

Maternal and infant gut microbiome

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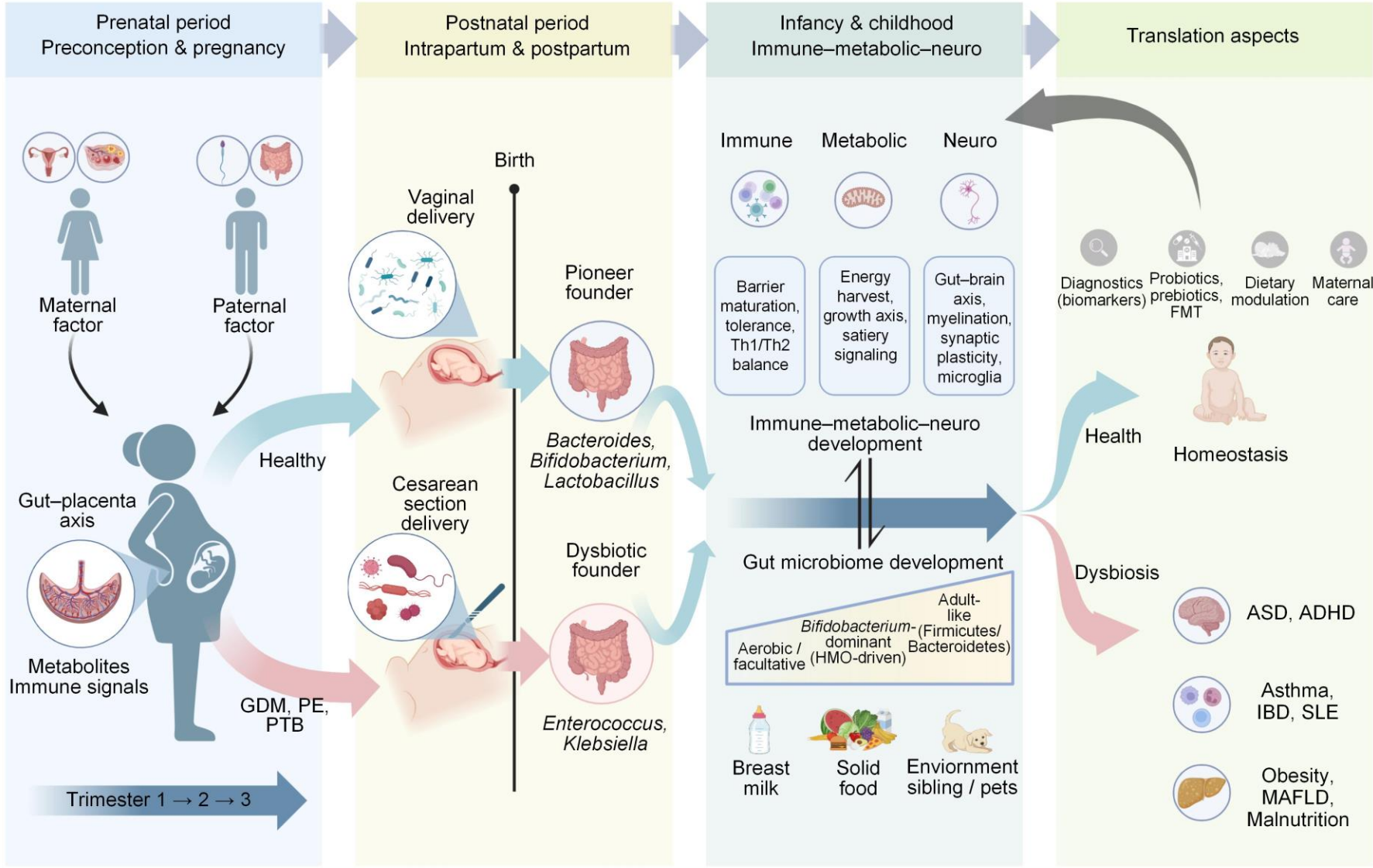
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Introduction





Highlights

- 1 Maternal and early-life microbiota shape developmental programming from preconception to childhood
- 2 Dysbiosis during critical windows may affect immune, metabolic, and neurodevelopmental trajectories
- 3 Microbiome-based diagnostics and precision interventions may improve maternal–infant health



