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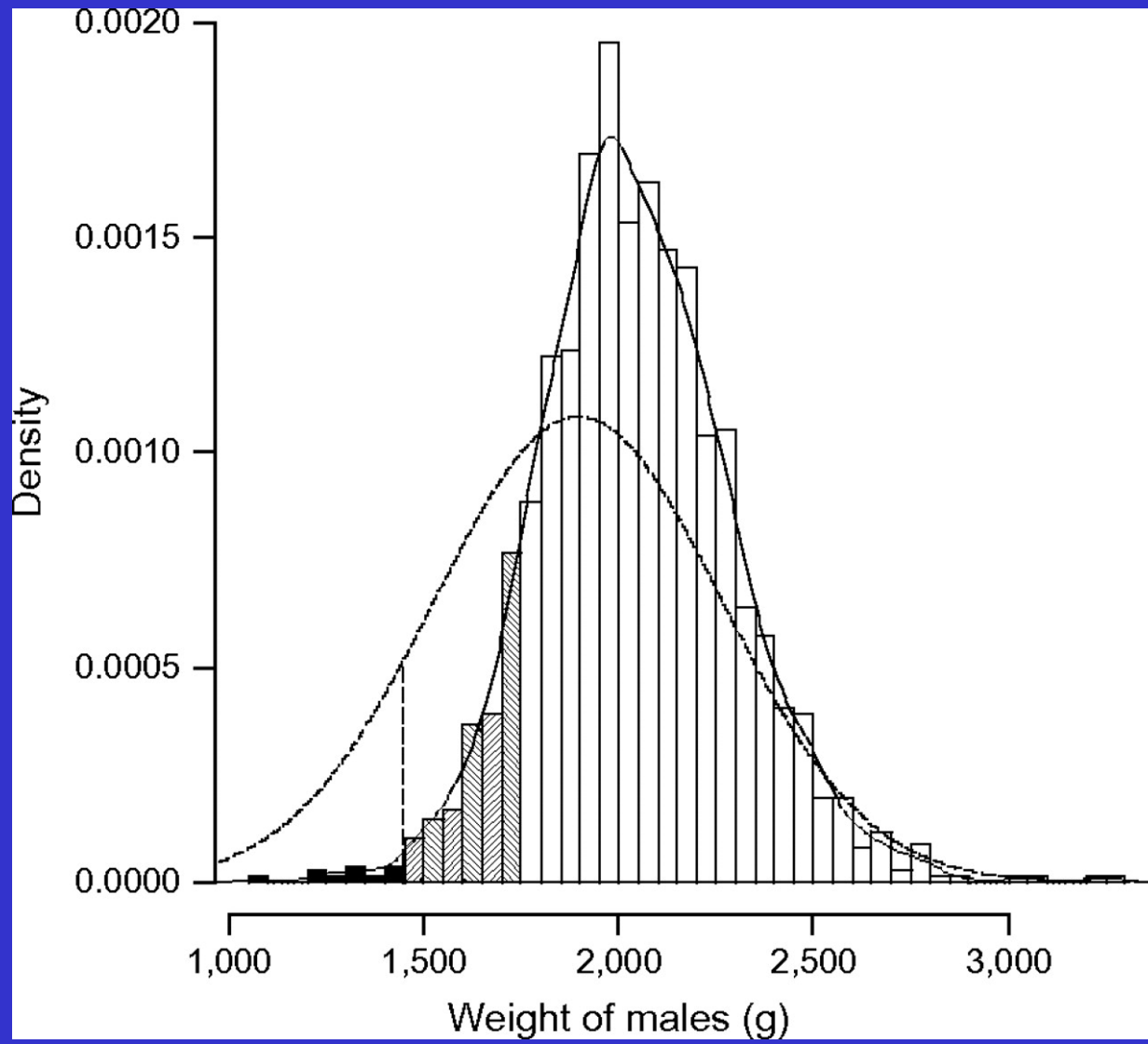
Does One Size Fit All?

- Birth weight for gestational age
 - A proxy for fetal “growth”
 - Reflects adequacy of intrauterine environment
- Sex-specific BW-for-GA standards widely accepted
- Other differences in BW for GA
 - Developed vs developing countries
 - Within-country differences
 - § Ethnicity
 - § Parity
 - § Height
 - § BMI
- Are these differences “physiologic” or “pathologic”?

