# How to read a signal averaged electrocardiogram at Musgrove

## Introduction

Ventricular late potentials (VLPs) can be recorded using high-resolution electrocardiography, also know as signal averaged electrocardiography (SAECG). VLPs indicate the presence areas of slow conduction in the ventricle. These can be a substrate for ventricular arrhythmias. A normal SAECG in patients post MI can identify patients at low risk.

We now have the capacity to undertake SAECGs at Musgrove and these can be performed by the ECG technicians.

Time domain analyses are performed on a number of averaged beats. Frequency domain analysis is not yet validated.

See the GE Healthcare poster for more information.

## Time Domain Analysis

At least 250 beats should be recorded in the X, Y and Z planes. These are averaged and filtered. The filter is between 40Hz-250Hz. The standard deviation (SD) of the noise level is given. This should be ≤ 0.30μV.

VLPs cannot be interpreted in patients with bundle branch block, paced beats and atrial arrhythmias.

The 1st ECG page is to confirm that the template is correct. All beats marked A should have the same morphology. Sinus rhythm should be confirmed. There should be no evidence of bundle branch block.

The 2nd ECG page gives the results.

There are a number of results given by the machine:

1. Std. QRS Duration (unfiltered)
2. Total QRS Duration (filtered)
3. Duration of HFLA1 signals < 40μV
4. RMS Voltage in terminal 40ms
5. Mean Voltage in terminal 40ms

1 HFLA – High Frequency, Low Amplitude

The key results to indicate that a late potential exists, according to the 1991 ESC/AHA/ACC consensus document, are when

1. The Total QRS Duration (filtered) is > 114ms1 (120ms)
2. The Duration of HFLA signals < 40μV is >38ms2
3. The RMS Voltage in terminal 40ms is < 16μV3 (20μV)

*In the consensus document:*

1 The filtered QRS duration

2 The amount of time that the filtered QRS complex remains below 40 μV

3 The root mean square voltage of the terminal 40ms of the filtered QRS complex (< 20μV of signal in the last 40ms of the vector magnitude complex, <16 μV at 40Hz filtering)