Figure 1. Preconception: maternal/paternal microbiota and reproductive health

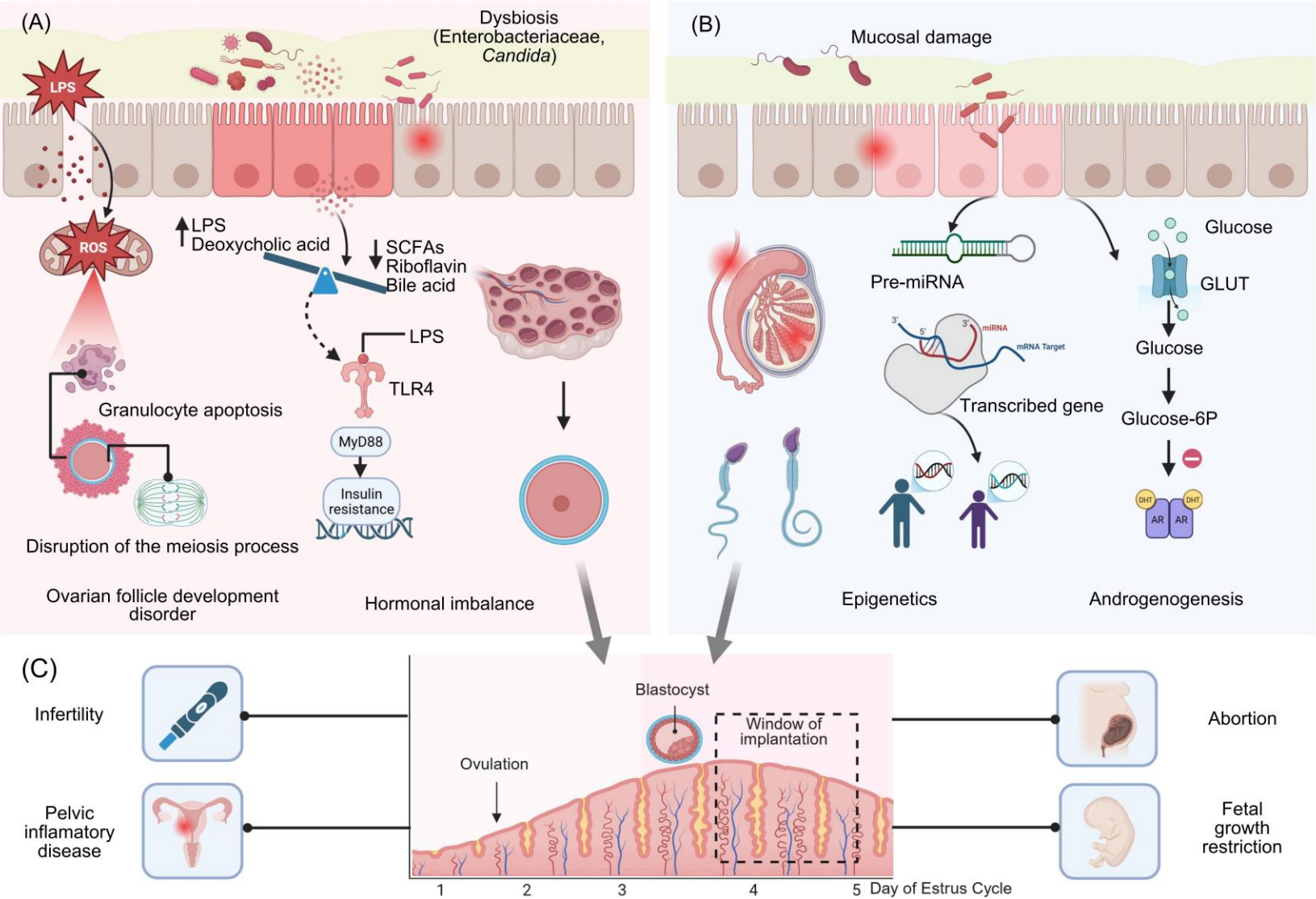
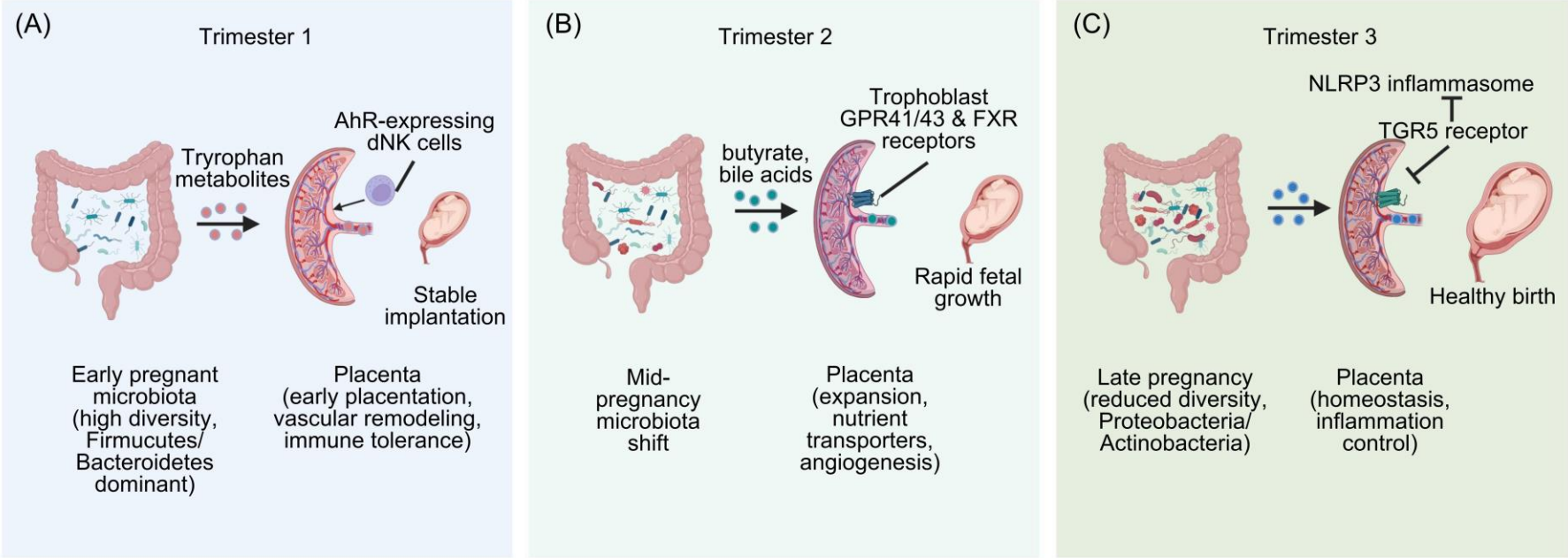




