

Application of network meta-analysis in vaccine research: an illustration using immunogenicity of pneumococcal vaccines in adults

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Background

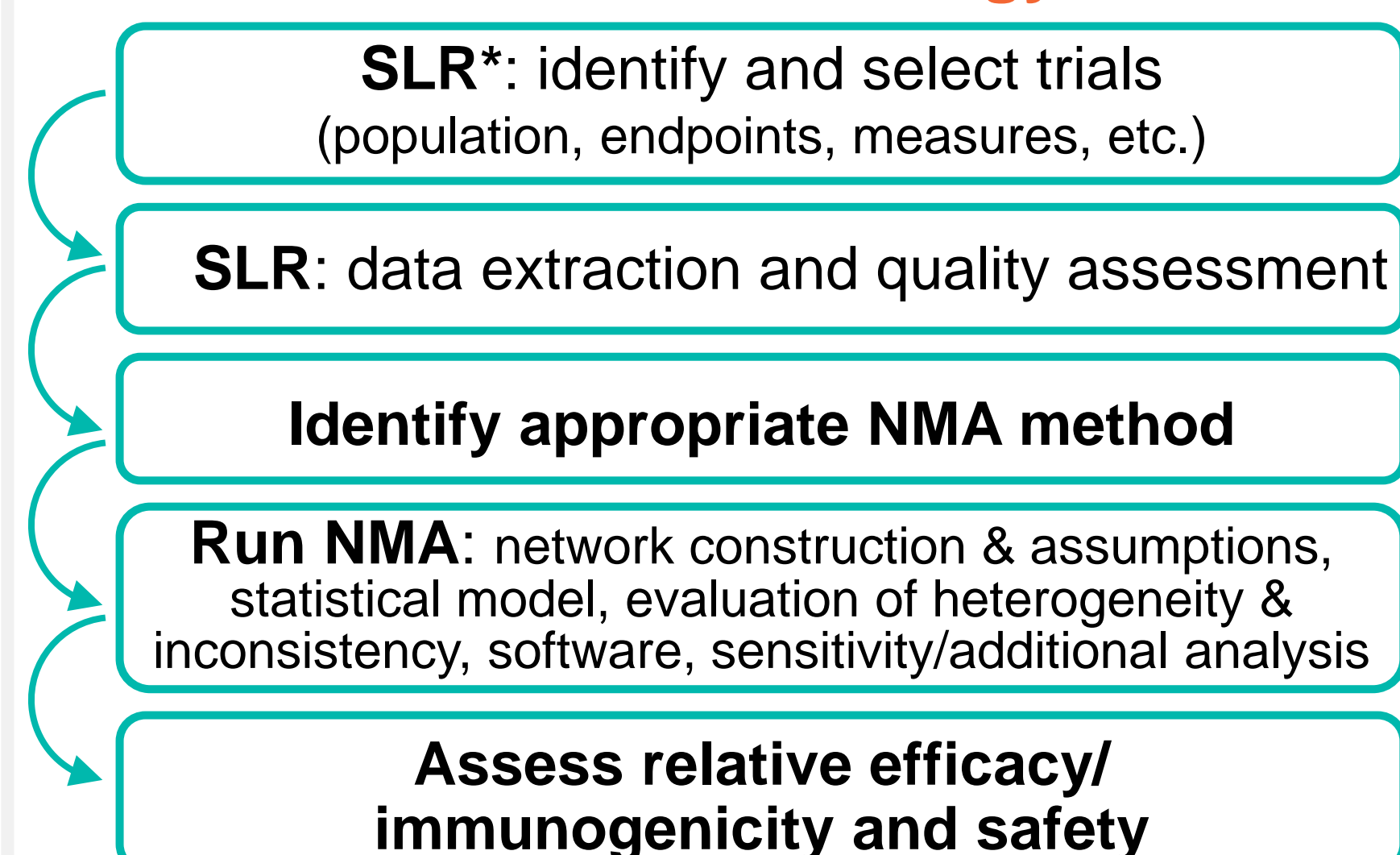
- Statistical techniques such as network meta-analysis (NMA) can offer insights into the comparative effectiveness, immunogenicity and safety of different vaccines and provide decision-makers with a consolidated review of the available data.
- We aimed to provide an example of applying NMA for evaluating prophylactic vaccines.
- Several pneumococcal vaccines (PnVx) are approved for preventing invasive disease caused by *Streptococcus pneumoniae*¹, however, no direct, head-to-head comparison of all vaccines have been performed, and data on the relative immunogenicity of the different vaccines is missing. In this work, we illustrate how NMA can be used to evaluate vaccines' relative immunogenicity, specifically against serotype (ST) 3.

