3.1. Global Cardiac Activity

As described in the previous section the global values are the average of the six segmental values of a single ventricle. In our study we correlated every parameter with gestational age (GA) and heart rate (HR), indicate a regression equation for the relationship between variables and present the variability explained with the correlation coefficient. We also present reference values for fetal cardiac motion and deformation Table 2 and 3).

Motion parameters systolic (Sys) and diastolic (Dias) Velocity (V) and Displacement (D) increase as pregnancy advances in both ventricles (LV and RV). There is no statistically significant relationship between V and HR except RV Sys V decreases as HR increases. D in both LV and RV decreases with increasing HR. Deformation parameters Sys and Dias Strain Rate (SR) decrease as GA increases and both Sys and Dias SR increase as HR increases. Strain in both ventricles decreases as GA increases and only LV S exhibits a statistically significant relationship with HR whereas RV S has no significant relationship with HR. LV S increases as HR goes up.

3.1.1. Motion Parameters

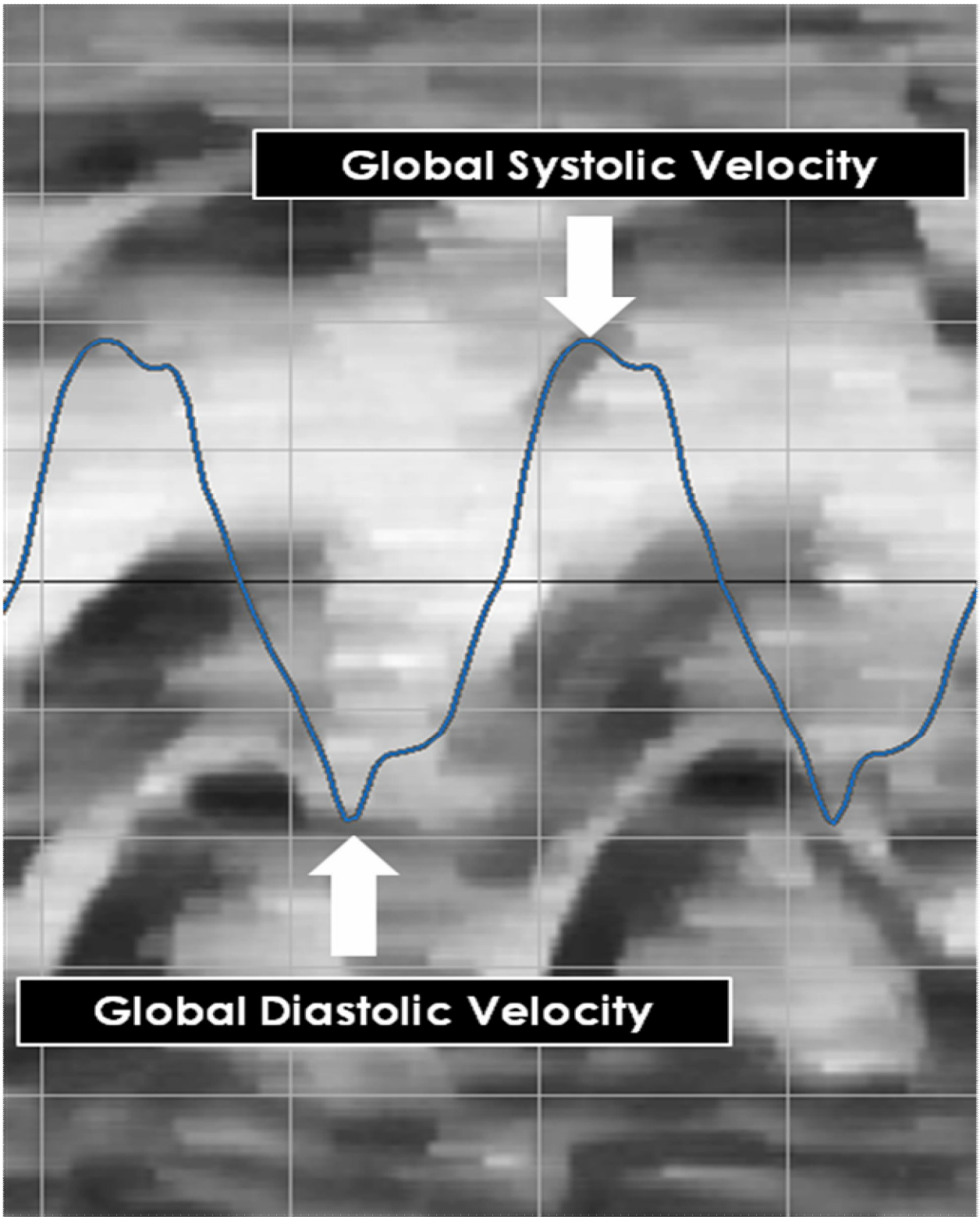


Fig. 33. Parameters characterizing myocardial motion are systolic and diastolic velocities and peak displacement as illustrated in the next figure. Two consecutive cardiac cycles are shown. Figure continues on the next page.