Figure 2. Pregnancy: gut–placenta signaling axis and pregnancy complications



Gut-placenta signaling axis

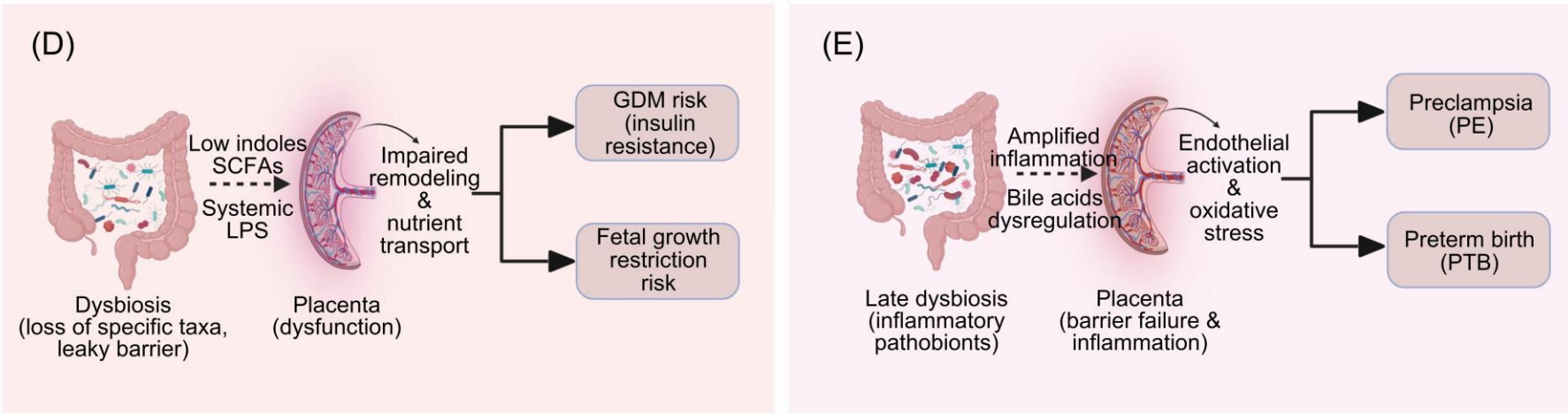


Figure 3. Intrapartum/early postpartum: initial colonization and maternal transmission

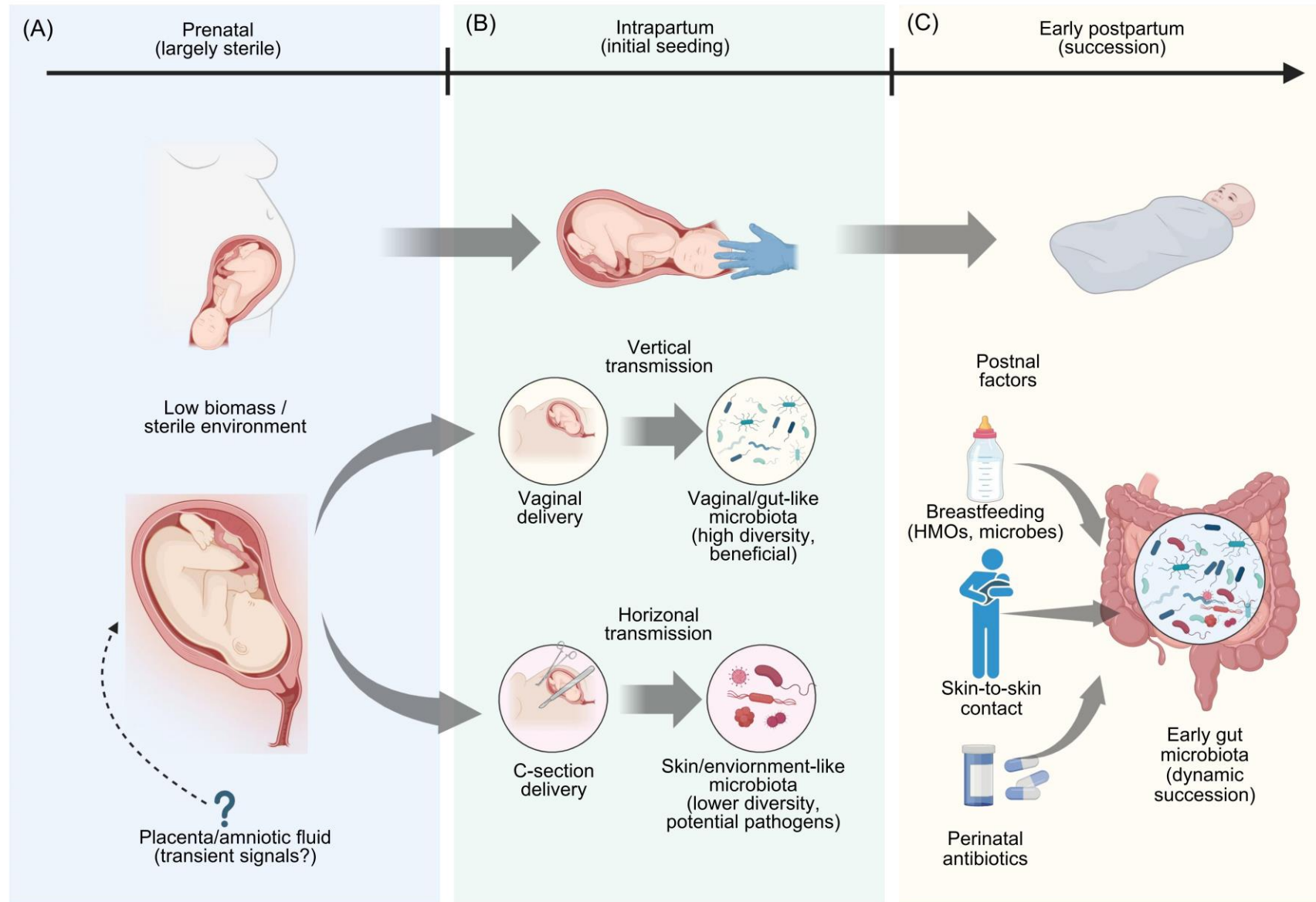


Figure 4. Preterm infants: host immaturity, clinical exposure, and functional restoration