“Customized” Standards

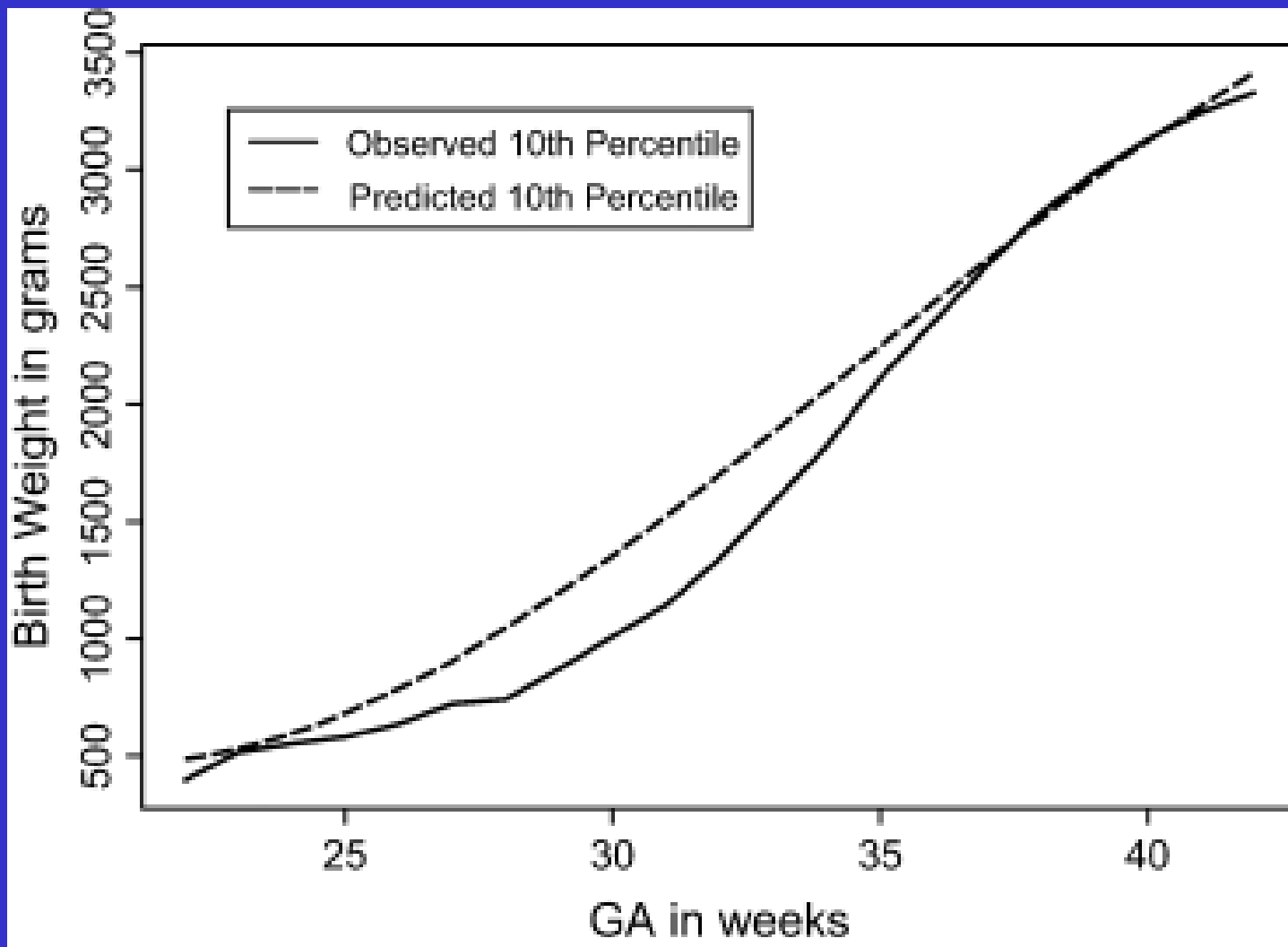
- Assume one size does *not* fill all
- Compare observed and “expected” BW for GA
- Estimate “expected” BW for GA
 - Based on regression model for presumed “physiologic” maternal characteristics known to affect fetal size
 - Key: expectation based on fetal weight, not BW*
- Most popular approach (Gardosi et al): Hadlock formula used to predict weight at 280 days

