Faculty/Post-doc

"Direct measurement of vessel pressure in chick embryo during development"

VijayaKumar Sukumaran*, Rawia Alhalbouni*, Huseyin Yalçın*

*Biomedical Research Center, Qatar University, PO Box 2713, Doha, QATAR

BACKGROUND

- Hemodynamic conditions play a critical role in embryonic cardiovascular development, and altered blood flow leads to congenital heart defects (CHD).
- Chicken embryos are commonly used as models of cardiac development, with abnormal blood flow achieved through left artery ligation (LAL) surgery intervention to restrict the blood flow.
- The heart is the first functioning organ in the developing embryo and a detailed understanding of the physiological mechanisms involved in its formation provides insights into CHD.
- Therefore, it is important to measure the pressure during the development of an embryo.
- This study aimed to develop measure the pressure during normal and LAL condition in chicken embryo by using an WPI-900A system.

OBJECTIVE

- This study aimed to measure the vitelline artery pressure during the development of chicken embryo. We also measure pressure after hemodynamic alteration using left artery ligation surgery.

Materials and Methods

Microelectrode Preparation:

Specifications (2µm thickness):

a. heater 1: 85°C

b. heater 2: 45°C

c. plate 1: 3.5cm

d. plate 2: 7cm

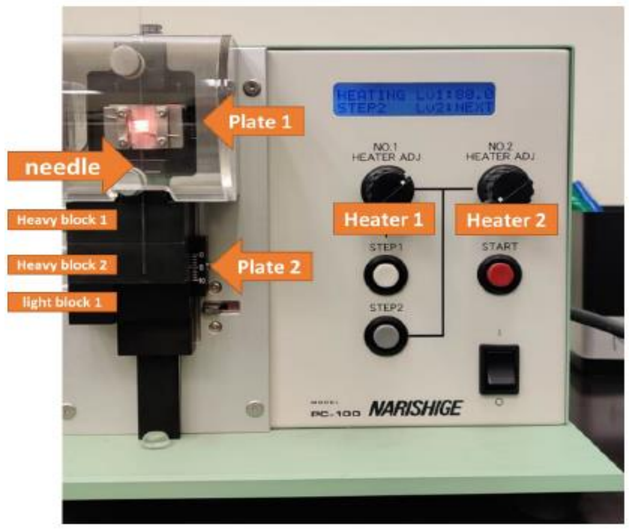

Figure 1: Needle Puller Specification

900A Micro pressure system Setup

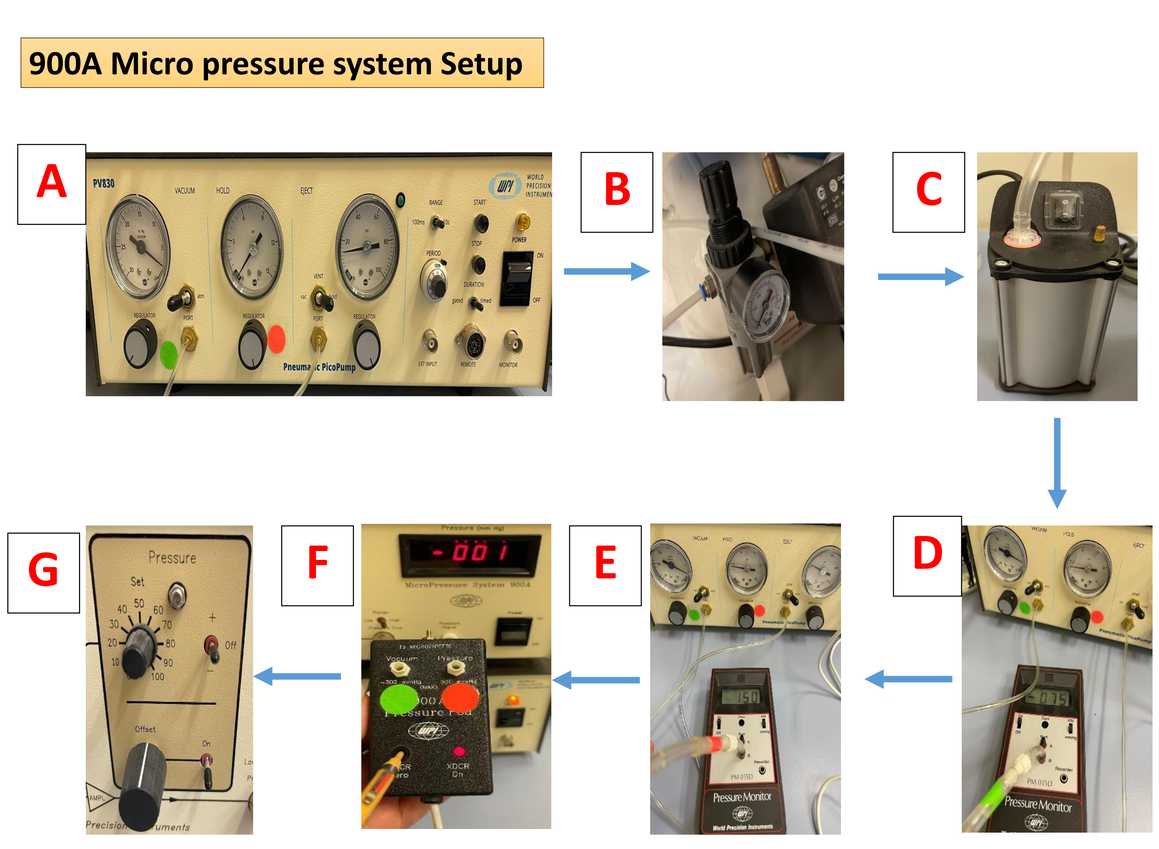

Figure 2 : 900A setup (A-G). Pico pump (A), pressure generator (B), pressure pump (C), positive pressure (D), negative pressure (E), 900A zero setup (F), resistance (G).

Preparing Micropipette & calibration

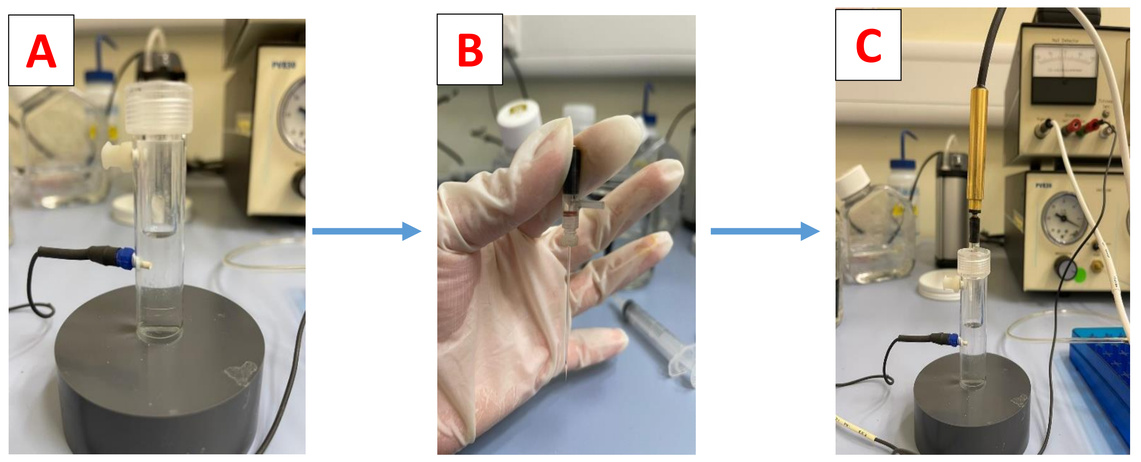

Figure 3 : (A-C) Preparing micropipette for calibration. A) pressure calibration chamber, B) micropipette filling with 10x PBS, C) pressure calibration unit with pressure probe