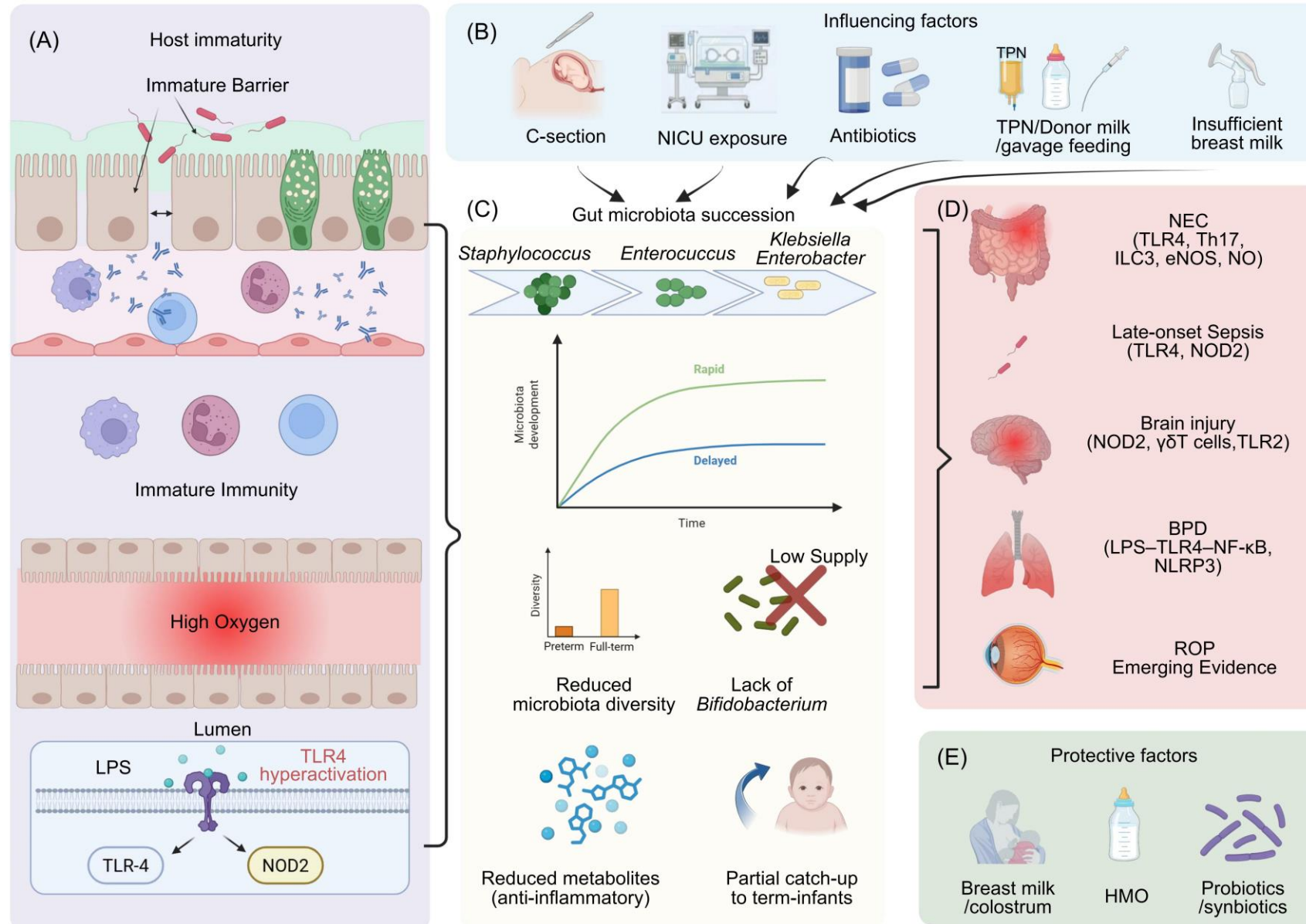


Figure 5. Infancy to childhood: staged microbial succession and functional maturation