BW vs Estimated Fetal Weight at 32 Wk



Source: Hutcheon & Platt, *Am J Epidemiol* 2008;167:786-792

Observed vs Predicted SGA Cut-Offs Sweden, 1992-2001



Source: Zhang et al, BJOG 2007;114:474-477

“Physiologic” vs “Pathologic” Growth Restriction

- Factors considered one at a time
- GA-specific patterns compared
 - Perinatal mortality
 - SGA based on single population standard
 - SGA based on stratum-specific standard
- Choose SGA standard whose pattern parallels that for perinatal mortality
- All rates based on fetuses at risk

“Revealed” SGA (Growth Restriction)

- No valid measure of growth restriction among all surviving fetuses at risk (FAR) stratified by factors (e.g., ethnicity) that affect fetal growth
- Proxy measure: “revealed” SGA rate

Numerator: SGA live births with that factor (therefore affected by birth rate)

Denominator: FAR with that factor

of SGA live births at given GA

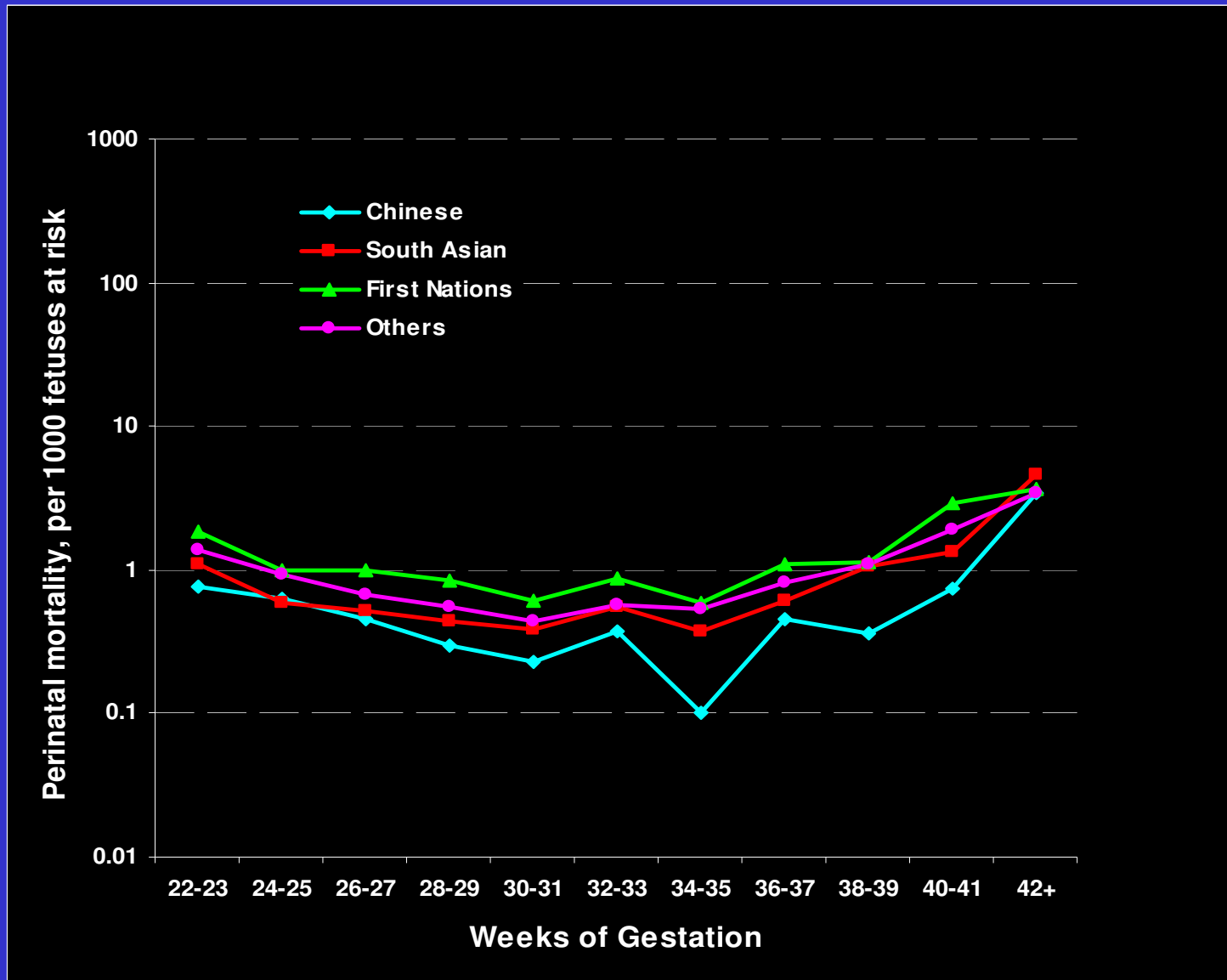
of FAR at that GA

Data Sources

Limited to Singleton Births

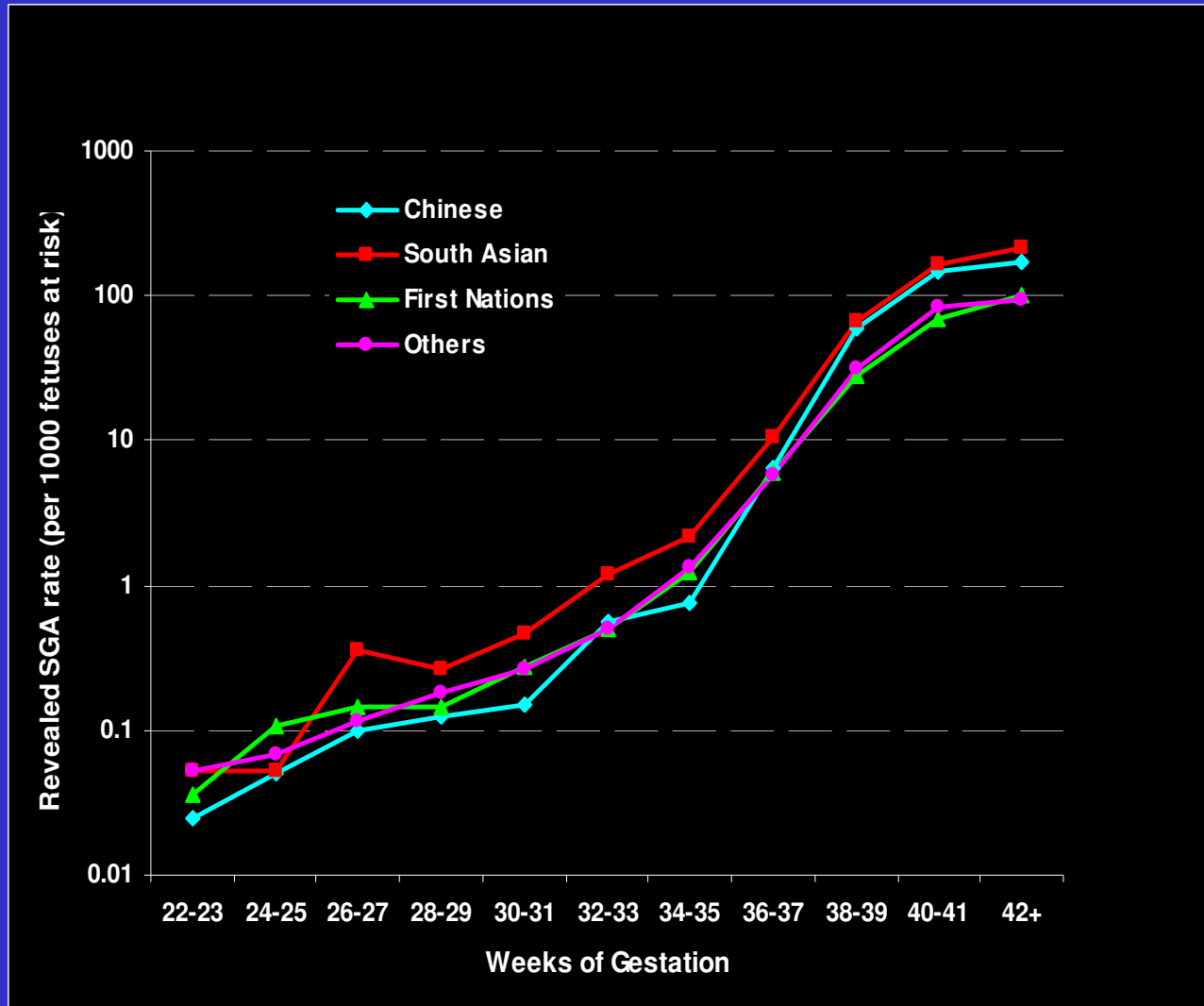
- Live- and stillbirths, British Columbia 1981-2000
 - Chinese (n=40,026)
 - South Asian (n=38,544)
 - First Nations (n=56,309)
 - Other (n=731,109)
- Live births, U.S. 1998-2000
 - Whites (n=9,012,194)
 - U.S.-born Blacks (n=1,554,382)
 - Foreign-born Blacks (n=200,395)

