

Vevo 770® Standard Measurements and Calculations

Calculations are computed from the measurements made on acquired data using the Measurements Tool. As measurements are made on the data, the Vevo software automatically computes the calculations that are derived from the related measurements.

Application Views

This document includes the following abbreviations for titles of the application views:

Abbreviation	Application View	Available in these Modes
A2C	Apical, 2 Chamber	B-Mode
A3C	Apical, 3 Chamber	PW Doppler Mode
A4C	Apical, 4 Chamber	B-Mode, PW Doppler Mode
A5C	Apical, 5 Chamber	PW Doppler Mode
Emb	Embryonic	B-Mode
Endo	Endocardial	B-Mode
Epi	Epicardial	B-Mode
FMBF	Fetal/Maternal Blood Flow	B-Mode, M-Mode, PW Doppler Mode
Ins	Insufficiency	PW Doppler Mode
K	Kidney	B-Mode, PW Doppler Mode
L	Liver	B-Mode, PW Doppler Mode
PSA	Parasternal Short Axis	PW Doppler Mode, M-Mode
PLA	Parasternal Long Axis	B-Mode, M-Mode
Simp	Simpson's	B-Mode
LV Mass	LV Mass	B-Mode

Assumptions

The B-Mode and M-Mode calculations assume that the associated measurements have been made at end diastole or end systole, as appropriate.

Detailed Summary

The document includes detailed summaries of the available measurements and calculations for the following ultrasound modes: B-Mode, PW Doppler Mode, M-Mode.

B-Mode Measurements

B-Mode Measurement	Description	Measurement Type	Units	Views
Simpson 1 Length; d	Simpson Length	Linear Distance	<i>mm</i>	Simp
Simpson 1 Area 1; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Area 2; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Area 3; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Area 4; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Length; s	Simpson Length	Linear Distance	<i>mm</i>	Simp
Simpson 1 Area 1; s	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Area 2; s	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Area 3; s	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 1 Area 4; s	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 2 Length; d	Simpson Length	Linear Distance	<i>mm</i>	Simp
Simpson 2 Area 1; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 2 Area 2; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 2 Area 3; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 2 Area 4; d	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 2 Length; s	Simpson Length	Linear Distance	<i>mm</i>	Simp
Simpson 2 Area 1; s	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp
Simpson 2 Area 2; s	Simpson Area	Polygon ROI Area	<i>mm²</i>	Simp

B-Mode Measurement	Description	Measurement Type	Units	Views
Simpson 2 Area 3; s	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 2 Area 4; s	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Length; d	Simpson Length	Linear Distance	mm	Simp
Simpson 3 Area 1; d	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Area 2; d	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Area 3; d	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Area 4; d	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Length; s	Simpson Length	Linear Distance	mm	Simp
Simpson 3 Area 1; s	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Area 2; s	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Area 3; s	Simpson Area	Polygon ROI Area	mm ²	Simp
Simpson 3 Area 4; s	Simpson Area	Polygon ROI Area	mm ²	Simp
LV Area Endocardial Border; d	Left Ventricle Endocardial Border; Diastole	Polygon ROI Area	mm ²	LV Mass, A2C, A4C
LV Area Epicardial Border; d	Left Ventricle Epicardial Border; Diastole	Polygon ROI Area	mm ²	LV Mass, A2C, A4C
LVL; d	Left Ventricle Length; Diastole	Linear Distance	mm	LV Mass
LVL; s	Left Ventricle Length; Systole	Linear Distance	mm	LV Mass
Epicardial Area; d	Epicardial Area; Diastole	Polygon ROI Area	mm ²	Epi
Epicardial Area; s	Epicardial Area; Systole	Polygon ROI Area	mm ²	Epi
Epicardial Major; d	Epicardial Major Axis; Diastole	Linear Distance	mm	Epi
Epicardial Major; s	Epicardial Major Axis; Systole	Linear Distance	mm	Epi
Endocardial Area; d	Endocardial Area; Diastole	Polygon ROI Area	mm ²	Endo
Endocardial Area; s	Endocardial Area; Systole	Polygon ROI Area	mm ²	Endo

