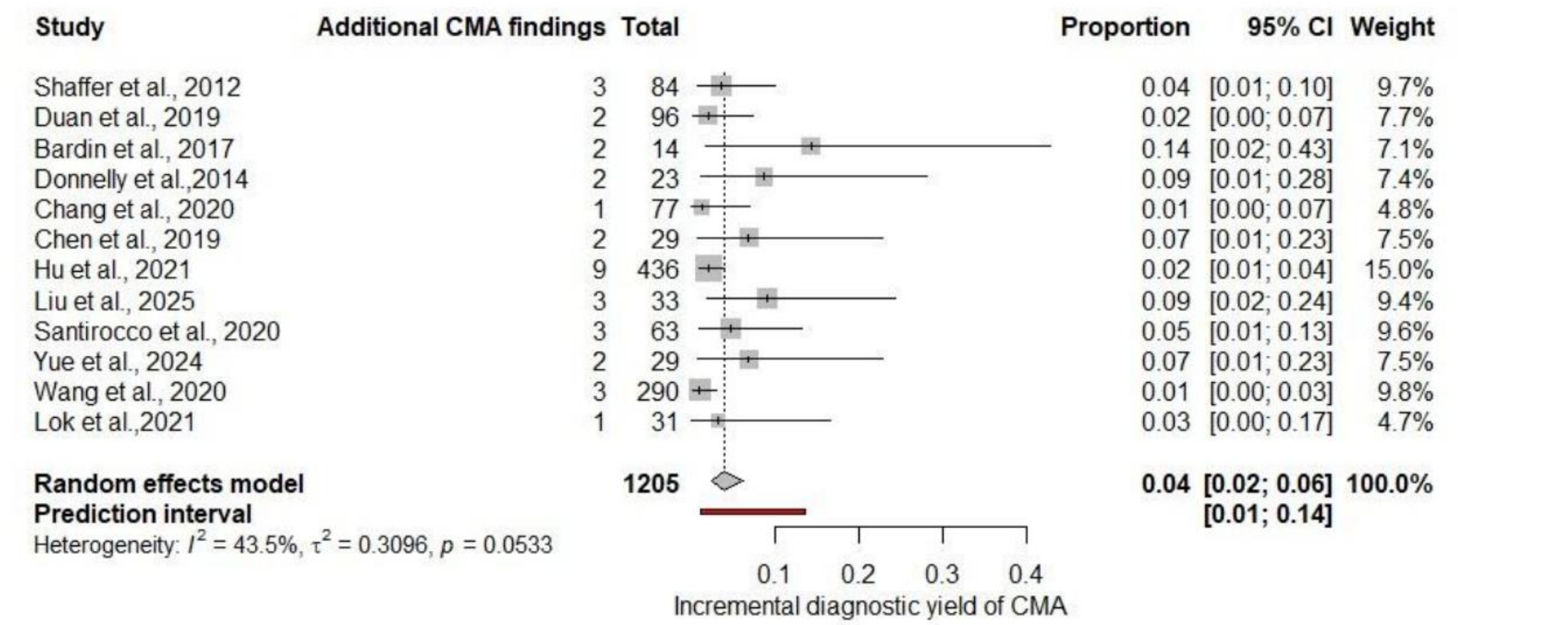
Prediction intervals: all VM 1%-26%; isolated 1%-14%; non-isolated 2%-35%; mild isolated 0%-9%.