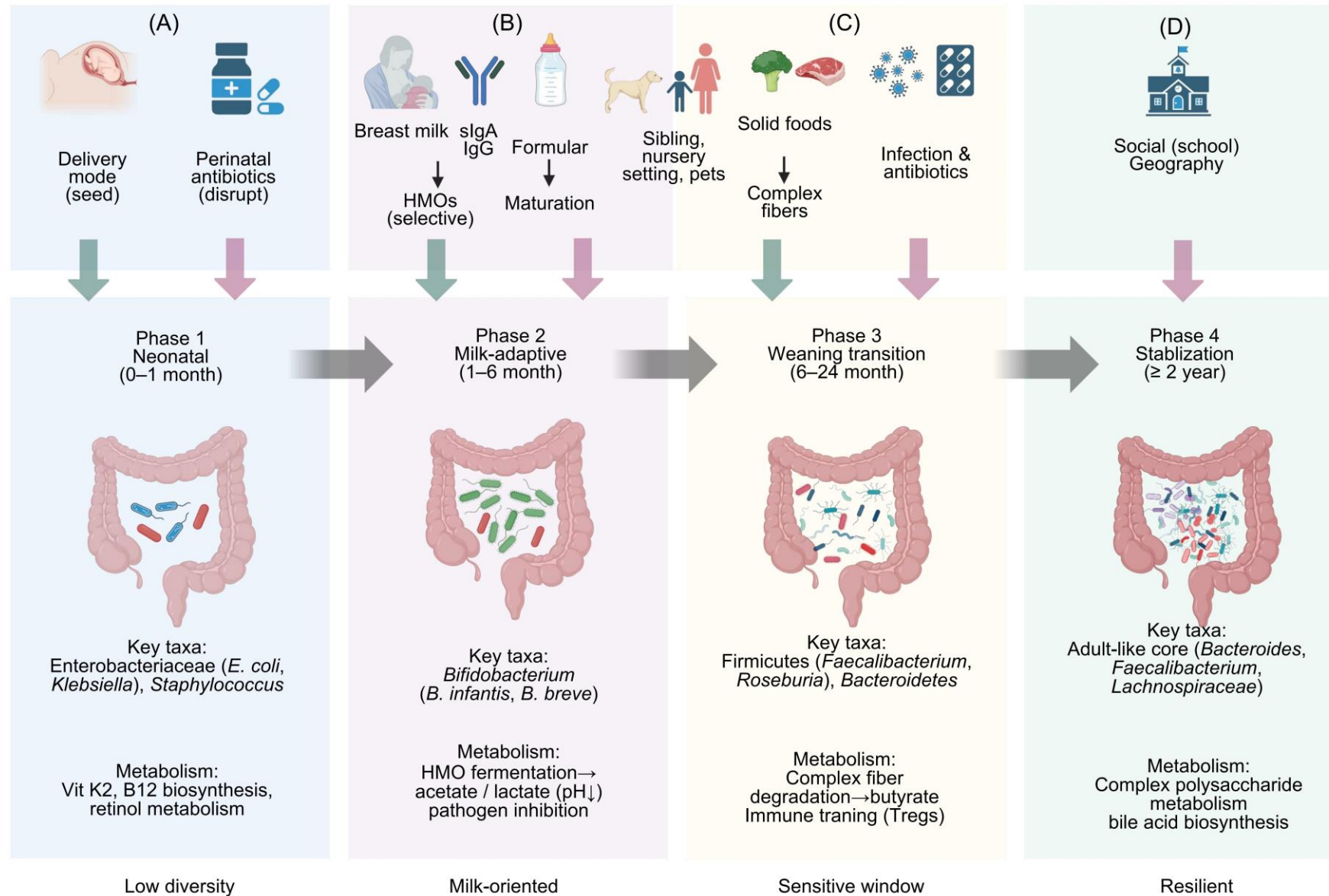




Figure 6. Neurodevelopment: gut–brain axis and neurodevelopmental disorders

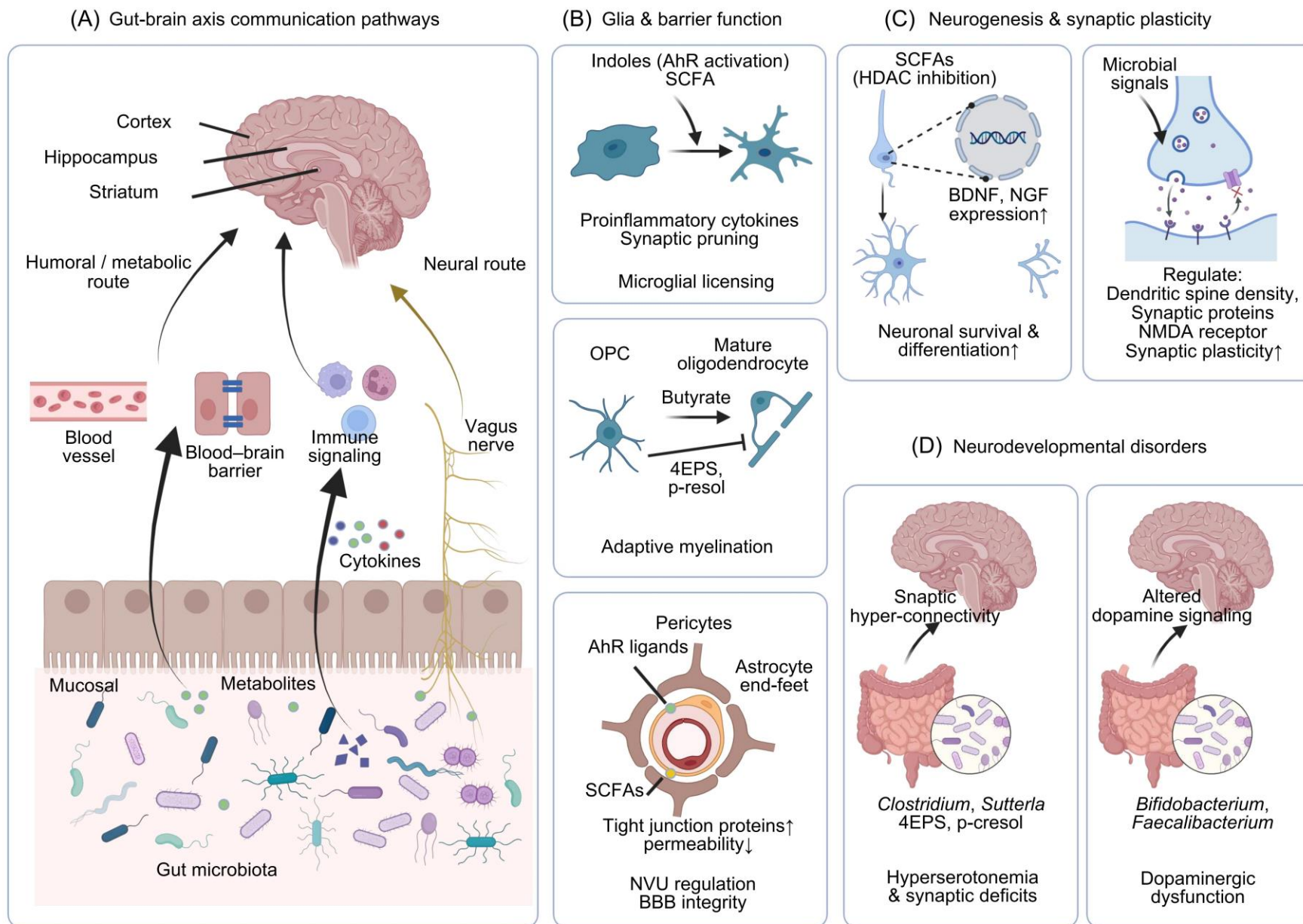


Figure 7. Immune development: microbial training, immune tolerance, and inflammation