Conclusions

- The application of NMA in vaccine research may provide considerable benefit to researchers and decision-makers by supporting understanding of the relative efficacy/immunogenicity and safety induced by different vaccines, integrating direct and indirect treatment comparisons from multiple clinical trials.
- Overall, the results from this case example suggest that among the PnVx assessed, Pn-MAPS24v could exhibit high functional antibody response against the predominantly circulating ST3.

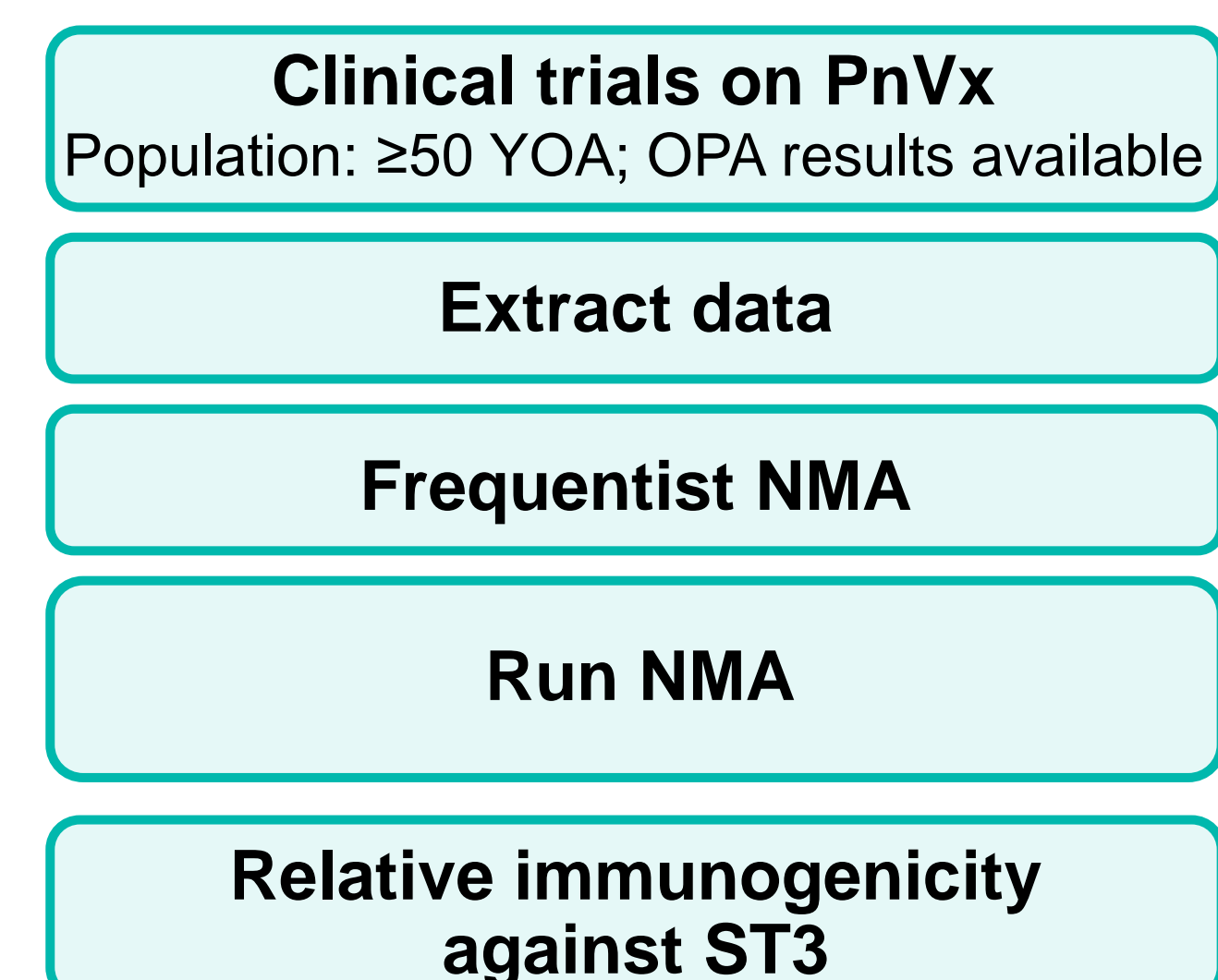
Aims

NMA methodology



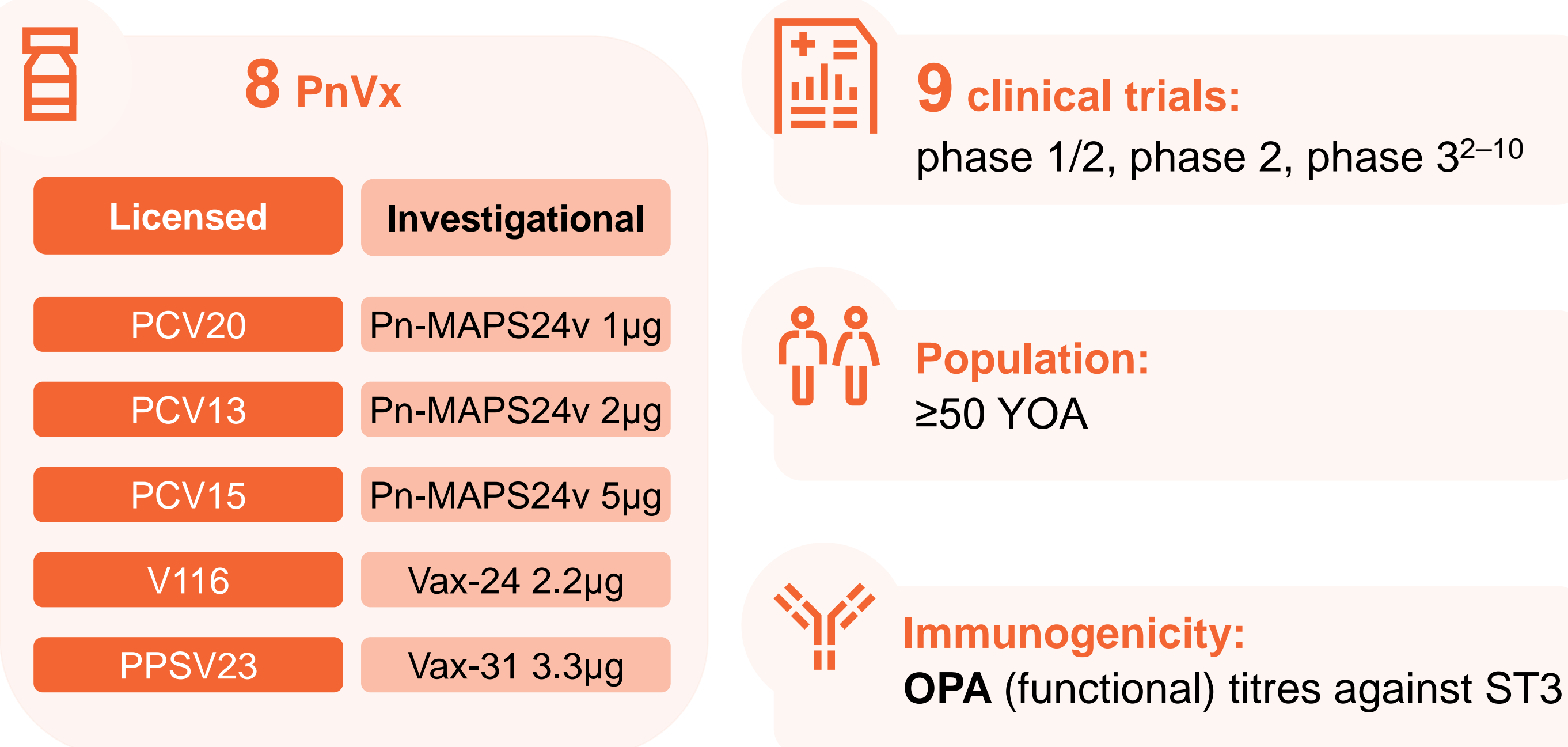
SLR, systematic literature review; YOA, years of age; OPA, opsonophagocytic activity. *Points for consideration: similarities and differences between the trials, in terms of study population, laboratory assays, etc., should be thoroughly assessed. Supplemental information available via QR code.