B-Mode Measurement	Description	Measurement Type	Units	Views
Endocardial Major; d	Endocardial Major Axis; Diastole	Linear Distance	mm	Endo
Endocardial Major; s	Endocardial Major Axis; Systole	Linear Distance	mm	Endo
LV Area; d	Left Ventricle Area; Diastole	Polygon ROI Area	mm ²	A2C, A4C
LV Area; s	Left Ventricle Area; Systole	Polygon ROI Area	mm ²	A2C, A4C
LV Major; d	Left Ventricle Major Axis; Diastole	Linear Distance	mm	A2C, A4C
LV Major; s	Left Ventricle Major Axis; Systole	Linear Distance	mm	A2C, A4C
RV Area; d	Right Ventricle Area; Diastole	Polygon ROI Area	mm ²	A2C, A4C
RV Area; s	Right Ventricle Area; Systole	Polygon ROI Area	mm ²	A2C, A4C
RV Major; d	Right Ventricle Major Axis; Diastole	Linear Distance	mm	A2C, A4C
RV Major; s	Right Ventricle Major Axis; Systole	Linear Distance	mm	A2C, A4C
Abdominal Diameter	Abdominal Diameter	Linear Distance	mm	Emb
Axial Cross Sectional Area	Axial Cross Sectional Area	Polygon ROI Area	mm ²	Epi, Emb
Biparietal Diameter	Biparietal Diameter	Linear Distance	mm	Emb
Crown Rump Length	Crown Rump Length	Linear Distance	mm	Epi, Emb
Femur Length	Femur Length	Linear Distance	mm	Emb
Humeral Length	Humeral Length	Linear Distance	mm	Emb
Lens Diameter; Left	Lens Diameter; Left	Linear Distance	mm	Emb
Lens Diameter; Right	Lens Diameter; Right	Linear Distance	mm	Emb
Liquor; Deepest Pool	Liquor; Deepest Pool	Linear Distance	mm	Emb
Nose Rump Length	Nose Rump Length	Linear Distance	mm	Emb
Occipitofrontal Diameter	Occipitofrontal Diameter	Linear Distance	mm	Emb
Placental Diameter	Placental Diameter	Linear Distance	mm	Emb
Placental Depth	Placental Depth	Linear Distance	mm	Emb

B-Mode Measurement	Description	Measurement Type	Units	Views
Spinal Cord Diameter	Spinal Cord Diameter	Linear Distance	mm	Emb
UA Doppler	UA Doppler	Linear Distance	mm	Emb
Cortex	Cortex	Linear Distance	mm	K
Medulla	Medulla	Linear Distance	mm	K
Hilum	Hilum	Linear Distance	mm	K
Renal Vein	Renal Vein	Linear Distance	mm	K
Renal Artery	Renal Artery	Linear Distance	mm	K
Hepatic Artery	Hepatic Artery	Linear Distance	mm	L
Hepatic Vein	Hepatic Vein	Linear Distance	mm	L
Portal Vein	Portal Vein	Linear Distance	mm	L
Lobe	Lobe	Linear Distance	mm	L
Umbilical Vein	Umbilical Vein	Linear Distance	mm	FMBF
Umbilical Artery	Umbilical Artery	Linear Distance	mm	FMBF
Vitelline Artery	Vitelline Artery	Linear Distance	mm	FMBF
Vitelline Vein	Vitelline Vein	Linear Distance	mm	FMBF
Placenta	Placenta	Linear Distance	mm	FMBF
Aorta Area 1	Aorta Area	Ellipse ROI Area	mm ²	A2C, A4C
Aorta Area 2	Aorta Area	Ellipse ROI Area	mm ²	A2C, A4C
Aorta Area 3	Aorta Area	Ellipse ROI Area	mm ²	A2C, A4C
Residual Lumen 1	Residual Lumen	Polygon ROI Area	mm ²	A2C, A4C
Residual Lumen 2	Residual Lumen	Polygon ROI Area	mm ²	A2C, A4C
Residual Lumen 3	Residual Lumen	Polygon ROI Area	mm ²	A2C, A4C
LV ED; d	Left Ventricle, End Diastole	Linear Distance	mm	PLA

B-Mode Measurement	Description	Measurement Type	Units	Views
LV ES; s	Left Ventricle, End Systole	Linear Distance	mm	PLA

B-Mode Calculations

B-Mode Calculation	Formula	Units	Views
Epicardial Vol; d (Epicardial Volume; Diastole) Formula Legend: Ep=Epicardial	$\frac{4\pi}{3} \times \frac{Ep \text{ Major; } d}{2} \times \left(\frac{Ep \text{ Area; } d}{\pi \left(\frac{Ep \text{ Major; } d}{2} \right)} \right)^2$	μl	Epi
Epicardial Vol; s (Epicardial Volume; Systole) Formula Legend: Ep=Epicardial	$\frac{4\pi}{3} \times \frac{Ep \text{ Major; } s}{2} \times \left(\frac{Ep \text{ Area; } s}{\pi \left(\frac{Ep \text{ Major; } s}{2} \right)} \right)^2$	μl	Epi
Epicardial SV (Epicardial Stroke Volume)	$Epicardial \text{ Vol; } d - Epicardial \text{ Vol; } s$	μl	Epi
Epicardial %EF (Epicardial Percent Ejection Fraction)	$\frac{Epicardial \text{ SV}}{Epicardial \text{ Vol; } d} \times 100$	%	Epi
Epicardial %FAC (Epicardial Percent Fractional Area Change)	$\frac{Epicardial \text{ Area; } d - Epicardial \text{ Area; } s}{Epicardial \text{ Area; } d} \times 100$	%	Epi
Epicardial Area Change	$Epicardial \text{ Area; } d - Epicardial \text{ Area; } s$	mm^2	Epi
Epicardial CO (note 1) (Epicardial Cardiac Output)	$\frac{Epicardial \text{ SV}}{2} \times Heart \text{ Rate}$	$\mu\text{l}/\text{min}$	Epi

