



## Better reference intervals improve diagnoses in children

Reference intervals are a set of values that a doctor uses to interpret a patient's test results. Pediatric reference intervals, specifically for children, are important for correctly assessing health and detecting diseases among kids. A new study, "Current State of Pediatric Reference Intervals and the Importance of Correctly Describing the Biochemistry of Child Development," found that many reference intervals used for children do not accurately reflect the biology of child development. This can lead to misinterpretation of a child's health status.

**Pediatric  
reference intervals  
are critical for  
accurate diagnosis**

Health professionals run laboratory tests on blood and other bodily fluids to measure biomarkers. When test results from healthy children are used for comparison, they are called "reference intervals" or "normal ranges." Test results outside the reference intervals may prompt further investigation because abnormal results can indicate a disease.

Example: A child's thyroid hormone levels in blood are compared to a reference interval. If the child's levels are outside the reference interval, then further investigations are initiated to determine whether and what kind of thyroid disease the child may have.

As children grow and develop, normal biomarker levels in their blood and other bodily fluids change. Reference intervals need to describe those changes to correctly assess health and detect disease at any age.

Example: As children go through puberty, their healthy steroid hormone levels change and eventually reach healthy adult levels.

**As children grow,  
their reference  
intervals change**

### Partners work to develop reliable pediatric reference intervals

Clinicians, the Centers for Disease Control and Prevention (CDC), and the American Association for Clinical Chemistry investigated whether current pediatric reference intervals reflect biological changes during child development. Researchers studied data from scientific literature, commercial laboratory websites, study cohorts, and textbooks.

Thyroid Stimulating Hormone  
**1→21**  
Biomarker Pediatric Reference Intervals

*For 1 biomarker, such as TSH, 21 pediatric reference intervals are suggested for use.*

The researchers found that for certain biomarkers, many pediatric reference intervals are published. The differences are in the patterns, extent, and timing of biomarker changes, which are highly variable, particularly during developmental stages that feature rapid biologic changes. Many pediatric reference intervals do not fully capture the rapid biological changes. This can cause variability in biomarker interpretation and diagnosis. As a result, clinical laboratories often don't rely on published reference intervals.

The new study, "Current State of Pediatric Reference Intervals and the Importance of Correctly Describing the Biochemistry of Child Development," co-authored by CDC, found that accurate and universal pediatric reference intervals are needed to ensure correct pediatric care. CDC previously developed better adult reference intervals and, in collaboration with clinical partners, aims to create better pediatric reference intervals.

*Current State of Pediatric Reference Intervals and the Importance of Correctly Describing the Biochemistry of Child Development, [JAMA Pediatrics](#), April 2022*