Reviewer's report

**Title:** Evaluation of Coronary Blood Flow during Cardiac Arrest with Circulation Maintained through Mechanical Chest Compressions in a Porcine Model

**Version:** 2  **Date:** 27 June 2011

**Reviewer:** Brian Bridal Løgstrup

**Reviewer's report:**

The paper by Wagner H et al. "Evaluation of Coronary Blood Flow during Cardiac Arrest with Circulation Maintained through Mechanical Chest Compressions in a Porcine Model" concludes that during cardiac arrest with ongoing mechanical chest compressions, coronary blood flow can be normalized, and may even generate a slight tendency towards reactive hyperemia assessed by Doppler flow measurements.

In general this is a wellwritten paper and well conducted study. However this reviewer have some concerns regarding the methodology and conclusions. Furthermore several corrections should be done.

**Major Compulsory Revisions:**

1) How was the average peak velocity obtained - an average of 3 or 5? - please comment in Methods.

2) The conclusion that during cardiac arrest with ongoing mechanical chest compressions, coronary blood flow can be normalized is speculative. Comparing the model in rest (baseline) with mechanical chest compression is difficult. Please provide the data on heart rate at rest and during chest compressions (probably 100 compressions/bpm). Probably there is a significant difference in heart rate. This may alter both the flow frequency and velocity (as you measure). It will strengthen the study to increase the baseline heart rate to the same level as during chest compressions to have a "clean" comparison.

3) Please correct the analysis for heart rate.

4) Was the heart rate at a fixed rate during mechanical compressions? Provide table 1 with baseline heart rate and compression heart rate.

5) The conclusion "....may even generate a slight tendency towards reactive hyperemia....." is also speculative. The difference in APV from baseline to the fx. 0-2 min APV and so on - might be the increasing heart rate and increased adrenaline levels and not a reactive hyperemic response.

6) Furthermore it would strengthen the study to have a "control group" with manual chest compression and an comparison to the mechanical group by blinded analysis.

7) In the Methods section coronary flow velocity was measured and evaluated by "time periods which were visually free from noise and had typical Doppler-curve like shape" - please provide data on how many sec/minutes that was analyzed in
each time frame (0-2, 2-4 and so on)? It might have a large impact on data (especially late in compression time) and as the authors mention in limitation section "During ongoing mechanical chest compressions when evaluating coronary flow with APV, the measured curves were prone to movement artifacts...."

8) Finally it would be preferable to have the "area under curve (time velocity integral)" for the flow profiles of coronary flow velocity because the peak value says nothing about the amount of blood and is a surrogate for coronary flow.

Minor Essential Revisions:

1) The title should include Velocity. "Evaluation of Coronary Blood flow Velocity...."

2) Abstract: Line 4: quantitatively instead of actually

3) Abstract: the abbreviation APV is used several times in the abstract and manuscript for average peak velocity, Intracoronary blood flow and mean coronary flow - please decide and use consistent. The most correct term seems to be "average peak coronary flow velocity".

4) Background: second last line please provide sentence with "...the left descending artery during...." instead of "..coronary arteries....".

5) Methods, Experimental protocol: The sentence "Continuous measurements of ECG, body...." contains ECG 2 times.

6) Methods, Experimental protocol: Line 1: Please spell out LAD first time.

7) Methods, Measurements: AP and CVP has already been defined.

8) Methods, Measurements: Line 6: Coronary flow velocity, APV.... Is APV still a abbreviation for average peak velocity?

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.