B-Mode Calculation	Formula	Units	Views
LV Vol; d (Left Ventricle Volume; Diastole)	$\frac{4\pi}{3} \times \frac{LV\ Major; d}{2} \times \left(\frac{LV\ Area; d}{\pi \left(\frac{LV\ Major; d}{2} \right)} \right)^2$	μl	A2C, A4C
LV Vol; s (Left Ventricle Volume; Systole)	$\frac{4\pi}{3} \times \frac{LV\ Major; s}{2} \times \left(\frac{LV\ Area; s}{\pi \left(\frac{LV\ Major; s}{2} \right)} \right)^2$	μl	A2C, A4C
LV SV (Left Ventricle Stroke Volume)	$LV\ Vol; d - LV\ Vol; s$	μl	A2C, A4C
LV %EF (Left Ventricle Percent Ejection Fraction)	$\frac{LV\ SV}{LV\ Vol; d} \times 100$	%	A2C, A4C
LV %FAC (Left Ventricle Percent Fractional Area Change)	$\frac{LV\ Area; d - LV\ Area; s}{LV\ Area; d} \times 100$	%	A2C, A4C
LV Area Change (Left Ventricle Area Change)	$LV\ Area; d - LV\ Area; s$	mm^2	A2C, A4C
LV CO (note 1) (Left Ventricle Cardiac Output)	$LV\ SV \times Heart\ Rate$	$\mu l/min$	A2C, A4C
RV Vol; d (Right Ventricle Volume; Diastole)	$\frac{4\pi}{3} \times \frac{RV\ Major; d}{2} \times \left(\frac{RV\ Area; d}{\pi \left(\frac{RV\ Major; d}{2} \right)} \right)^2$	μl	A2C, A4C

B-Mode Calculation	Formula	Units	Views
RV Vol; s (Right Ventricle Volume; Systole)	$\frac{4\pi}{3} \times \frac{RV\ Major; s}{2} \times \left(\frac{RV\ Area; s}{\pi \left(\frac{RV\ Major; s}{2} \right)} \right)^2$	μl	A2C, A4C
RV SV (Right Ventricle Stroke Volume)	$RV\ Vol; d - RV\ Vol; s$	μl	A2C, A4C
RV %EF (Right Ventricle Percent Ejection Fraction)	$\frac{RV\ SV}{RV\ Vol; d} \times 100$	%	A2C, A4C
RV %FAC (Right Ventricle Percent Fractional Area Change)	$\frac{RV\ Area; d - RV\ Area; s}{RV\ Area; d} \times 100$	%	A2C, A4C
RV Area Change (Right Ventricle Area Change)	$RV\ Area; d - RV\ Area; s$	mm^2	A2C, A4C
RV CO (note 1) (Right Ventricle Cardiac Output)	$RV\ SV \times Heart\ Rate$	$\mu l/min$	A2C, A4C
Percent Aortic Stenosis 1	$100 \times (1 - (Residual\ Lumen\ 1 / Aorta\ Area\ 1))$	%	A2C, A4C
Percent Aortic Stenosis 2	$100 \times (1 - (Residual\ Lumen\ 2 / Aorta\ Area\ 2))$	%	A2C, A4C
Percent Aortic Stenosis 3	$100 \times (1 - (Residual\ Lumen\ 3 / Aorta\ Area\ 3))$	%	A2C, A4C
LV %FS (Left Ventricle Percent Fractional Shortening)	$100 \times (1 - LV\ ES; s / LV\ ED; d)$	%	PLA

B-Mode Calculation	Formula	Units	Views
Endocardial Vol; d	$\frac{4\pi}{3} \times \frac{\text{End Major; } d}{2} \times \left(\frac{\text{End Area; } d}{\pi \left(\frac{\text{End Major; } d}{2} \right)} \right)^2$	μl	Endo
Endocardial Vol; s	$\frac{4\pi}{3} \times \frac{\text{End Major; } s}{2} \times \left(\frac{\text{End Area; } s}{\pi \left(\frac{\text{End Major; } s}{2} \right)} \right)^2$	μl	Endo
Endocardial SV (Endocardial Stroke Volume)	$\text{Endocardial Vol; } d - \text{Endocardial Vol; } s$	μl	Endo
Endocardial %EF	$\frac{\text{Endocardial SV}}{\text{Endocardial Vol; } d} \times 100$	%	Endo
Endocardial %FAC	$\frac{\text{Endocardial Area; } d - \text{Endocardial Area; } s}{\text{Endocardial Area; } d} \times 100$	%	Endo
Endocardial Area Change	$\text{Endocardial Area; } d - \text{Endocardial Area; } s$	mm^2	Endo
Endocardial CO (note 1)	$\frac{\text{Endocardial SV}}{2} \times \text{Heart Rate}$	$\mu l/min$	Endo
B (Average LV Radius)	$\sqrt{\frac{(\text{LV Area Endocardial Border; } d)}{\pi}}$	mm	LV Mass
T (Average Wall Thickness, uncorrected)	$\sqrt{\frac{(\text{LV Area Epicardial Border; } d)}{\pi}} - \sqrt{\frac{(\text{LV Area Endocardial Border; } d)}{\pi}}$	mm	LV Mass