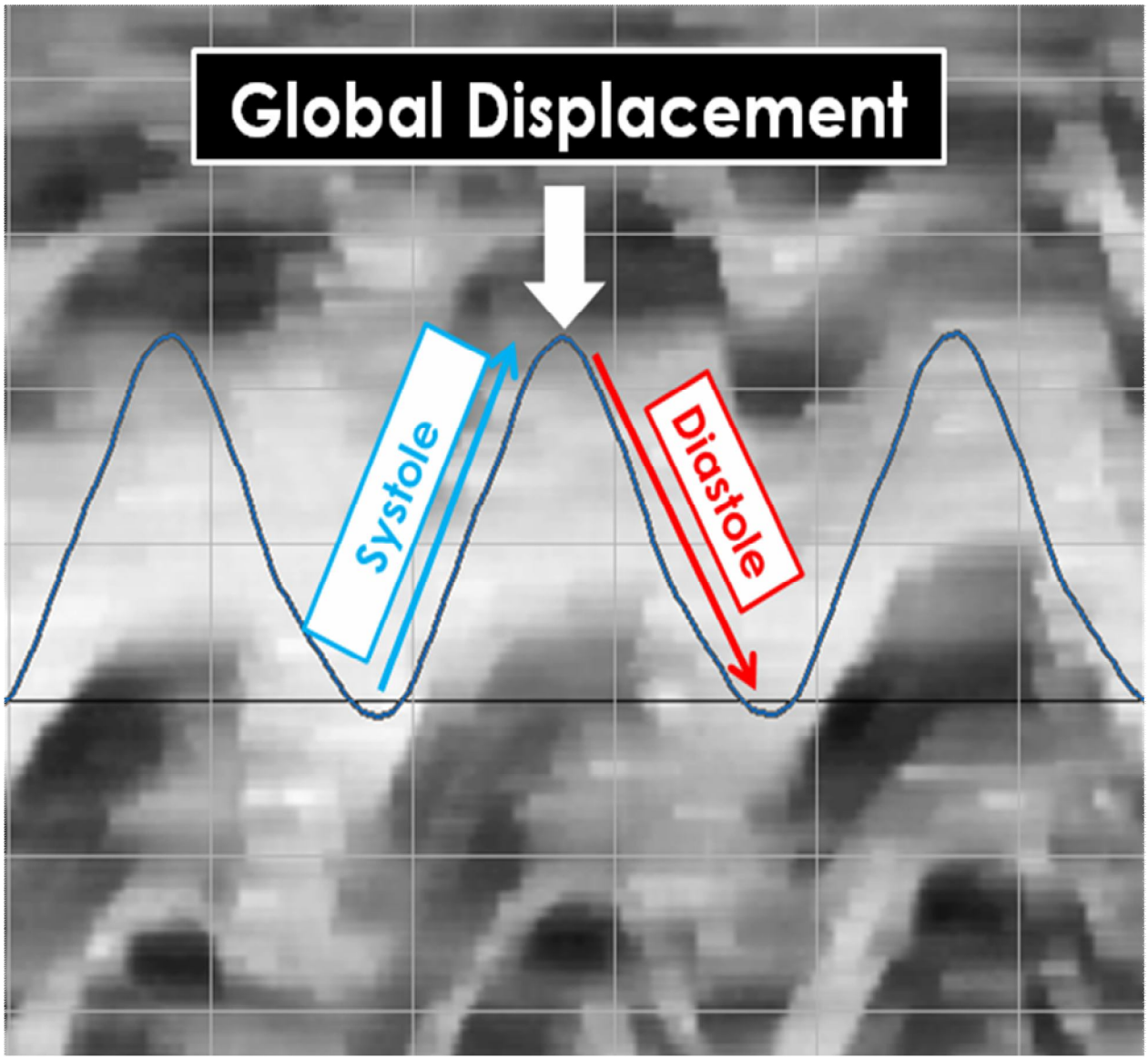
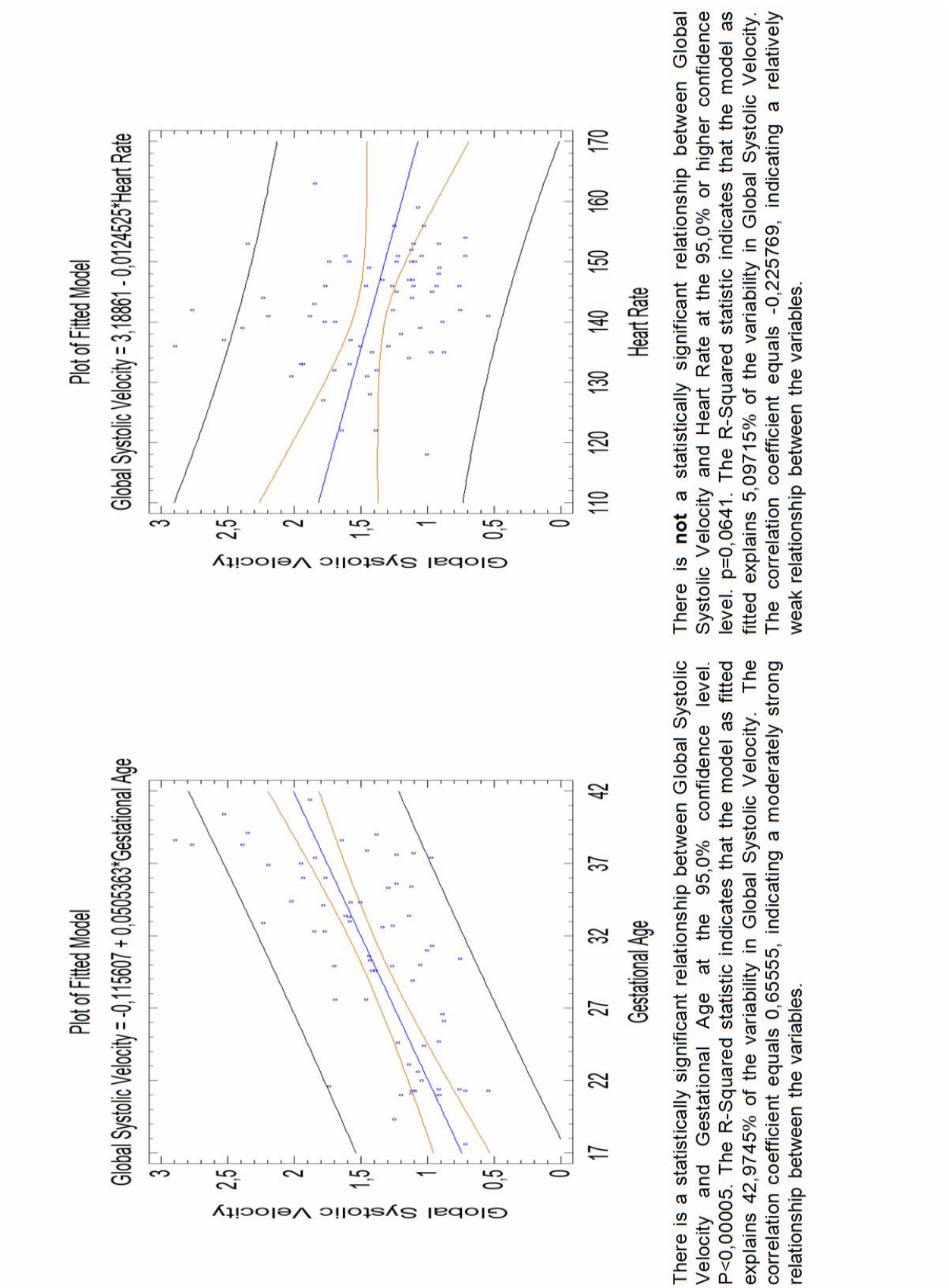