Perinatal Mortality, BC



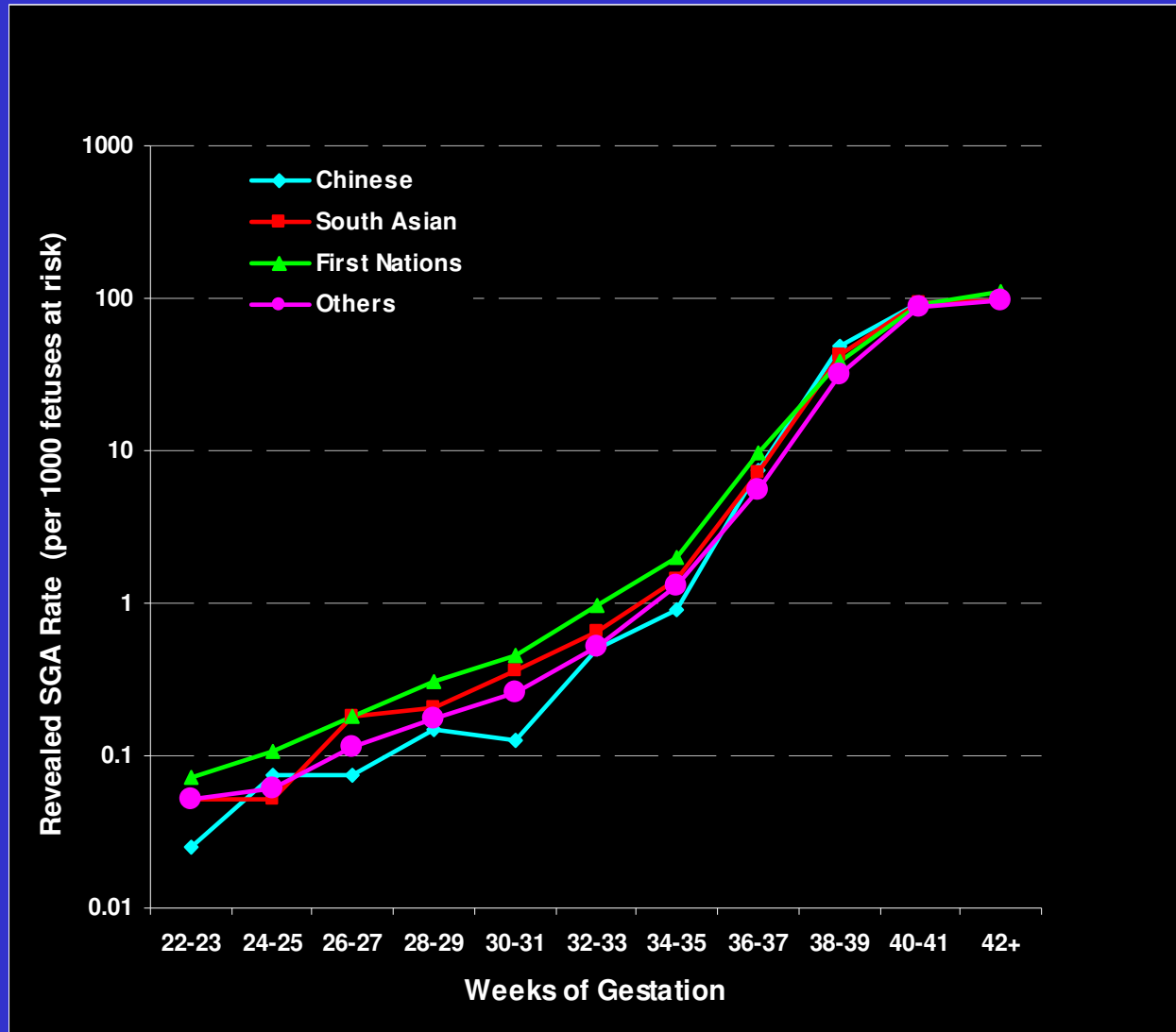
Revealed SGA, BC