Case illustration: PnVx

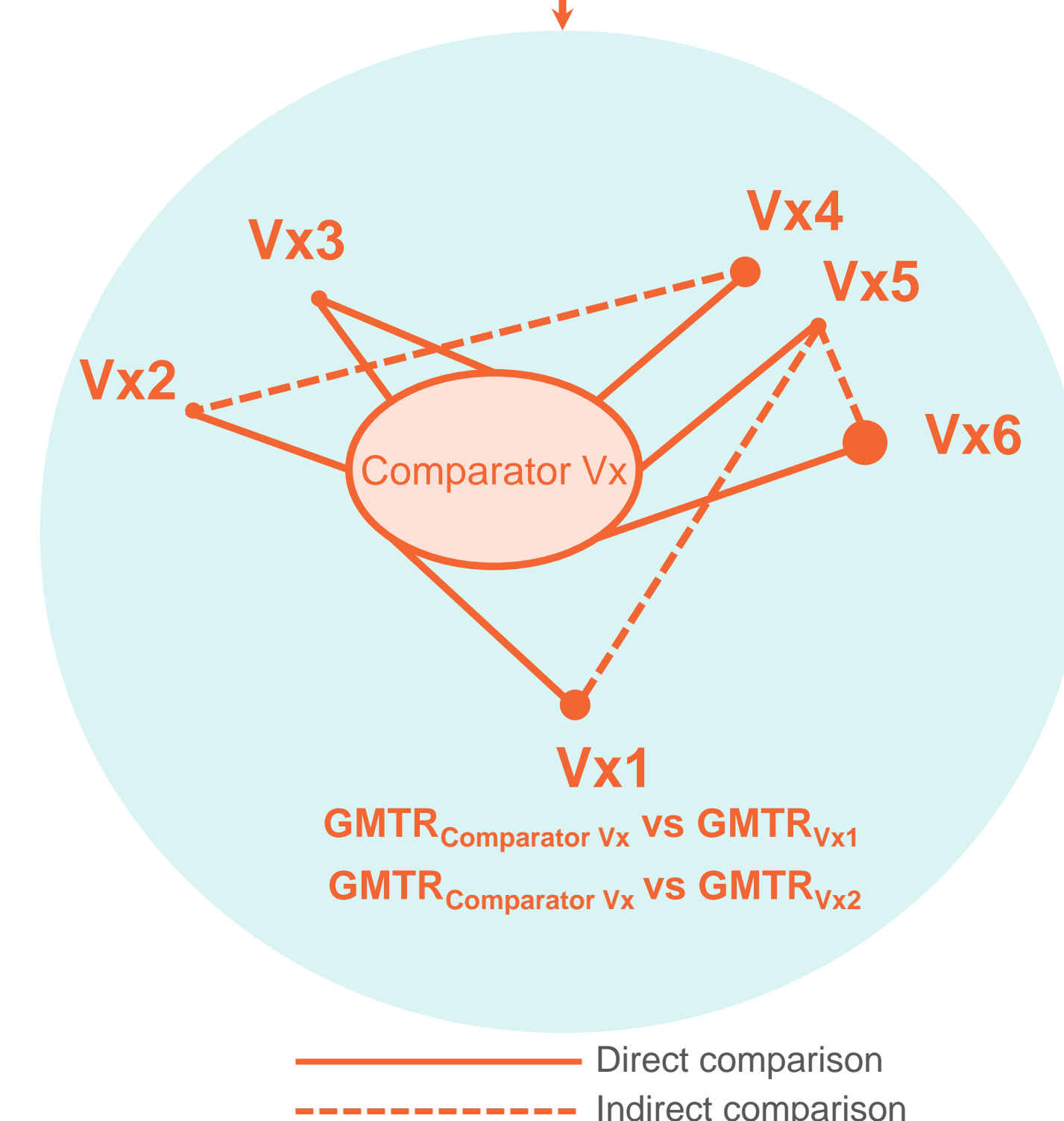


Methods

Frequentist NMA to describe the relative immunogenicity of PnVx against ST3



Main analysis parameter: GMTRs against *S. pneumoniae* polysaccharides



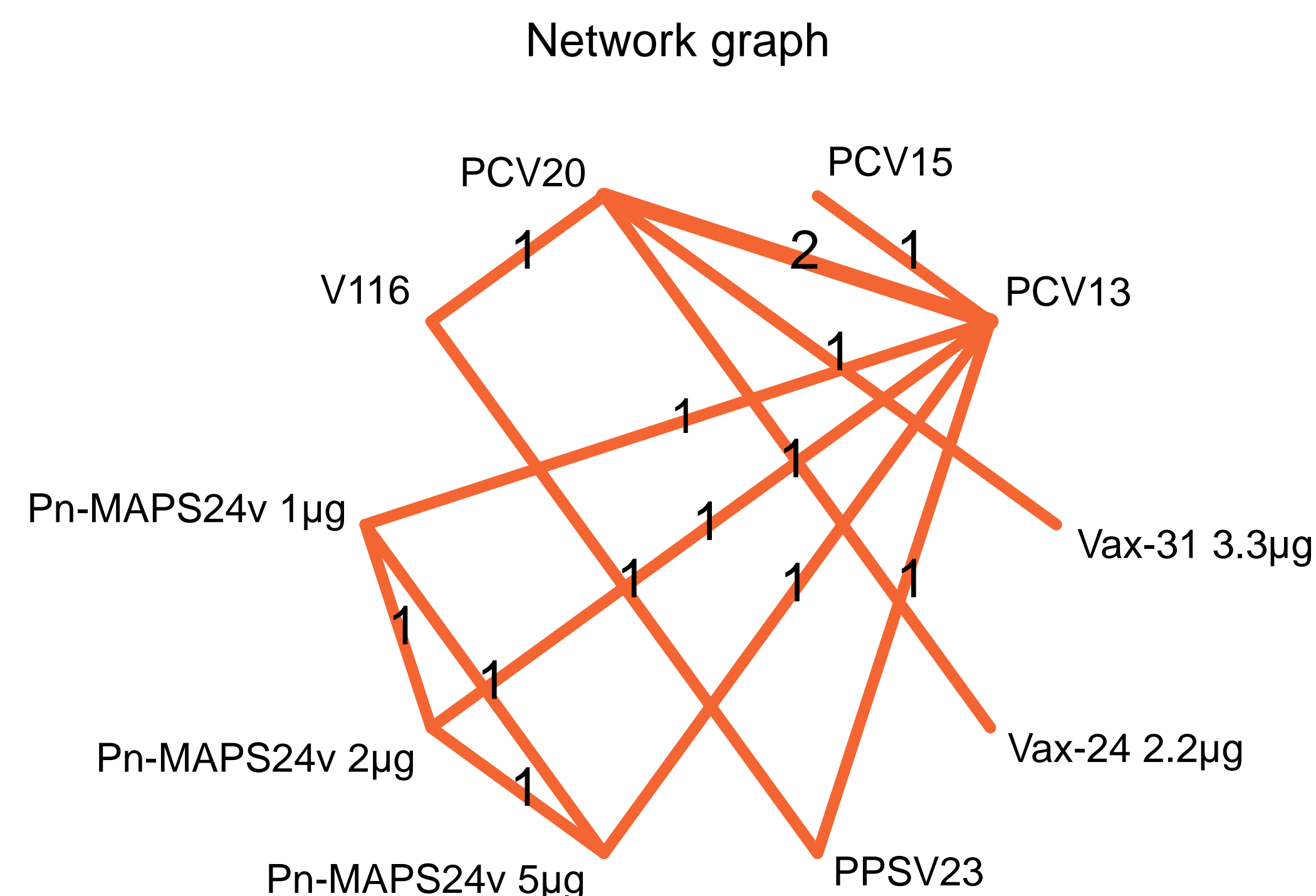
PCV20: common comparator across studies

P-score measurements: quantitative approach to understand how treatments compare within the NMA

PCV20, 20-valent pneumococcal conjugate vaccine (PCV); **PCV13**, 13-valent PCV; **PCV15**, 15-valent PCV; **V116**, 21-valent PCV; **PPSV23**, 23-valent pneumococcal polysaccharide vaccine; **Pn-MAPS24v 1µg/2µg/5µg**, 24-valent MAPS technology-based PnVx formulations including 1 µg, 2 µg or 5 µg of each polysaccharides; **Vax-24 2.2µg**, 24-valent PCV with 2.2µg of each antigen; **Vax-31 3.3µg**, 31-valent PCV with 3.3µg of each antigen; **GMTR**, geometric mean ratios of functional titres; **Vx**, vaccine.

