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Advantage technology-precision measurement of ECG parameters- A milestone in online medical diagnosis for quality healthcare delivery

H R Singh
Drona College of Management and Technology, India

The quality healthcare delivery is a subject of how accurately the biomedical parameters particularly related to cardio vascular signals are measured and analyzedto help detect and diagnosis of the ailment properly. This presentation describes an attempt utilizing various available software tools, such as Lab-view and Mat-lab to extract out some of the most vulnerable biomedical parameters, such as QRS complex and QT interval precisely from the ECG signal. The accuracy in peak detection of an ECG signal has always been very criticaland directly responsible to affect the accuracy of overall measurements of other parameters and as a result the proper diagnosis of the problem. Hilbert transform the most powerful result providing mathematical tool has been applied on ECG signal to convert it into an analytical signal, which can be subsequently used as an ideal signal for applying these tools for better understanding and analyzing the signal. The measured parameters along with the acquired ECG signal are then transmitted to the doctor online on his computer or mobile phone for further processing at his end. Apart from above several time domain measures of heart rate variability such as RR mean and standard deviation, HR mean and standard deviation, RMSSSD, NN50 count and pNN50 count etc. were also measured with reasonably high degree of accuracy for several other clinical applications. The measurement strategy has been demonstrated through several front panels and snap shots for easy understanding.

hrst_52@rediffmail.com

New tracersfor determination of vulnerability of the atherosclerotic plaque: A review of recent research results

Hendrikus H Boersma
University of Groningen, Netherlands

PET, SPECT and fluorescence tracers can be used to identify vulnerable plaques in atherosclerotic disease. Clinical PET/SPECT camera systems are restricted in terms of resolution for the visualization of detailed inflammation patterns in smaller vascular structures. This paper reviews the possible added value of a high-resolution molecular imaging in excised human carotid artery plaques using several tracers representing the pathogenesis of vulnerable plaques, such as folate ($[^{99m}Tc]$- or FITC-folate), $[^{89}Zr]$-bevacizumab, $Na[^{18}F]F$, and $[^{18}F]RGD-K5$ (targeting avb3-integrins) and $[^{18}F]$-fluorodesoxymannose (FDM).In our studies patients with a planned carotid endarterectomy were included. Excised plaques were incubated in one of the tracer solutions and imaged with either microPET, microSPECT or a fluorescence camera. Tracer uptake was confirmed using relevant immunohistochemical methods. Plaque calcification was assessed additionally with microCT and correlated to tracer uptake. Furthermore, we were able to investigate FDM imaging to evaluate plaque vulnerability *in vivo* in rabbits.Tracer uptake from $[^{99}mTc]$-or FITC-folate, $[^{89}Zr]$-bevacizumab, $Na[^{18}F]F$, $[^{18}F]RGD-K5$ and FDM indicative for plaque vulnerability and histology were compared with symptomatology. Heterogeneous distributions and variable intensities of uptake were found within the plaques with good resolution. A positive correlation between the distribution of macrophages and uptake of the tracers was demonstrated for most of the investigated tracers.

These studies demonstrate that carotid artery plaques can be visualized in detail using nuclear and optical micro-imaging systems. Enhancement of the resolution in clinical imaging of these tracers, either nuclear or optical, is needed for translation into the clinic.

h.h.boersma@umcg.nl

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