B-Mode Calculation	Formula	Units	Views
AWT; d (Average Wall Thickness, Diastole)	$\frac{\sqrt{\frac{(LV\ Area\ Epicardial\ Border; d)}{\pi}} - \sqrt{\frac{(LV\ Area\ Endocardial\ Border; d)}{\pi}}}{\sqrt{\frac{(LV\ Area\ Endocardial\ Border; d)}{\pi}}}$		LV Mass
LV Mass	$1.05 \times \left(\frac{5}{6} \times LVAEPI \times (LVL; d + T) \right) - \left(\frac{5}{6} \times LVAEND \times LVL; d \right)$	mg	LV Mass
Simpson 1 Volume; d	$\left((Simpson\ 1\ Area\ 1; d + Simpson\ 1\ Area\ 2; d + Simpson\ 1\ Area\ 3; d) \times \frac{Simpson\ 1\ Length; d}{4} \right)$ $+ \left(\left(\frac{Simpson\ 1\ Length; d}{2} \right) \times Simpson\ 1\ Area\ 4; d \right)$ $+ \left(\frac{\pi}{6} \times \left(\frac{Simpson\ 1\ Length; d}{4} \right)^3 \right)$	μl	Simp

B-Mode Calculation	Formula	Units	Views
Simpson 1 Volume; s	$\left((Simpson\ 1\ Area\ 1; s + Simpson\ 1\ Area\ 2; s + Simpson\ 1\ Area\ 3; s) \times \frac{Simpson\ 1\ Length; s}{4} \right)$ $+ \left(\left(\frac{Simpson\ 1\ Length; s}{2} \right) \times Simpson\ 1\ Area\ 4; s \right)$ $+ \left(\frac{\pi}{6} \times \left(\frac{Simpson\ 1\ Length; s}{4} \right)^3 \right)$	μl	Simp
Simpson 1 SV (Simpson 1 Stroke Volume)	$Simpson\ 1\ Volume; d - Simpson\ 1\ Volume; s$	μl	Simp
Simpson 1 %EF (Simpson 1 Ejection Fraction)	$\frac{Simpson\ 1\ SV}{Simpson\ 1\ Volume; d} \times 100$	%	Simp
Simpson 1 %FAC (Simpson 1 Fractional Area Change)	$\frac{Simpson\ 1\ Area\ 2; d - Simpson\ 1\ Area\ 2; s}{Simpson\ 1\ Area\ 2; d} \times 100$	%	Simp
Simpson 1 CO (note 1)	$Simpson\ 1\ SV \times Heart\ Rate$	$\mu l/min$	Simp

B-Mode Calculation	Formula	Units	Views
Simpson 2 Volume; d	$\left((Simpson\ 2\ Area\ 1; d + Simpson\ 2\ Area\ 2; d + Simpson\ 2\ Area\ 3; d) \times \frac{Simpson\ 2\ Length; d}{4} \right)$ $+ \left(\left(\frac{Simpson\ 2\ Length; d}{2} \right) \times Simpson\ 2\ Area\ 4; d \right)$ $+ \left(\frac{\pi}{6} \times \left(\frac{Simpson\ 2\ Length; d}{4} \right)^3 \right)$	μl	Simp
Simpson 2 Volume; s	$\left((Simpson\ 2\ Area\ 1; s + Simpson\ 2\ Area\ 2; s + Simpson\ 2\ Area\ 3; s) \times \frac{Simpson\ 2\ Length; s}{4} \right)$ $+ \left(\left(\frac{Simpson\ 2\ Length; s}{2} \right) \times Simpson\ 2\ Area\ 4; s \right)$ $+ \left(\frac{\pi}{6} \times \left(\frac{Simpson\ 2\ Length; s}{4} \right)^3 \right)$	μl	Simp
Simpson 2 SV (Simpson 2 Stroke Volume)	$Simpson\ 2\ Volume; d - Simpson\ 2\ Volume; s$	μl	Simp
Simpson 2 %EF (Simpson 2 Ejection Fraction)	$\frac{Simpson\ 2\ SV}{Simpson\ 2\ Volume; d} \times 100$	%	Simp

B-Mode Calculation	Formula	Units	Views
Simpson 2 %FAC (Simpson 2 Fractional Area Change)	$\frac{\text{Simpson 2 Area 2; } d - \text{Simpson 2 Area 2; } s}{\text{Simpson 2 Area 2; } d} \times 100$	%	Simp
Simpson 2 CO (note 1)	$\text{Simpson 2 SV} \times \text{Heart Rate}$	$\mu\text{l}/\text{min}$	Simp
Simpson 3 Volume; d	$\left((\text{Simpson 3 Area 1; } d + \text{Simpson 3 Area 2; } d + \text{Simpson 3 Area 3; } d) \times \frac{\text{Simpson 3 Length; } d}{4} \right)$ $+ \left(\left(\frac{\text{Simpson 3 Length; } d}{4} \right) \times \text{Simpson 3 Area 4; } d \right)$ $+ \left(\frac{\pi}{6} \times \left(\frac{\text{Simpson 3 Length; } d}{4} \right)^3 \right)$	μl	Simp
Simpson 3 Volume; s	$\left((\text{Simpson 3 Area 1; } s + \text{Simpson 3 Area 2; } s + \text{Simpson 3 Area 3; } s) \times \frac{\text{Simpson 3 Length; } s}{4} \right)$ $+ \left(\left(\frac{\text{Simpson 3 Length; } s}{4} \right) \times \text{Simpson 3 Area 4; } s \right)$ $+ \left(\frac{\pi}{6} \times \left(\frac{\text{Simpson 3 Length; } s}{4} \right)^3 \right)$	μl	Simp