Single Standard

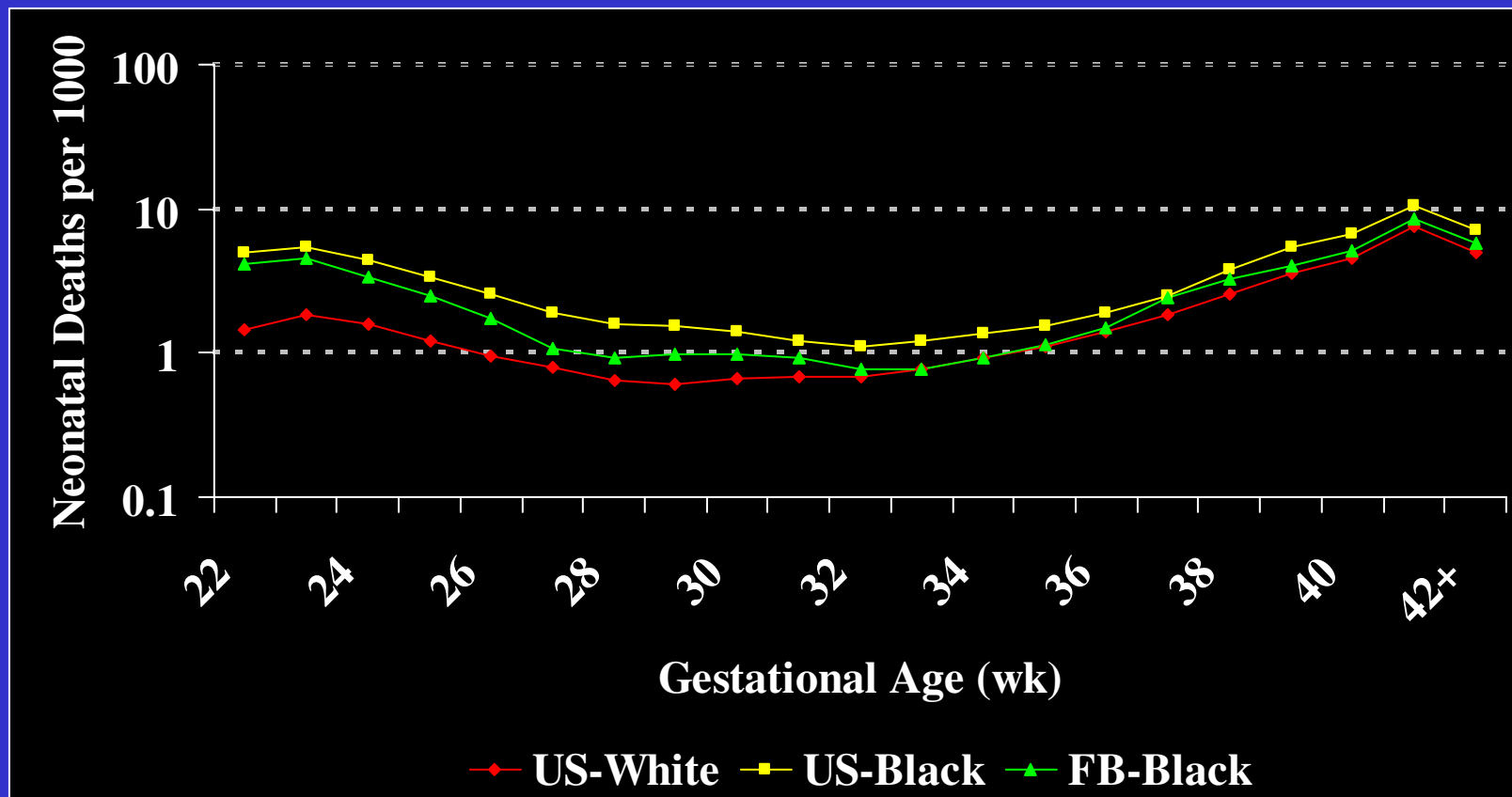


Revealed SGA, BC

