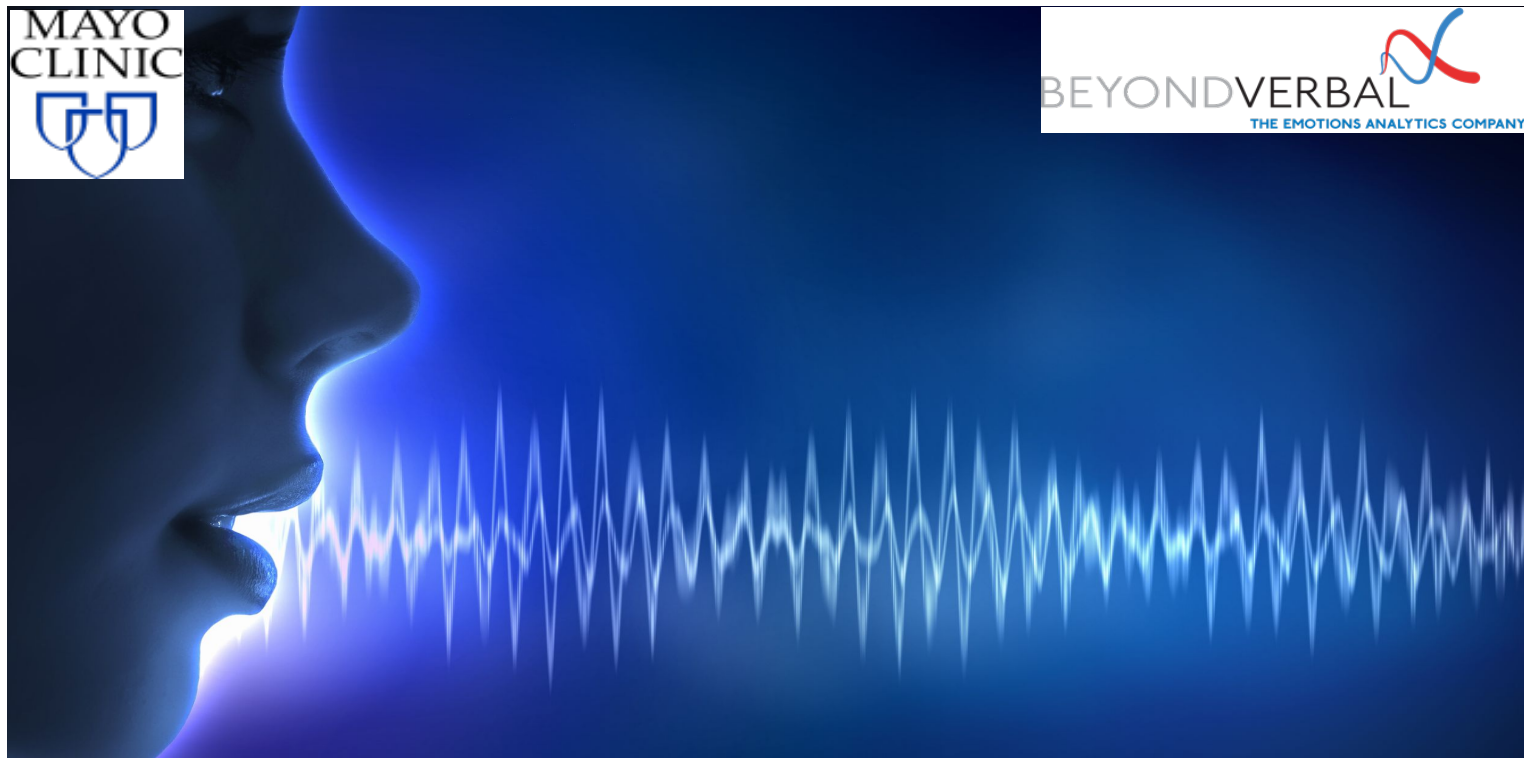


A feasibility pilot study using a smartphone to determine the association between voice signal abnormalities and the presence and severity of coronary artery disease in patients referred for elective coronary angiography for suspected myocardial ischemia at the Mayo Clinic, MN



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Background



- Coronary artery disease (CAD) is the leading cause of morbidity and mortality.
- Methods in managing CAD include early identification of disease and patient risk stratification which allow for prompt and appropriate therapy.
- Traditional cardiovascular risk factors have been shown to account for less than half of all coronary events. Other studies have demonstrated the limited utility of such scores in particular cohorts of patients, namely young adults and female subjects and patients with inflammatory disorders.
- There is an unmet need for more individual and remote monitoring of CAD



Background



- Voice signal characteristics have been shown to be associated with a number of different pathological entities including dyslexia, ADHD and Parkinson's Disease.
- Preliminary studies indicated that several disease states including CAD may have a unique voice signal characteristics.
- Thus, the current study was designed to test the hypothesis that the association between a unique voice signal characteristics and the presence and the degree of CAD. Moreover, the changes in the voice signal characteristics were assessed following coronary intervention. .