B-Mode Calculation	Formula	Units	Views
Simpson 3 SV (Simpson 3 Stroke Volume)	$Simpson\ 3\ Volume; d - Simpson\ 3\ Volume; s$	μl	Simp
Simpson 3 %EF (Simpson 3 Ejection Fraction)	$\frac{Simpson\ 3\ SV}{Simpson\ 3\ Volume; d} \times 100$	%	Simp
Simpson 3 %FAC (Simpson 3 Fractional Area Change)	$\frac{Simpson\ 3\ Area\ 2; d - Simpson\ 3\ Area\ 2; s}{Simpson\ 3\ Area\ 2; d} \times 100$	%	Simp
Simpson 3 CO (note 1)	$Simpson\ 3\ SV \times Heart\ Rate$	$\mu l/min$	Simp

PW Doppler Mode Measurements

PW Doppler Mode Measurement	Description	Measurement Type	Units	Views
Heart Rate	Heart Rate	Heart Rate	<i>BPM</i>	A3C, A4C, A5C, PSA, Ins
Area Under R-R Curve	Area Under R-R Curve	VTI	<i>cm</i>	A3C, A4C, A5C, PSA, Ins
Stroke Distance	The Positive Area Under the Aortic Outflow Velocity Curve.	VTI	<i>cm</i>	A3C, A4C, A5C PSA, Ins
IV CT (LV)	Isovolumetric Contraction Time (Left Ventricle)	Time Interval	<i>ms</i>	A3C, A4C, A5C
IV RT (LV)	Isovolumetric Relaxation Time (Left Ventricle)	Time Interval	<i>ms</i>	A3C, A4C, A5C
ET (LV)	Ejection Time (Left Ventricle)	Time Interval	<i>ms</i>	A3C, A4C, A5C
IV CT (RV)	Isovolumetric Contraction Time (Right Ventricle)	Time Interval	<i>ms</i>	A3C, A4C, A5C
IV RT (RV)	Isovolumetric Relaxation Time (Right Ventricle)	Time Interval	<i>ms</i>	A3C, A4C, A5C
ET (RV)	Ejection Time (Right Ventricle)	Time Interval	<i>ms</i>	A3C, A4C, A5C
MV E	Mitral Valve Peak E Velocity	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C

PW Doppler Mode Measurement	Description	Measurement Type	Units	Views
MV A	Mitral Valve Peak A Velocity	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C
MV E at A	Mitral Valve E at A	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C
MV AT	Mitral Valve Acceleration Time	Time Interval	ms	A3C, A4C, A5C
MV Accel	Mitral Valve Acceleration	Acceleration	$\frac{mm}{s^2}$	A3C, A4C, A5C
MV DT	Mitral Valve Deceleration Time	Time Interval	ms	A3C, A4C, A5C
TV E	Tricuspid Valve Peak E Velocity	Velocity	$\frac{mm}{s}$	A4C, A5C, PSA
TV A	Tricuspid Valve Peak A Velocity	Velocity	$\frac{mm}{s}$	A4C, A5C, PSA
TV E at A	Tricuspid Valve E at A	Velocity	$\frac{mm}{s}$	A4C, A5C, PSA
TV AT	Tricuspid Valve Acceleration Time	Time Interval	ms	A4C, A5C, PSA
TV Accel	Tricuspid Valve Acceleration	Acceleration	$\frac{mm}{s^2}$	A4C, A5C, PSA
TV DT	Tricuspid Valve Deceleration Time	Time Interval	ms	A4C, A5C, PSA
Ao VTI	Aortic Velocity Time Integral	VTI	cm	A5C, PSA
Ao Vmax	Aortic Maximum Velocity	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C
Ao AT	Aortic Acceleration Time	Time Interval	ms	A3C, A4C, A5C
PA VTI	Pulmonary Artery Velocity Time Integral	VTI	cm	A5C, PSA