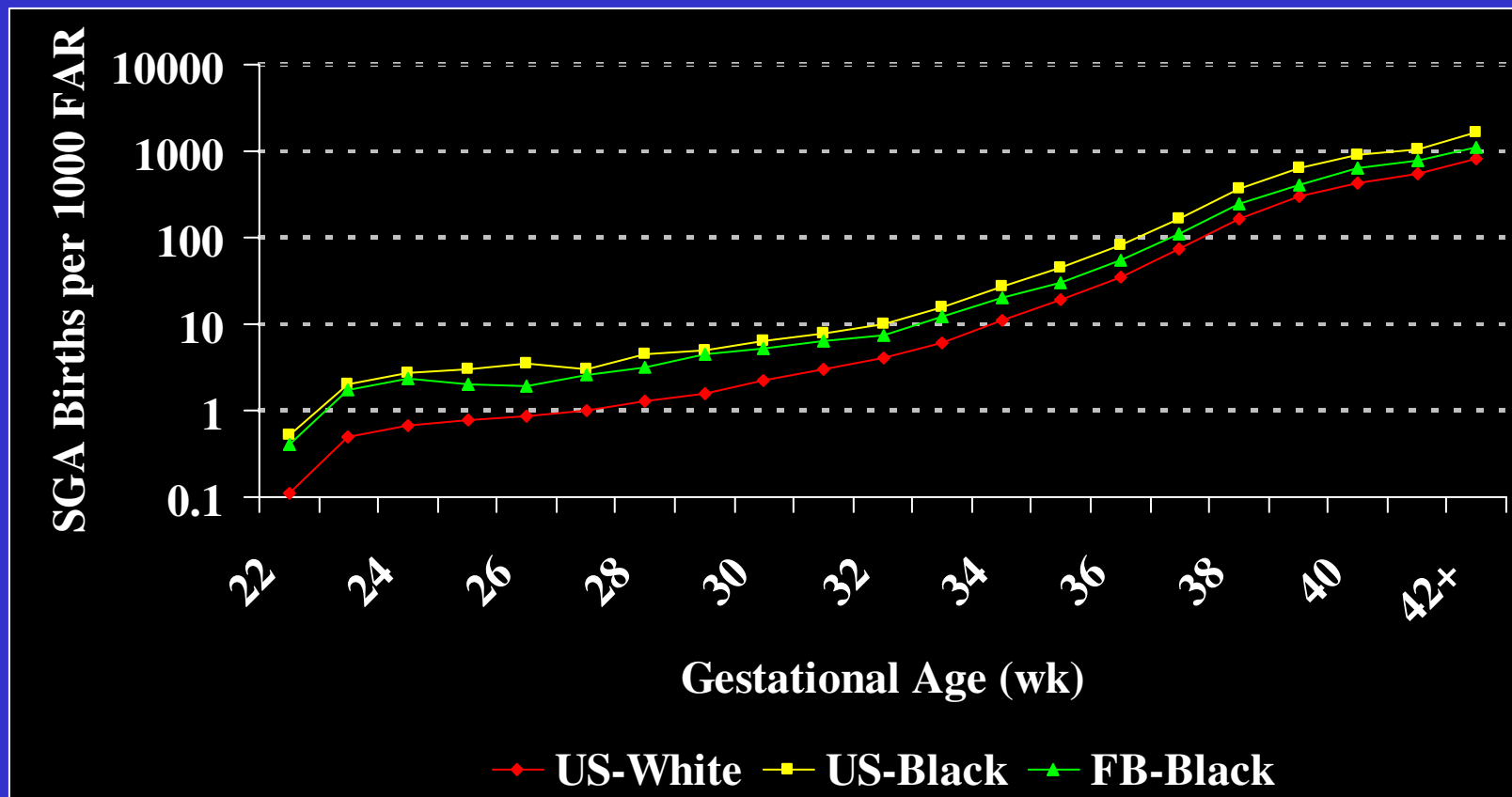
Ethnic-Specific Standards



Neonatal Mortality, U.S.

