Reviewer's report

Title: Phono-spectrographic analysis of heart murmurs in children

Version: 1 Date: 29 December 2006

Reviewer: Morton E Tavel

Reviewer's report:

Overall, this is an excellent study that is presented well. I believe that it should be published at a high priority. I have some concerns and recommendations for minor modifications, as detailed below:

1. The authors' displays of the spectrograms utilize relative color-coding to detect sound intensities at the differing frequencies. They seem to use the yellow zones to define their limits of peak frequency and overall durations of the murmurs, but is this actually what was done? This designation seems to suffice for all the authors' examples wherein the gain settings are the same from case to case. Their yellow zone, however, seems to cover a fairly broad frequency band—from minus 15 to minus 45 decibels. Thus if one were to change the gain settings, it is quite likely that this yellow zone could be made to display entirely different values. This shortcoming would likely prevent replication of their results in other laboratories unless some standardized way of spectral display could be found. This shortcoming could potentially be overcome through the use of single demarcations superimposed upon the spectral displays to demonstrate specific attenuations of intensity; for instance, a line of demarcation to indicate the exact levels of (say) minus 25 decibels. This limitation should be mentioned in their discussion.

2. Page 6, paragraph 1: The authors' state that pathological murmurs are dispersed into a wide frequency spectrum, being more intense at lower frequencies, further stating that the higher the velocity of flow, the wider the frequency scale. It seems fairly clear that pathologic conditions increase the upper frequencies, and these latter values can be determined in a semi-quantitative fashion. Their statement, however, claiming that these murmurs are more intensive at lower frequencies seems to lack any objective validation, seemingly only resulting from visual subjective assessment. If this is the case, the authors should clarify and explain this fact. The same problem arises in paragraph 5 on page 6, wherein the authors state that the low frequency limits differed statistically between pathological and physiological murmurs.

3. Page 6, paragraph 2: The authors state that volume was compared to the mean of the amplitudes of S1 and S2. They should clarify this to state that this was done from the waveform display (not the spectral)—which I assume to be the case.

4. The authors should explain the specific filtration that was used to produce the waveform displays, for this could have influenced their determination of relative amplitude of murmurs and sounds.

5. Page 8, paragraph 3: The statement that “the frequency of vibratory innocent murmur decreases over time” is unclear. Does “time” mean with patient age, or within the systolic interval?

6. Figure 5 seems to display an ejection sound (the second portion of the sound labeled “S1”). The authors might comment on this—do they agree with my assessment? Were they able to observe the behavior of this component with respiration?

7. The meaning of the phrase “monotonic wave movement” cited on page 7 is unclear. We expect that it might refer to “harmonic waves” which describes a sound spectrum dominated by relatively pure tomes bearing a harmonic, or integral relation in frequency.

What next?: Accept after minor essential revisions