PW Doppler Mode Measurement	Description	Measurement Type	Units	Views
PA Vmax	Pulmonary Artery Maximum Velocity	Velocity	$\frac{mm}{s}$	A4C, A5C, PSA
PA AT	Pulmonary Artery Acceleration Time	Time Interval	ms	A5C, PSA
AR Vmax	Aortic Regurgitation Maximum Velocity	Velocity	$\frac{mm}{s}$	Ins
AR VTI	Aortic Regurgitation Velocity Time Integral	VTI	cm	Ins
AR Decel	Aortic Regurgitation Deceleration	Acceleration	$\frac{mm}{s^2}$	Ins
AR DT	Aortic Regurgitation Deceleration Time	Time Interval	ms	Ins
AR P1/2T	Aortic Regurgitation Peak-to-Half-Peak Time	Time Interval	ms	Ins
AR LVedp Vel	Aortic Regurgitation LVedp Vel	Velocity	$\frac{mm}{s}$	Ins
PR Vma	Pulmonary Regurgitation Maximum Velocity	Velocity	$\frac{mm}{s}$	Ins
PR VTI	Pulmonary Regurgitation Velocity Time Integral	VTI	cm	Ins
PR Decel	Pulmonary Regurgitation Deceleration	Acceleration	$\frac{mm}{s^2}$	Ins
PR DT	Pulmonary Regurgitation Deceleration Time	Time Interval	ms	Ins
PR P1/2T	Pulmonary Regurgitation Peak-to-Half-Peak Time	Time Interval	ms	Ins
PR LVedp Vel	Pulmonary Regurgitation LVedp Vel	Velocity	$\frac{mm}{s}$	Ins

PW Doppler Mode Measurement	Description	Measurement Type	Units	Views
MR Vmax	Mitral Regurgitation Maximum Velocity	Velocity	$\frac{mm}{s}$	Ins
MR VTI	Mitral Regurgitation Velocity Time Integral	VTI	cm	Ins
MR Decel	Mitral Regurgitation Deceleration	Acceleration	$\frac{mm}{s^2}$	Ins
MR DT	Mitral Regurgitation Deceleration Time	Time Interval	ms	Ins
MR P1/2T	Mitral Regurgitation Peak-to-Half-Peak Time	Time Interval	ms	Ins
MR LVedp Vel	Mitral Regurgitation LVedp Vel	Velocity	$\frac{mm}{s}$	Ins
TR Vmax	Tricuspid Regurgitation Maximum Velocity	Velocity	$\frac{mm}{s}$	Ins
TR VTI	Tricuspid Regurgitation Velocity Time Integral	VTI	cm	Ins
TR Decel	Tricuspid Regurgitation Deceleration	Acceleration	$\frac{mm}{s^2}$	Ins
TR DT	Tricuspid Regurgitation Deceleration Time	Time Interval	ms	Ins
TR P1/2T	Tricuspid Regurgitation Peak-to-Half-Peak Time	Time Interval	ms	Ins
TR LVedp Vel	Tricuspid Regurgitation LVedp Vel	Velocity	$\frac{mm}{s}$	Ins
Renal Vein Velocity	Renal Vein Velocity	Velocity	$\frac{mm}{s}$	K
Renal Artery Velocity	Renal Artery Velocity	Velocity	$\frac{mm}{s}$	K

PW Doppler Mode Measurement	Description	Measurement Type	Units	Views
Hepatic Artery Velocity	Hepatic Artery Velocity	Velocity	$\frac{mm}{s}$	L
Hepatic Vein Velocity	Hepatic Vein Velocity	Velocity	$\frac{mm}{s}$	L
Portal Vein Velocity	Portal Vein Velocity	Velocity	$\frac{mm}{s}$	L
Umbilical Vein Velocity	Umbilical Vein Velocity	Velocity	$\frac{mm}{s}$	FMBF
Umbilical Artery Velocity; s	Umbilical Artery Velocity	Velocity	$\frac{mm}{s}$	FMBF
Umbilical Artery Mean Velocity	Umbilical Artery Mean Velocity	Velocity	$\frac{mm}{s}$	FMBF
Umbilical Artery Velocity; d	Umbilical Artery Velocity	Velocity	$\frac{mm}{s}$	FMBF
Vitelline Artery Velocity	Vitelline Artery Velocity	Velocity	$\frac{mm}{s}$	FMBF
Peak Right ICA Proximal Velocity; s	Peak Right ICA Proximal Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Right ICA Mid Velocity; s	Peak Right ICA Mid Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Right ICA Distal Velocity; s	Peak Right ICA Distal Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Right ICA Proximal Velocity; d	Peak Right ICA Proximal Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA

PW Doppler Mode Measurement	Description	Measurement Type	Units	Views
Peak Right ICA Mid Velocity; d	Peak Right ICA Mid Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Right ICA Distal Velocity; d	Peak Right ICA Distal Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Right CCA Mid Velocity; s	Peak Right CCA Mid Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Right CCA Mid Velocity; d	Peak Right CCA Mid Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left ICA Proximal Velocity; s	Peak Left ICA Proximal Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left ICA Mid Velocity; s	Peak Left ICA Mid Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left ICA Distal Velocity; s	Peak Left ICA Distal Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left ICA Proximal Velocity; d	Peak Left ICA Proximal Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left ICA Mid Velocity; d	Peak Left ICA Mid Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left ICA Distal Velocity; d	Peak Left ICA Distal Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left CCA Mid Velocity; s	Peak Left CCA Mid Velocity; s	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA
Peak Left CCA Mid Velocity; d	Peak Left CCA Mid Velocity; d	Velocity	$\frac{mm}{s}$	A3C, A4C, A5C, PSA

