

Expert Answers

From the IFCC Committee on Clinical Applications of Cardiac Bio-Markers

CARDIAC Q&A SERIES VI: CARDIAC TROPONINS IN CHILDREN

Pediatric upper reference limits (URL) for cardiac troponins; what are they?

All high sensitivity cardiac troponin (hs-cTn) assays for use in children use assay-specific URLs. The literature is predominately based on large studies from CALIPER, NHANES, LIFE, and recent studies from China (see key reference). Higher concentrations are observed in children <1 year with the lowest concentrations observed at approximately 2 years, followed by a slight increase at puberty until concentrations reach adult concentrations. During puberty sex differences become evident with higher concentrations in boys. Additional data are needed to examine potential ethnic differences.

Key reference: Aakre KM, Jeewa A, Cullen L et al. Current and Future Indication for Testing and Use of Cardiac Troponin in Children. *Clin Chem.* 2026;72: 625-640.

Additional reading: Bohn MK, Higgins V, Kavsak P et al. High-Sensitivity Generation 5 Cardiac Troponin T Sex- and Age-Specific 99th Percentiles in the CALIPER Cohort of Healthy Children and Adolescents. *Clin Chem* 2019;65: 589-91.

McEvoy JW, Wang D, Brady T et al. Myocardial Injury Thresholds for 4 High-Sensitivity Troponin Assays in a Population-Based Sample of US Children and Adolescents. *Circulation* 2023;148: 7-16.

Are there recommendations for use of cardiac troponins in children, and if so what cutoffs should be used?

Assay-specific and sex-specific 99th percentile URLs are recommended for hs-cTn in adults. The rationale for using both assay- and sex-specific URLs in adults also applies to children. Additionally, there are age-specific considerations for cutoffs in children.

The 99th percentile URL has limitations related to higher uncertainty (broader 95% confidence intervals for the concentration suggested) whilst using the 97.5th percentile as a decision threshold for myocardial injury has other limitations, mainly related to clinical interpretation and the complexity of differences between children and adults. Reducing the threshold for diagnosing myocardial injury in children will lead to a higher positive rate. The potential clinical benefit of this is unknown, and may increase the risk of unnecessary anxiety for patients and parents, as well as increased healthcare utilization. The IFCC C-CB suggests that laboratories reporting hs-cTn results for children include age- and sex-specific URLs if they are available in the literature. Which cutoff the laboratory should use needs to be discussed and decided in agreement with local clinicians depending on local practice and needs.

Key reference: Aakre KM, Jeewa A, Cullen L et al. Current and Future Indication for Testing and Use of Cardiac Troponin in Children. *Clin Chem.* 2026;72: 625-640.

Additional reading: Cardiac Troponin Reporting in Children and Young Adults: Time to Change Clinical Practice. Aakre KM, Meex SJR, Mills NL. *Circulation*.2023;148:17-19.

Thurston AJF, Røys EÅ, Røysland R et al. Cardiac troponin thresholds in children and young adults: a multi-center cohort study. *J Appl Lab Med*. 2026;1: 554-568.

Is the use of cardiac troponin in pediatric cohorts appropriate?

In clinical practice the decision to test or not test should always be made with consideration of the individual patient and the clinical context. An isolated normal cTn does not necessarily exclude cardiac disease or injury. Cardiac signs and/or symptoms during or after an infection, and in particular viral infections, are the main clinical signals of presumed myocarditis or myopericarditis. In this setting, cTn testing with high sensitivity assays may be of value. Less frequent indications are arrhythmia, respiratory symptoms, cardiotoxicity (e.g., side effects of treatment), inflammatory or degenerative muscular diseases with possible cardiac involvement, or clinical contexts where there is suspicion of heart failure, cardiac ischemia or vasospasm. Childhood cancer survivors should undergo risk-based screening according to treatment-related exposures on a regular basis, for secondary prevention. Screening with cTn may also be reasonable in chest trauma with possible cardiac contusion (or commotio cordis), which is the most overlooked trauma-related pediatric injury.

Key reference: Aakre KM, Jeewa A, Cullen L et al. Current and Future Indication for Testing and Use of Cardiac Troponin in Children. *Clin Chem*.2026;72: 625-640.

Additional reading: Lipshultz SE, Miller TL, Scully RE et al. Changes in cardiac biomarkers during doxorubicin treatment of pediatric patients with high-risk acute lymphoblastic leukemia: associations with long-term echocardiographic outcomes *J Clin Oncol* 2012;30: 1042-9.

Wang AP, Homme JL, Qureshi MY et al. High-Sensitivity Troponin T Testing for Pediatric Patients in the Emergency Department. *Pediatr Cardiol* 2022;43: 350-9.

The information provided above is a brief summary of common questions and answers developed by consensus of the IFCC C-CB committee, however it is important to recognise that greater knowledge and understanding is recommended and can be sourced from the referenced resources and <https://ifcc.org/ifcc-education-division/emd-committees/committee-on-clinical-applications-of-cardiac-bio-markers-c-cb/> including links to detailed papers, podcasts and presentations.