A New Tool to Identify Still’s Murmurs
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BACKGROUND
While 80% of children have a murmur during childhood, less than 1% of these murmurs are due to organic heart disease. Of 970 new patients referred to the outpatient clinics of the IWK Children’s Heart Center in Halifax, Nova Scotia in 2003, 64.2% were shown to have an innocent murmur, the greatest percentage being the vibratory (Still’s) murmur. Sub-optimal auscultation skill has been shown to exist in office based pediatricians and a distinctly unsatisfactory level in family physicians. In this study, objective analysis of heart sounds using a new computer software technique is carried out; the objective being to make available to pediatricians and family physicians an easy and inexpensive method to identify functional murmurs in their office.

OBJECTIVE
To evaluate pitch (frequency spectrum) of pediatric heart murmurs and to identify characteristic features of the Still’s murmur utilizing the phonocardiograph and Fast Fourier Transform (FFT) and power plots (Figure 1).

RESULTS
Sixty three percent of clinically diagnosed Still’s murmurs had very narrow frequency bandwidth within 40Hz, with mean frequency being 110Hz. Eighty percent were within 55Hz bandwidth. This is consistent with the clinical characteristic of the Still’s murmur as being musical (vibratory). By definition, musical sound must be closely contained within a single tone. In comparison average frequency band-width for the systolic murmur of pulmonary stenosis was shown to be 84Hz, with mean frequency being 124Hz (Figure 5). FFT plots demonstrated the Still’s murmur to have a unique and characteristic obelisk-like form.

Using the student t-test and ANOVA statistical analysis, the difference in the maximum frequency between the Still’s murmurs and pathological murmurs was NOT statistically significant (p-value of 0.138). However, the difference in the bandwidths between the Still’s murmurs and pathological murmurs was statistically significant to a p-value of <0.0001.

CONCLUSION
Innocent Still’s murmurs can be easily and inexpensively identified using computerized software to analyze their frequency spectrum and by demonstrating the characteristic obelisk-like form, thus negating the necessity of other expensive diagnostic procedures.

FUTURE DIRECTIONS
• Automate grading of murmur intensity.
• Automate murmur diagnosis.
• Conduct clinical trials with unknown heart sounds.
• Conduct clinical trials to determine the role of this technology in evaluating children with murmurs.