PW Doppler Mode Calculations

PW Doppler Mode Calculation	Formula	Units	Views
Mean Velocity (note 1)	$\frac{\text{StrokeDistance}}{\left(\frac{60}{\text{HeartRate}}\right)}$	$\frac{cm}{s}$	A3C, A4C, A5C, PSA, Ins
MV E/MV A	$\frac{MV E}{MV A}$		A3C, A4C, A5C
MV A/MV E	$\frac{MV A}{MV E}$		A3C, A4C, A5C
TV E/TV A	$\frac{TV E}{TV A}$		A4C, A5C, PSA
TV A/TV E	$\frac{TV A}{TV E}$		A4C, A5C, PSA
Ao Peak Grad (Aortic Peak Gradient)	$\frac{1.053}{2} \times \left(\frac{Ao Vmax}{100}\right)^2$	mmHg	A3C, A4C, A5C
PA Peak Grad (Pulmonary Artery Peak Gradient)	$\frac{1.053}{2} \times \left(\frac{PA Vmax}{100}\right)^2$	mmHg	A4C, A5C, PSA
Ao AT/ET (LV)	$\frac{Ao AT}{ET (LV)}$		A3C, A4C, A5C
MPI (LV) (Myocardial Performance Index, Left Ventricle)	$\frac{IV CT (LV) + IV RT (LV)}{ET (LV)}$		A3C, A4C, A5C
MPI (RV) (Myocardial Performance Index, Right Ventricle)	$\frac{IV CT (RV) + IV RT (RV)}{ET (RV)}$		A3C, A4C, A5C
S/D Ratio	$\frac{\text{Umbilical Artery Velocity; } s}{\text{Umbilical Artery Velocity; } d}$		FMBF

PW Doppler Mode Calculation	Formula	Units	Views
Peak Pourcelot Resistive Index	$\frac{\text{Umbilical Artery Velocity; } s - \text{Umbilical Artery Velocity; } d}{\text{Umbilical Artery Velocity; } s}$		FMBF
Pulsatility Index	$\frac{\text{Umbilical Artery Velocity; } s - \text{Umbilical Artery Velocity; } d}{\text{Umbilical Artery Mean Velocity}}$		FMBF
Right ICA Proximal / CCA Mid; s	$\frac{\text{Peak Right ICA Proximal Velocity; } s}{\text{Peak Right CCA Mid Velocity; } s}$		A3C, A4C, A5C, PSA
Right ICA Mid / CCA Mid; s	$\frac{\text{Peak Right ICA Mid Velocity; } s}{\text{Peak Right CCA Mid Velocity; } s}$		A3C, A4C, A5C, PSA
Right ICA Distal / CCA Mid; s	$\frac{\text{Peak Right ICA Distal Velocity; } s}{\text{Peak Right CCA Mid Velocity; } s}$		A3C, A4C, A5C, PSA
Right ICA Proximal / CCA Mid; d	$\frac{\text{Peak Right ICA Proximal Velocity; } d}{\text{Peak Right CCA Mid Velocity; } d}$		A3C, A4C, A5C, PSA
Right ICA Mid / CCA Mid; d	$\frac{\text{Peak Right ICA Mid Velocity; } d}{\text{Peak Right CCA Mid Velocity; } d}$		A3C, A4C, A5C, PSA
Right ICA Distal / CCA Mid; d	$\frac{\text{Peak Right ICA Distal Velocity; } d}{\text{Peak Right CCA Mid Velocity; } d}$		A3C, A4C, A5C, PSA
Left ICA Proximal / CCA Mid; s	$\frac{\text{Peak Left ICA Proximal Velocity; } s}{\text{Peak Left CCA Mid Velocity; } s}$		A3C, A4C, A5C, PSA
Left ICA Mid / CCA Mid; s	$\frac{\text{Peak Left ICA Mid Velocity; } s}{\text{Peak Left CCA Mid Velocity; } s}$		A3C, A4C, A5C, PSA
Left ICA Distal / CCA Mid; s	$\frac{\text{Peak Left ICA Distal Velocity; } s}{\text{Peak Left CCA Mid Velocity; } s}$		A3C, A4C, A5C, PSA
Left ICA Proximal / CCA Mid; d	$\frac{\text{Peak Left ICA Proximal Velocity; } d}{\text{Peak Left CCA Mid Velocity; } d}$		A3C, A4C, A5C, PSA

PW Doppler Mode Calculation	Formula	Units	Views
Left ICA Mid / CCA Mid; d	$\frac{\text{Peak Left ICA Mid Velocity}; d}{\text{Peak Left CCA Mid Velocity}; d}$		A3C, A4C, A5C, PSA
Left ICA Distal / CCA Mid; d	$\frac{\text{Peak Left ICA Distal Velocity}; d}{\text{Peak Left CCA Mid Velocity}; d}$		A3C, A4C, A5C, PSA