Methods



- 100 patients presenting for elective coronary angiogram, 40 controls - 20 healthy, 20 patients undergoing an non-cardiac procedure
- All patients will go after recording to have their routine coronary angiograms which are clinically indicated to determine whether or not they have CAD, and if so to what extent.
- Each patient's voice signal will be characterized as either 'normal' or 'abnormal.' If 'abnormal,' the voice recording system will characterize the abnormalities by determining whether there are acoustic features presented.
- The findings of the coronary angiograms will be ascertained by assessment of each patient's catheterization laboratory each report and where necessary clarification will be made through review of radiographs taken during procedure.
- Comparisons will then be made to see if there is an association with the presence of abnormal voice signals and the presence of coronary artery disease and if so, whether the extent of voice signal abnormality (determined by the number of pathological patterns) correlates with the degree of CAD.

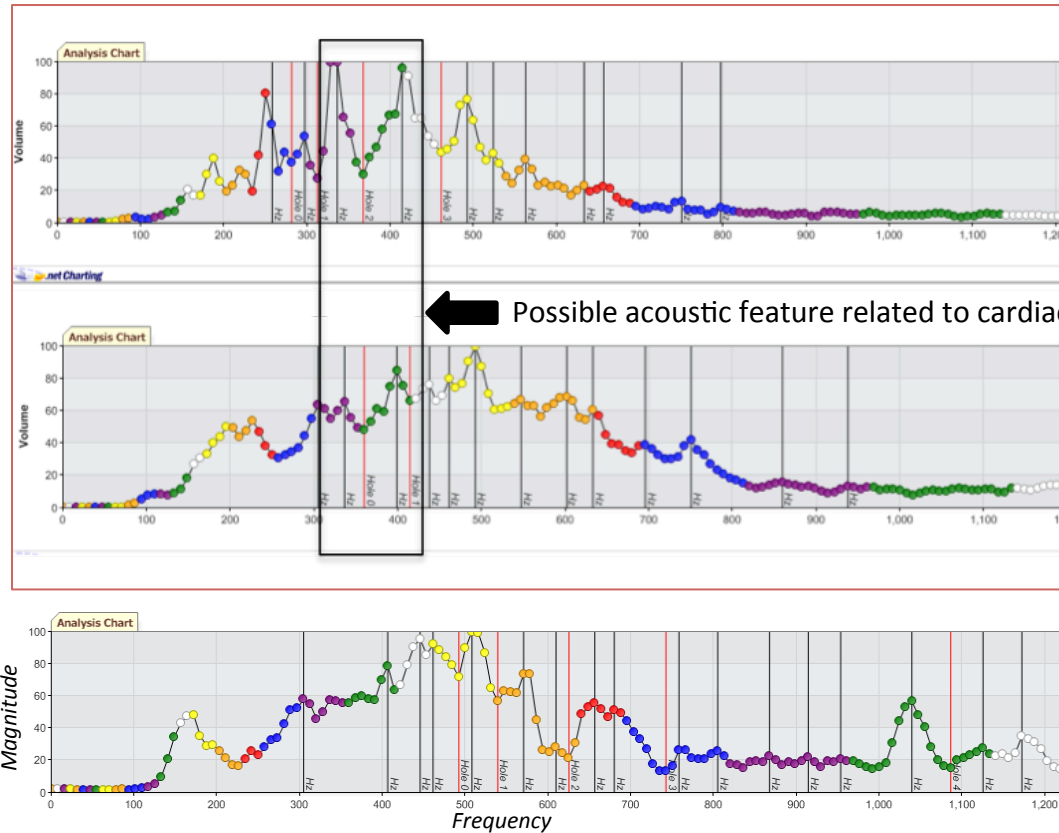


Preliminary results



Average FFT transform of selected voice recording segments

These figures illustrate representative voice signal characteristics signals from a patient prior and following coronary angiography and intervention as compared to a normal control.



CAD patient prior to angiography

← Possible acoustic feature related to cardiac condition

CAD patient after angiography and intervention

Example of voice signal of a healthy individual



Conclusion



- The study will be completed in the next year.
- The association between voice signal characteristics and the presence of CAD may serve as a remote non-invasive methods for the early identification of CAD.

