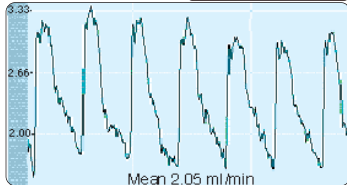




Nanoprobe
0.5PSL on
mouse renal
artery



Courtesy of M.F. Callahan,
Wake Forest University Health Sciences

Fig. 1: Conscious Mouse Renal Arterial Blood Flow, day 4 post implant of 0.5PSL flowprobe.



Fig. 2: New 0.5PSB (right) with standard 0.5 mm V probe (left) and ballpoint pen tip (bottom).

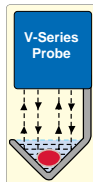
PS-Series Nanoprobe: side view

Fig. 3: The full height of the ultrasonic window has (ideally) the same flow sensitivity, so that the vessel can be positioned anywhere within the "perfect" probe.



V-Series: side view
(acute use only)

Fig. 4: Only within the triangle (shaded) portion of the V will the probe reach its full flow sensitivity.



Choosing a Flowprobe for Small Vessels

Transonic Systems' Nanoprobes and V-Series probes produce repeatable, high resolution volumetric blood flow measurement data on vessels as small as 250 micron diameter (Fig. 1). The following table compares the newer PS-Series Nanoprobes with V-Series Flowprobes. Both styles are now cited in the literature for flow measurement studies in the mouse.

PS-Series Nanoprobes

- + Acute and chronic use (Fig. 1): flowprobe may be configured for acute anesthetized studies or for chronic implantation with short cables and small connectors. The subjects can then be recovered and measurements taken while the animal is conscious over a period of days, weeks or months.
- + Smaller probe body (Fig. 2): the probe occupies minimal space in the surgical field and fits small anatomical spaces such as the mouse renal cavity.
- + Measurements are less sensitive to vessel position within probe lumen. The smaller rectangular lumen of Nanoprobes requires only general vessel position for proper ultrasonic illumination (Fig. 3). The vessel should fill 75% or more of the probe lumen for best accuracy.
- + Small amount of coupling gel needed to fill air space between the probe and vessel
- + Smaller measurement scale; more appropriate range for small vessel flow rates
- + Stainless steel handle is standard for acute use probes: MA0.5PSB; MA0.7PSB (Fig. 5)

- Delicate construction
- Can be difficult to place vessel within probe lumen because the reflector is thicker than the metal V-probe reflector



Fig. 5: Nanoprobe with stainless steel handle for stable positioning.

V-Series Flowprobes

- Acute use only: supplied with stainless steel handle: MA0.5VB, MA0.7VB (Fig. 6)
- Larger physical probe size for small diameter vessel (Fig. 2); occupies more space in surgical field and requires a longer isolated vessel segment
 - Not a major problem on mouse carotid application because vessel is long and without branches
 - Is a problem on mouse renal artery where space is limited and the vessel has many small branches
- Position sensitive; gives erroneous readings if used incorrectly. Vessel must be positioned in bottom of the V (Fig. 4) defined by the reflector even though the probe lumen is much larger
- Requires more coupling gel to fill up large air space

- + Rugged construction
- + Thin metal reflector: easier to place vessel within probe



Fig. 6: Handle on V-probes allows for stable position with a micromanipulator.

FLOWPROBE SPECIFICATIONS FOR MOUSE APPLICATIONS

PRECISION PROBE SERIES	VESSEL OD (mm) MA-PROBES acute application	VESSEL OD (mm) MC-PROBES chronic application	BIDIRECTIONAL FLOW (ml/min)			Maximum Range	ACCURACY (%)			ULTRASOUND Frequency (MHz)
			Resolution	Scale Settings Low Flow	Normal Flow		Zero Offset	Absolute Accuracy	Relative Accuracy	
0.5PS	0.3 - 0.5	0.3 - 0.48	0.03	1.5	6	30	± 0.12	± 15	± 2	14.4
0.7PS	0.5 - 0.7	0.4 - 0.7	0.05	2.5	10	50	± 0.2	± 15	± 2	9.6
1.5PS	1.2 - 1.5	1.2 - 1.5	0.075	10	40	200	± 0.8	± 15	± 2	4.8
1 PR	0.7 - 1.0	0.7 - 1.2	0.05	5	20	100	± 0.2	± 10	± 2	7.2
0.5VB	0.25 - 0.50	NA	0.05	2.5	10	50	± 0.25	± 15	± 3	7.2
0.7VB	0.35 - 0.70	NA	0.075	5	20	100	± 0.5	± 15	± 3	4.8

Nanoprobes must be used with the proper length extension cable (probe + cable = approximately 185 cm) to meet performance specifications.

References

TN-23: V-Series Flowprobes
TN-24: R- & S-Series Flowprobes
RL-18: Nanoprobes