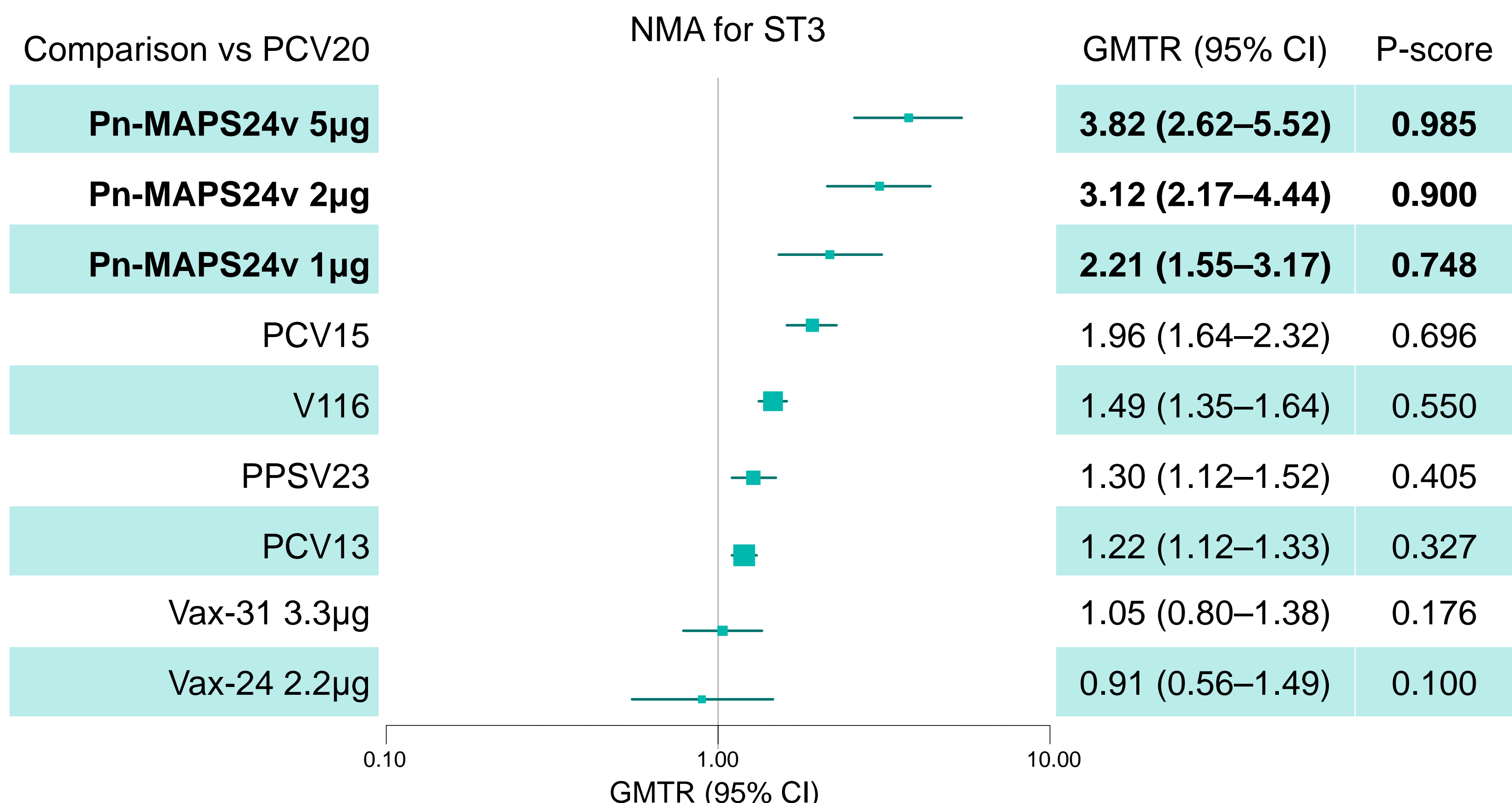
Application

- In this case example we compared OPA ST-specific responses to ST3 across several vaccines.



- Similar comparisons were done for other STs (data not shown).

- Among the PnVx assessed, Pn-MAPS24v at all 3 dose levels could exhibit higher GMTR vs PCV20 against ST3.



CI, confidence interval. The X-axis is using log₁₀ scale. The point sizes are proportional to the relative precision of the estimates: narrower CIs (indicating higher precision) resulted in larger points. P-score ranges from 0 to 1, where a higher P-score indicates a greater likelihood that the effect investigated is better.

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Disclosures

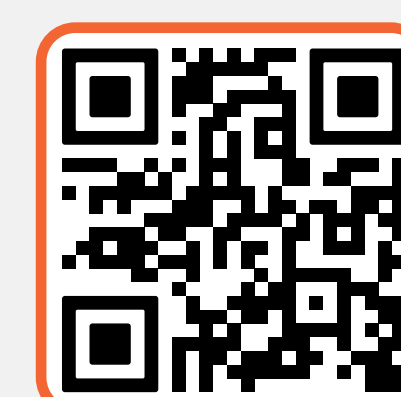
NK, MP and SS are employed by GSK and hold financial equities in GSK. SS has issued and pending patents on Multivalent Pneumococcal Vaccines.

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GSK

Trademark statement

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Digital poster
Supplemental data
Narrated summary