Fig. 33. (cont) Three consecutive fetal heart beats are shown. In the endsystole the fetal heart establishes its maximal shift towards the apex reaching the maximum displacement and then during diastole it moves back to its initial position.

3.1.1.1. Global Systolic Velocities

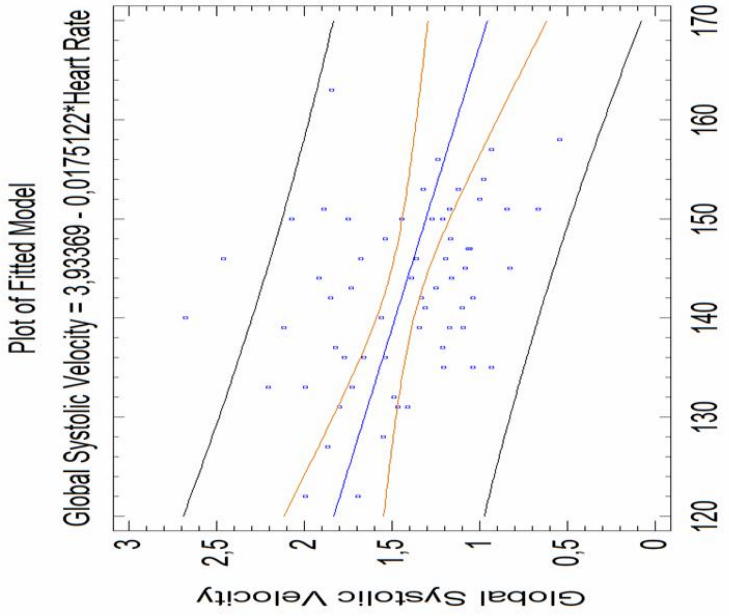
a) Left Ventricular Global Systolic Velocity