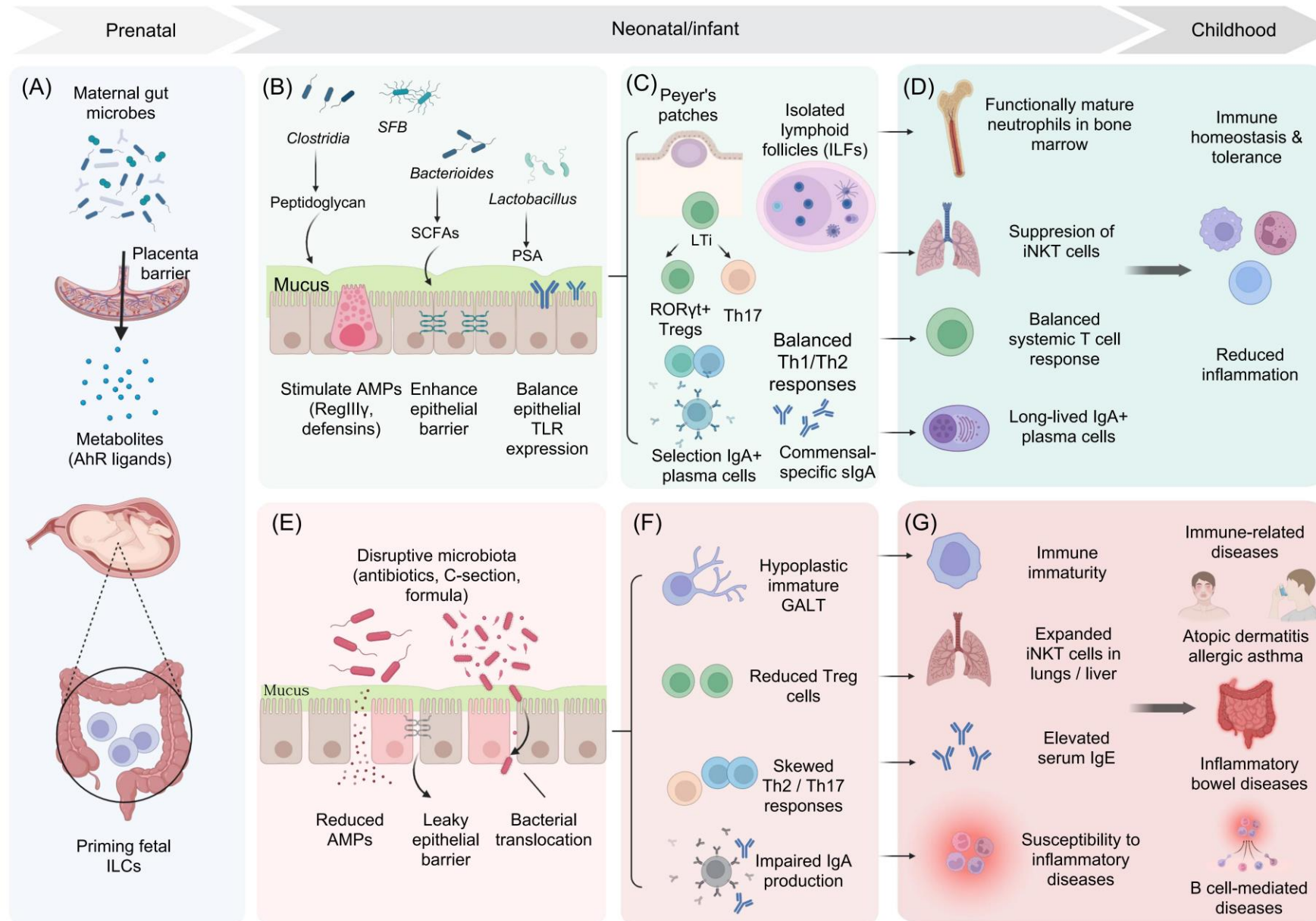
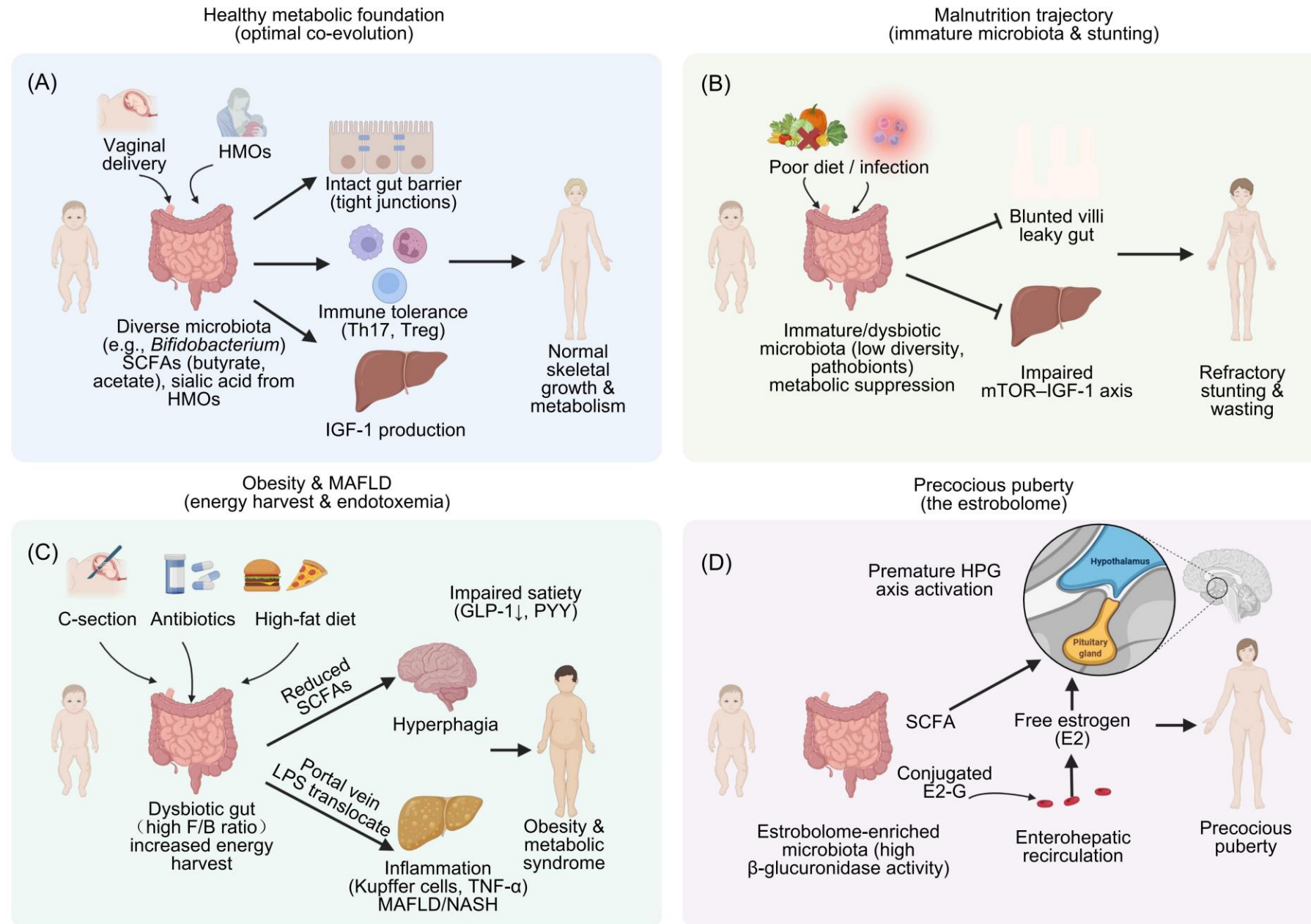