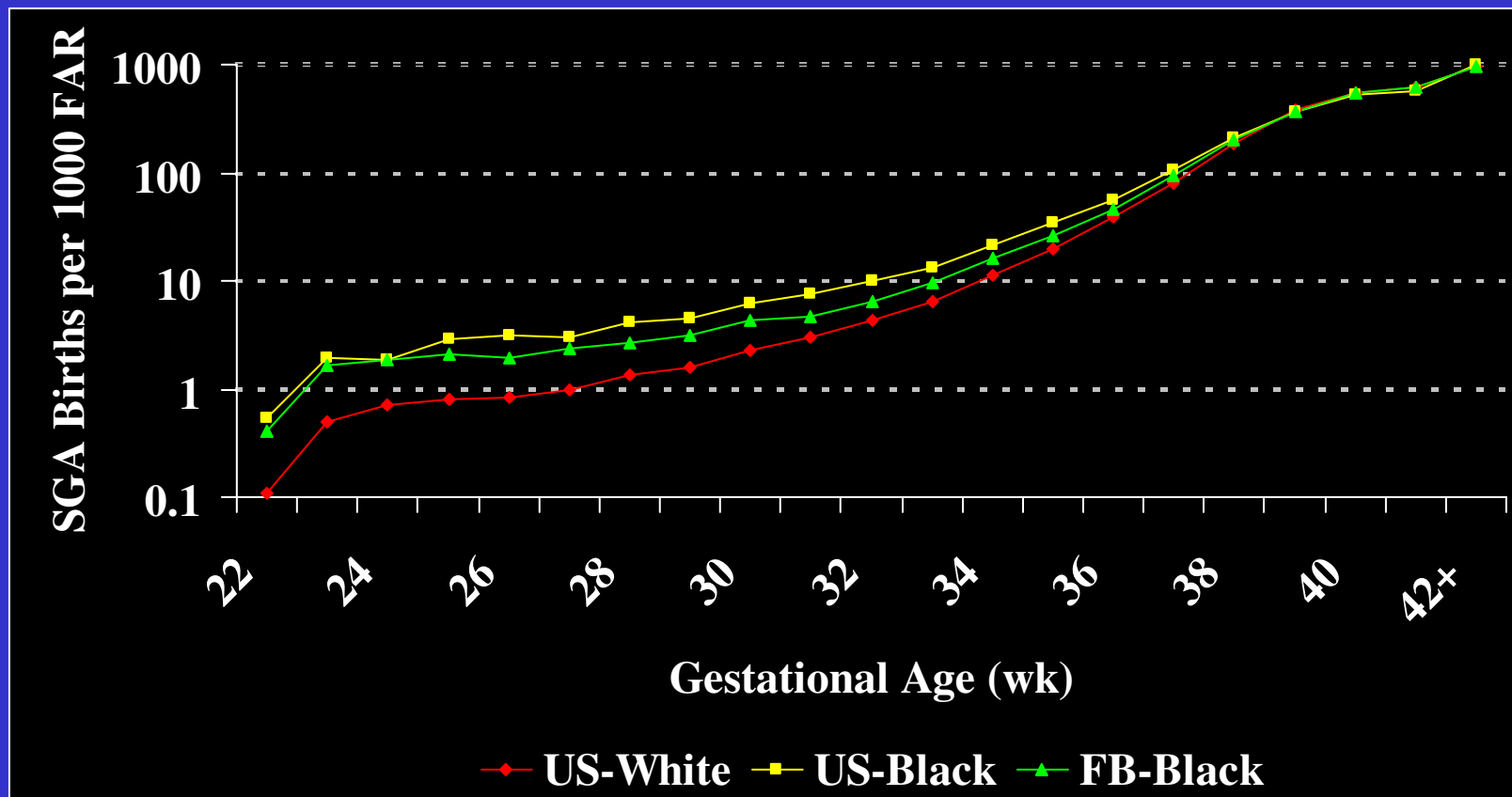


Revealed SGA, U.S. Single Standard



Revealed SGA

Group-Specific Standards, U.S.



“Healthy Migrant” Bias?

- BC Chinese and South Asian immigrants healthier than those who remained in country of origin
 - But neighborhood income distribution of these immigrants *lower* than in BC overall
 - No selection factor can simultaneously explain smaller fetal size and lower perinatal mortality
 - Ethnic-specific pattern for SGA: more coherent pattern
- Foreign-born Black immigrants to U.S. may also be healthier than U.S.-born Blacks
 - Intermediate results rule out genetic explanation
 - Single standard for SGA: more coherent pattern

Should Birth Weight Standards Be Customized?

- Evidence for customization is biased: little or no advantage over EFW uncustomized standard
- “Physiologic” vs “pathologic” differences usually assumed, not demonstrated
- Standards should be based on health consequences
 - Perinatal mortality or serious morbidity
 - Long-term outcomes and function
- Ethnic differences: depends on ethnic group
- Research priority: ethnic-specific EFW standards

Collaborators

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