Pressure Measurement

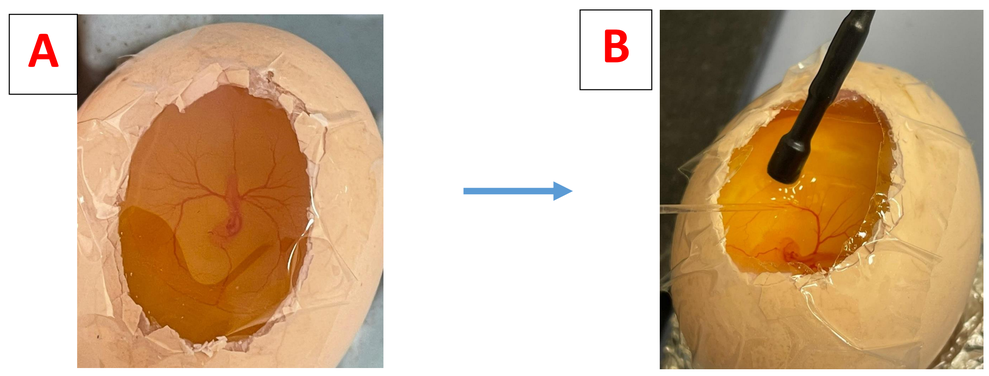

Figure 4 : (A-B) Pressure measurement. A) 3 days post incubated embryo, B) embryo with micropipette and reference electrode in black color.

Pressure measurement after 5 days of incubation

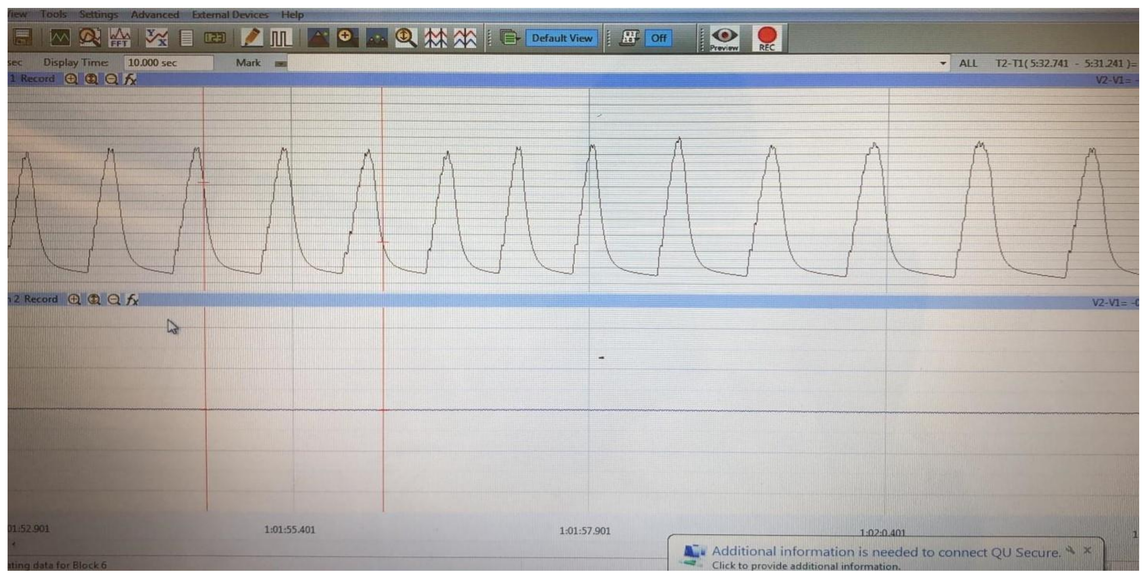

Figure 5 : Pressure wave observed in chicken embryo after 5days of incubation.

CONCLUSIONS

Our study provides a precise measurement of clinical relevant cardiac function. These measurements highlight the importance of hemodynamic alteration during the cardiovascular developments.

REFERENCES

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2. Marcel Y. Avila, David A. Carré, Richard A. Stone, Mortimer M. Civan; Reliable Measurement of Mouse Intraocular Pressure by a Servo-Null Micropipette System. *Invest. Ophthalmol. Vis. Sci.* 2001;42(8):1841-1846.