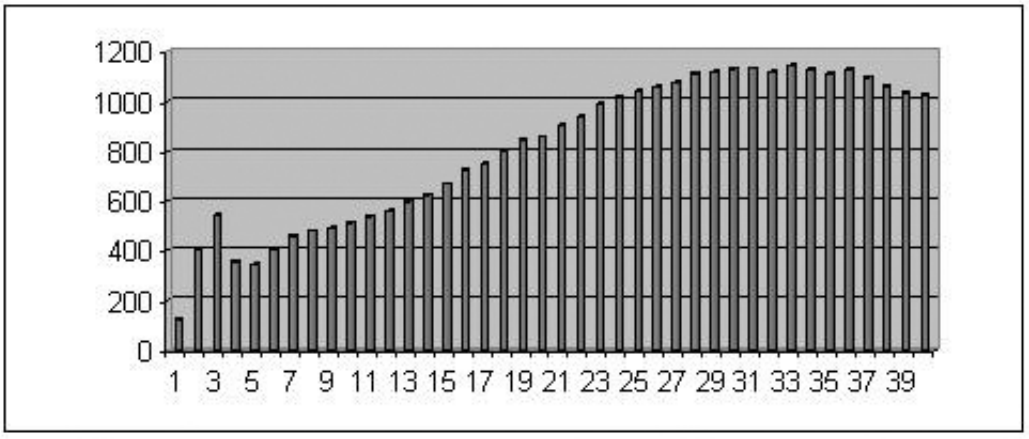
[F437] SOUND ASSESSMENT AND SOUND ANALYSIS OF ARTERIOVENOUS FISTULA (AVF) IN HEMODIALYSIS PATIENTS

Pavlos Malindretos,[1,2] Panagiotis Bamidis,[2] Christos Liaskos,[3] Andreas Papagiannis,[4] Dionisis Vrochides,[4] Christos Frantzidis,[2] Pantelis Sarafidis,[1] Anastasios Lasaridis,[1] Ioannis Chryssogonidis,[5] Pavlos Nikolaidis[1]. [1]1st Medical Department, AHEPA University Hospital, Thessaloniki, Greece; [2]Laboratory of Medical Informatics, Aristotle University, Thessaloniki, Greece; [3]Department of Informatics, Aristotle University, Thessaloniki, Greece; [4]Organ Transplant Unit, Aristotle University, Thessaloniki, Greece; [5]Radiology Department, Aristotle University, Thessaloniki, Greece

INTRODUCTION AND AIMS:
Traditionally, AVF function is assessed by clinical evaluation, Doppler ultrasound, Ultrasound dilution techniques, venography, and dialysis adequacy methods (URR and Kt/V). Clinical examination represents the easiest method; and is based on assessing a thrill and listening to the associated bruit at the site of arteriovenous anastomosis. Even though this method is the easiest and most popular, it is subjective by definition and vastly dependent on experience bias. The purpose of our study was to assess and analyze the produced bruit from blood circulation in an AVF with the assist of a computerized method.

METHODS:
For the estimation of bruit generated from blood circulation within the AVF, an electronic stethoscope was used. Its sensitivity was 20-20,000Hz. The stethoscope was connected to a portable Lap top computer (Intel 2.00GHz CPU, 1GHz RAM). 122 hemodialysis patients participated in the study. After the determination of the surface where the perceived bruit was more intense, the bruit was recorded, without using any sound filtering. The sample rate was decided to be 48,000 and was saved in wav type lossless format. In order to further evaluate sound frequency, Fast Fourier Transformation (FFT) was used. Fourier Transformation was preferred, since it can be particularly useful in revealing periodicity in input data, mapping its frequency behavior as well as the strength of its components. Frequencies obtained with FFT were divided in 40 frequency intervals, 250Hz apart. This way separate sound frequencies generated by the heart and the anastomosis bruit could be easier revealed.

RESULTS:
Recorded sound frequency varied from 250 Hz to 10,000 Hz. The median frequency was 5,500 Hz. Two major peaks were observed, one between 500 and 700 Hz and one between 7500 Hz and 10,000 Hz. The maximum sound "load" though was observed over 7500 Hz. Figure 1 shows the results of FFT transformation.
To our knowledge this is the first attempt to use computer assisted sound assessment for the estimation and analysis of the perceived bruit.



CONCLUSIONS:
Even though clinical estimation of a fistula's condition is part of every day practice in nephrology, computer assisted sound estimation is a readily available method that might increase diagnostic accuracy, without adding too much to the expenses.

Session: Poster Session: Vascular access