Figure 8. Metabolic development: nutrition, growth, and long-term metabolic health



🔊 **Figure 9. Critical windows: from “age windows” to “developmental synchronization”**

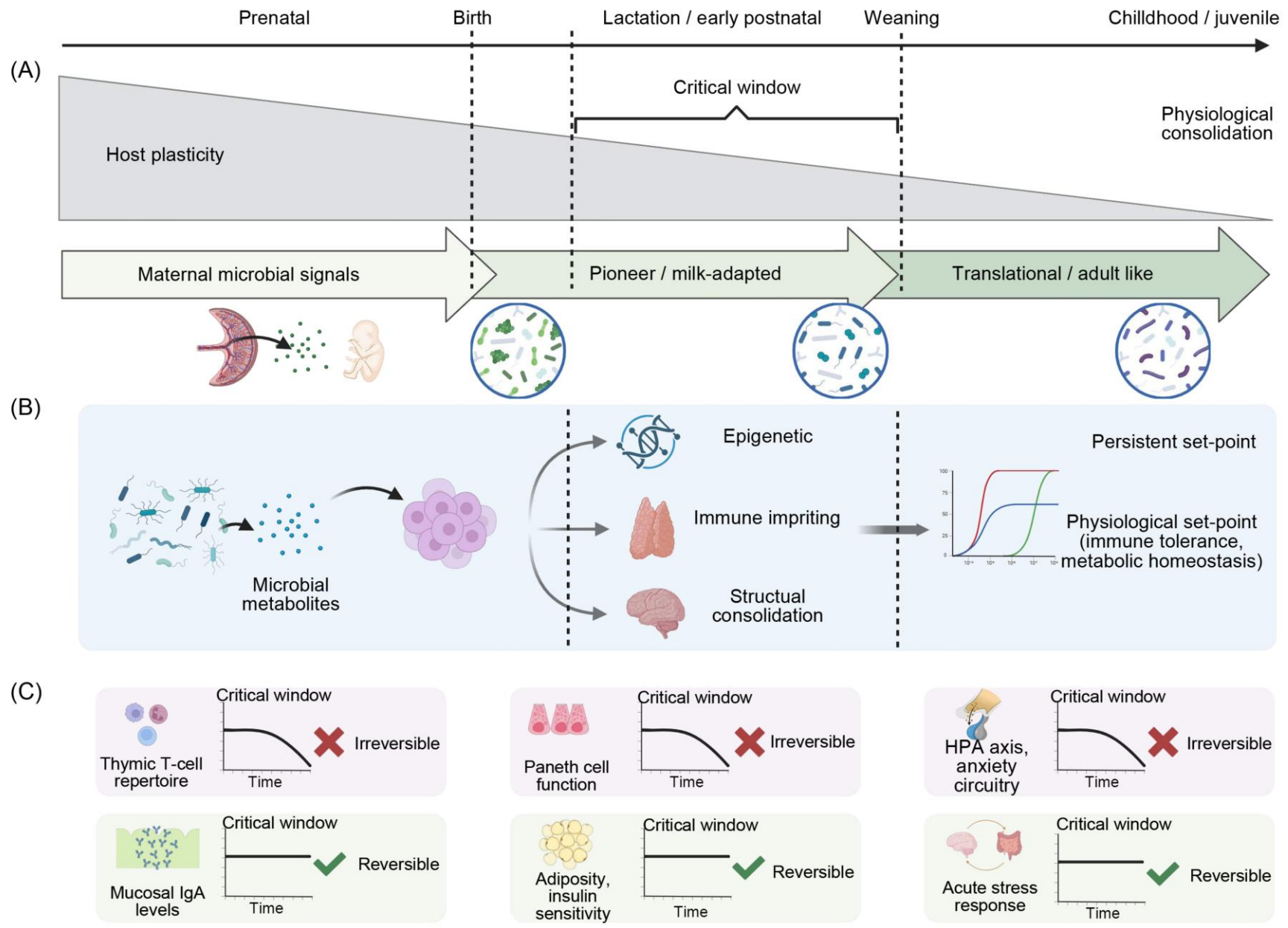
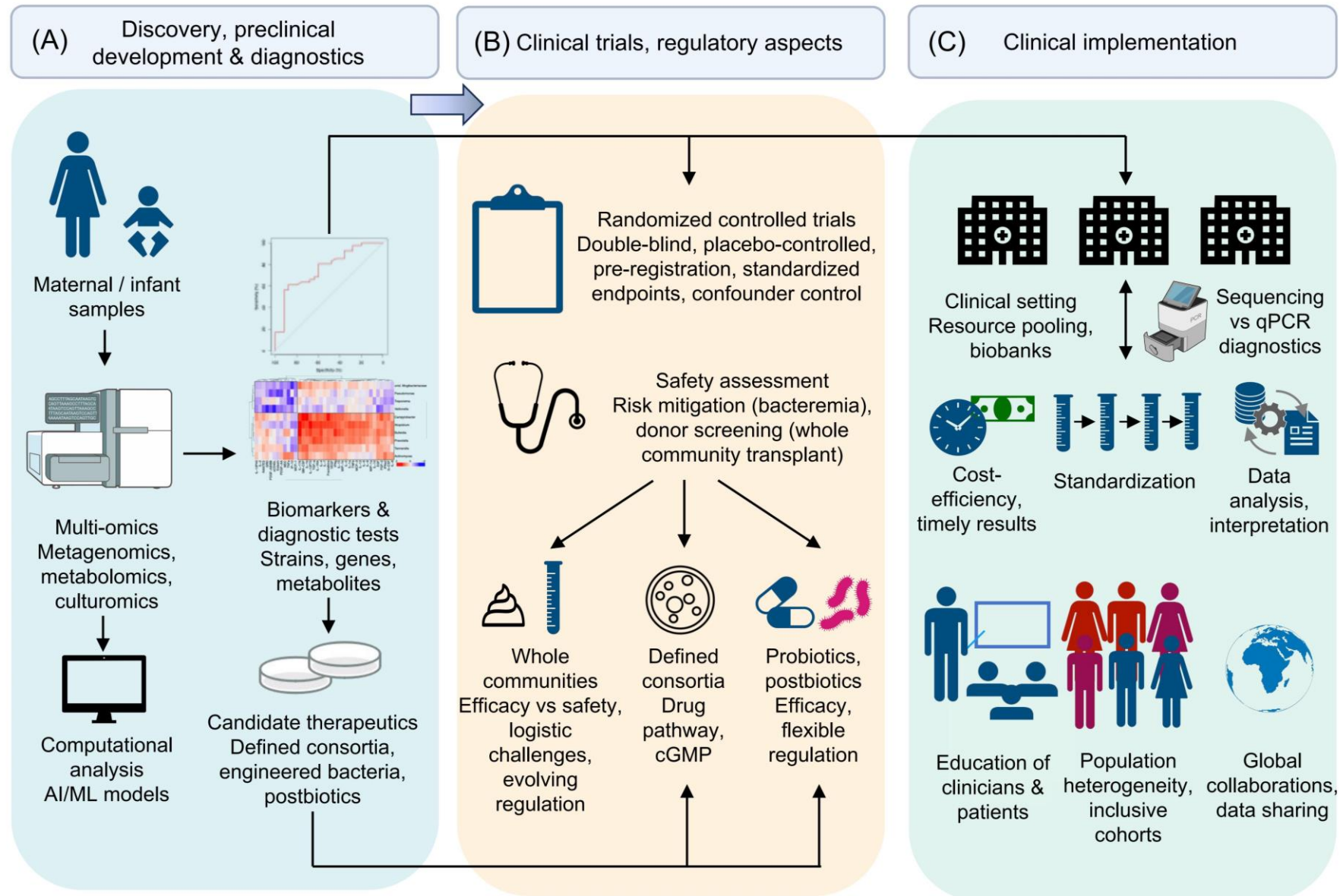