M-Mode Measurements

M-Mode Measurement	Description	Measurement Type	Units	Views
RV AW; d	Right Ventricle Anterior Wall; Diastole	Depth	mm	PSA, PLA
RVID; d	Right Ventricle; Diastole	Depth	mm	PSA, PLA
IVS; d	Intra Ventricular Septum; Diastole	Depth	mm	PSA, PLA
LVID; d	Left Ventricle; Diastole	Depth	mm	PSA, PLA
LV PW; d	Left Ventricle Posterior Wall; Diastole	Depth	mm	PSA, PLA
RV AW; s	Right Ventricle Anterior Wall; Systole	Depth	mm	PSA, PLA
RVID; s	Right Ventricle; Systole	Depth	mm	PSA, PLA
IVS; s	Intra-Ventricular Septum; Systole	Depth	mm	PSA, PLA
LVID; s	Left Ventricle; Systole	Depth	mm	PSA, PLA
LV PW; s	Left Ventricle Posterior Wall; Systole	Depth	mm	PSA, PLA
PWSV	Posterior Wall Shortening Velocity	Velocity	mm/s	PSA, PLA
PWSP; d	Posterior Wall Septal Line; Diastole	Depth	mm	PSA, PLA
PWSP; s	Posterior Wall Septal Line; Systole	Depth	mm	PSA, PLA
Heart Rate	Heart Rate	Heart Rate	BPM	PSA, PLA
Ao Diam	Aorta Diameter	Depth	mm	PSA, PLA
P Eff	Pericardial Effusion	Depth	mm	PSA, PLA

M-Mode Measurement	Description	Measurement Type	Units	Views
Umbilical Vein	Umbilical Vein	Depth	<i>mm</i>	FMBF
Umbilical Artery	Umbilical Artery	Depth	<i>mm</i>	FMBF
Vitelline Artery	Vitelline Artery	Depth	<i>mm</i>	FMBF
Vitelline Vein	Vitelline Vein	Depth	<i>mm</i>	FMBF
Placenta	Placenta	Depth	<i>mm</i>	FMBF

M-Mode Calculations

M-Mode Calculation	Formula	Units	Views
LV %FS (Left Ventricle Percent Fractional Shortening)	$\frac{LVID; d - LVID; s}{LVID; d} \times 100$	%	PSA, PLA
RV %FS (Right Ventricle Percent Fractional Shortening)	$\frac{RVID; d - RVID; s}{RVID; d} \times 100$	%	PSA, PLA
IVS; d / LV PW; d	$\frac{IVS; d}{LV PW; d}$		PSA, PLA
IVS; s / LV PW; s	$\frac{IVS; s}{LV PW; s}$		PSA, PLA
LV Vol; d (note 2) (Left Ventricle Volume; Diastole)	$\frac{7.0}{2.4 + LVID; d} \times (LVID; d)^3 \times 1000$	μl	PSA, PLA
LV Vol; s (note 2) (Left Ventricle Volume; Systole)	$\frac{7.0}{2.4 + LVID; s} \times (LVID; s)^3 \times 1000$	μl	PSA, PLA
RV Vol; d (note 2) (Right Ventricle Volume; Diastole)	$\frac{7.0}{2.4 + RVID; d} \times (RVID; d)^3 \times 1000$	μl	PSA, PLA
RV Vol; s (note 2) (Right Ventricle Volume; Systole)	$\frac{7.0}{2.4 + RVID; s} \times (RVID; s)^3 \times 1000$	μl	PSA, PLA

M-Mode Calculation	Formula	Units	Views
LV %EF (Left Ventricle Percent Ejection Fraction)	$\frac{LV\ Vol; d - LV\ Vol; s}{LV\ Vol; d} \times 100$	%	PSA, PLA
RV %EF (Right Ventricle Percent Ejection Fraction)	$\frac{RV\ Vol; d - RV\ Vol; s}{RV\ Vol; d} \times 100$	%	PSA, PLA
PWTH (Posterior Wall Thickening)	$\frac{LV\ PW; s - LVPW; d}{LV\ PW; d} \times 100$	%	PSA, PLA
LV Mass (Corrected)	$1.05 \times ((LVID; d + LV\ PW; d + IVS; d)^3 - LVID; d^3) \times 0.8$	mg	PSA, PLA
LV Mass (Uncorrected)	$1.05 \times ((LVID; d + LV\ PW; d + IVS; d)^3 - LVID; d^3)$	mg	PSA, PLA
RWT; d (Relative Wall Thickness, Diastole)	$\frac{2 \times LVPW; d}{LVID; d}$		PSA, PLA

Notes:

1. The associated Heart Rate measurement is made on acquired data in either PW Doppler Mode or M-Mode.
2. The original reference paper from which the formula for the ventricle volume in M-Mode is derived is:

Teichholz, LE, et. al., "Problems in Echocardiographic Volume Determination: Echocardiographic-Angiographic Correlations in the Presence or Absence of Asynergy." *American Journal of Cardiology*, January 1976, Vol. 37, pp. 7-11.

The formula is relevant to the human setting (units in cm range) and has not been proven to scale to the dimensions of a small animal model.

The original formula was derived from and tested in the human clinical setting and not on a small animal model.

As such, based on operator input and without an alternative methodology, the ventricle volume formula has been implemented in the Vevo software without modifications for a small animal model. Please use this calculation and its related calculations with caution.

Need help?

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