Danish Myo Technology A/S

APPLICATION NOTE AN-900L-03

Manual Coronary Flow Measurement

Langendorff System – Model 900L | Danish Myo Technology A/S

Document information	
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Applies to	Langendorff System 900L, Constant Pressure mode, free-hanging configuration, mouse and rat hearts
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Related documents	User Manual: Section 4.2 (Constant Pressure Mode), Chapter 5 (Heart Mounting and Experimental Procedures); AN-900L-01

1 Purpose and Scope

In Constant Pressure mode the pump supplies a surplus of buffer and the heart takes what it needs, so coronary flow varies with vascular resistance. This note describes how to measure that flow by hand: collect the effluent for a fixed time, weigh it and calculate the flow.

The method is optional. It is used for mouse and rat hearts, and only in the free-hanging configuration. In the submerged configuration the effluent mixes with the bath.

2 Equipment

- Stopwatch
- Preweighed collection tubes
- Laboratory balance (0.001 g, or 0.01 g with a longer collection time)
- Small funnel to place beneath the heart
- Waste container
- Recording sheet (Table 3)

NOTE For aqueous Krebs–Henseleit buffer, 1.00 g collected is about 1.00 mL.

3 Measurement

3.1 Collection Time

Table 1 – Collection time

Heart	Balance	Collection time
Mouse	0.001 g	60 seconds
Mouse	0.01 g only	120 seconds
Rat	Any suitable balance	Exactly 60 seconds

3.2 Procedure

1. **Stabilize the heart.** Wait until perfusion pressure, heart rate and cardiac function are stable.
2. **Position the funnel.** Place a small funnel beneath the whole heart. It must catch the pulmonary-artery outflow and every drop from the heart surface.
3. **Prepare the tube.** Weigh an empty, dry collection tube and record its mass.
4. **Collect.** Place the tube under the funnel outlet. Start the stopwatch and collect for the time in Table 1.
5. **Weigh.** Remove the tube, dry the outside and record the full mass.
6. **Calculate** the flow (Section 3.3).
7. **Repeat.** Make three baseline collections before the experimental intervention (Section 3.4).
8. **Record** the values in Table 3.

> **CAUTION** Do not collect cannula leaks, condensation or bath fluid. They make the flow appear higher than it is.

3.3 Calculation

Collected mass (g) = full mass – empty mass

Flow (mL/min) = collected mass (g) ÷ collection time (min)

For a 120 s collection, divide the collected mass by 2. For a 60 s collection, the flow in mL/min equals the collected mass in grams.

> **NOTE** **Example (illustrative values).** Empty tube 1.250 g, full tube 3.480 g, 60 s. Collected mass 2.230 g. Flow 2.23 mL/min.

3.4 Baseline Repeats

Do three independent baseline collections. No collection may deviate by more than 5% from the mean of the three. If one does, find the cause (Section 5) before you start the intervention.

3.5 Record at the Same Time

- Perfusion pressure
- Heart rate
- Temperature
- Experimental time point
- Arrhythmias, bubbles or leaks

4 Normalization

At the end of the experiment, weigh the heart in the same way each time (for example, blotted and with the cannula removed). Report the flow as:

- mL/min
- mL/min per g wet heart weight

5 Quality Checks

Reject the measurement, or repeat it, if any of the following happened (Table 2).

Table 2 – Reasons to reject a measurement

#	Problem
1	Perfusion pressure changed during the collection.
2	Effluent missed the funnel.
3	Buffer leaked around the aortic cannula.
4	Air bubbles entered the coronary circulation.
5	The pulmonary-artery outlet was blocked.
6	Bath fluid or condensation entered the collection tube.
7	The heart had a major arrhythmia during the collection.

6 Recording Sheet

Table 3 – Recording sheet

Time point	Empty (g)	Full (g)	Time (s)	Flow (mL/min)	Pressure (mmHg)	Heart rate (BPM)	Notes
Baseline 1							
Baseline 2							
Baseline 3							