Figure 10. Translational applications: from diagnostics to safe precision interventions

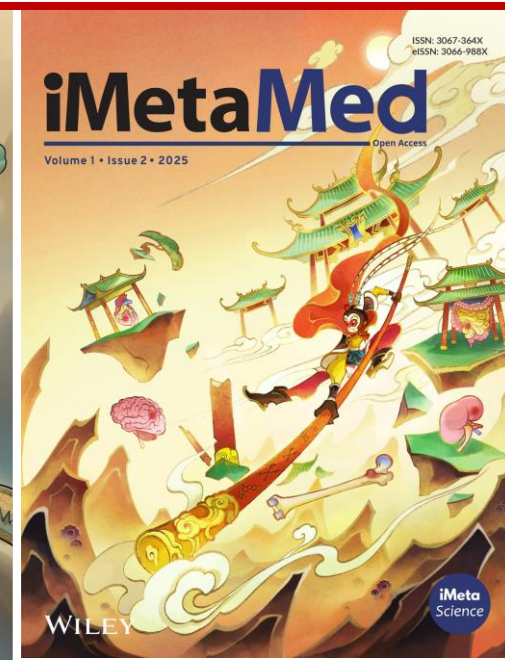
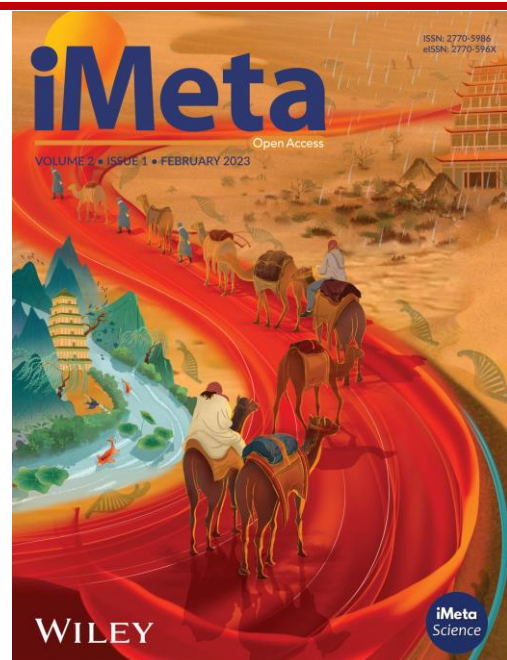




Summary

- ❑ The maternal–infant gut microbiome spans preconception, pregnancy, birth, postpartum life, and childhood, acting as a key ecosystem for early-life development.
- ❑ This review proposes a “developmental synchronization” framework: critical windows depend not only on age, but also on matching microbial signals to host developmental needs.
- ❑ Future interventions should move from simply “adding microbes” toward restoring function and synchronization for safer, more precise maternal–infant microbiome modulation.

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