FOREST PLOT EVIDENCE

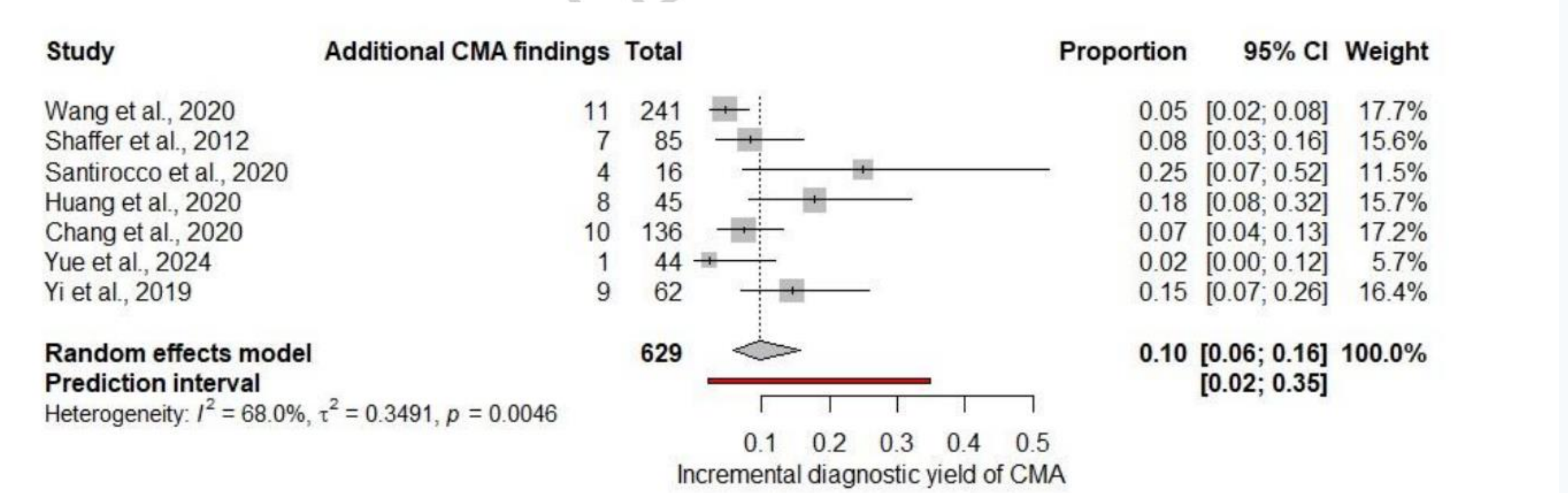
Overall ventriculomegaly



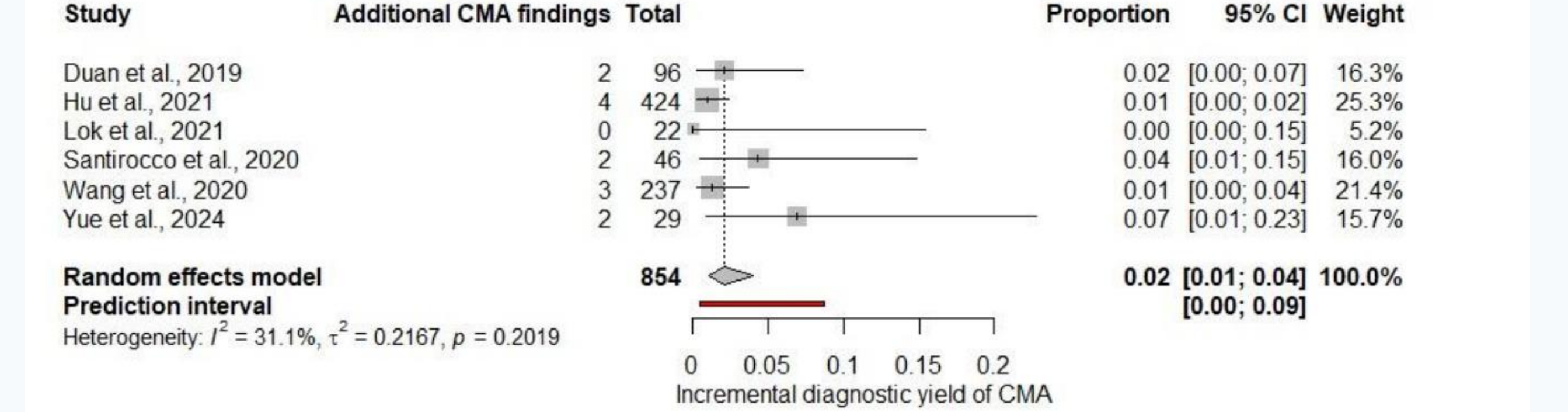
Isolated ventriculomegaly



Non-isolated ventriculomegaly



Mild isolated ventriculomegaly



CLINICAL IMPLICATIONS

Counseling should be stratified by VM phenotype.
A normal karyotype does not exclude clinically relevant submicroscopic CNVs. CMA should be discussed when invasive testing is clinically indicated, particularly for non-isolated VM.

TAKE-HOME

CMA adds diagnostic yield beyond karyotype in fetal VM: 7% overall, 10% in non-isolated VM, and 2% in mild isolated VM.