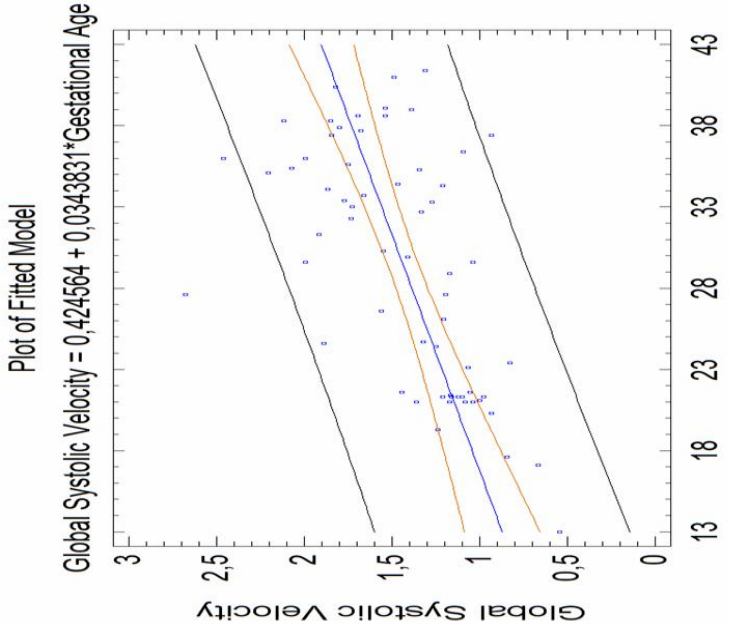
There is **not** a statistically significant relationship between Global Systolic Velocity and Heart Rate at the 95,0% or higher confidence level. p=0,0641. The R-Squared statistic indicates that the model as fitted explains 5,09715% of the variability in Global Systolic Velocity. The correlation coefficient equals -0,225769, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Systolic Velocity and Gestational Age at the 95,0% confidence level. P<0,00005. The R-Squared statistic indicates that the model as fitted explains 42,9745% of the variability in Global Systolic Velocity. The correlation coefficient equals 0,65555, indicating a moderately strong relationship between the variables.

b) Right Ventricular Global Systolic Velocity



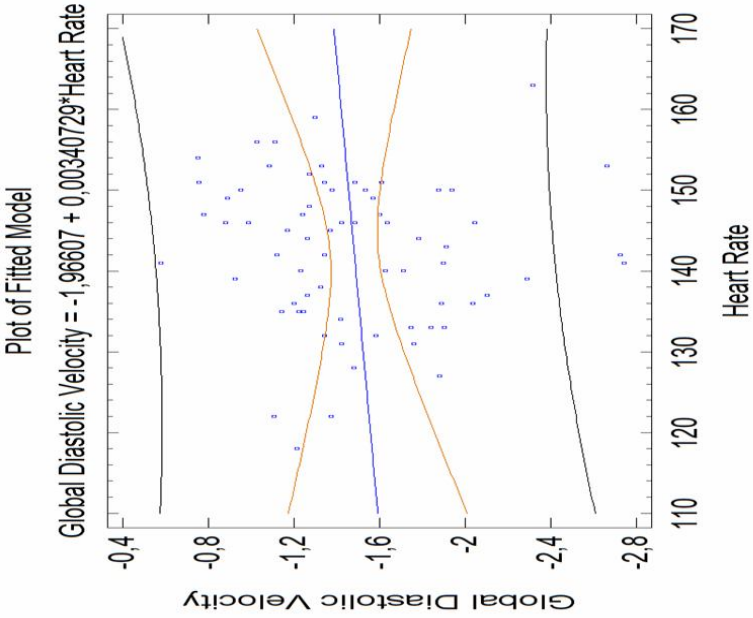
There is a statistically significant relationship between Global Systolic Velocity and Heart Rate at the 95,0% confidence level. p=0,0042. The R-Squared statistic indicates that the model as fitted explains 12,8641% of the variability in Global Systolic Velocity. The correlation coefficient equals -0,358666, indicating a relatively weak relationship between the variables.



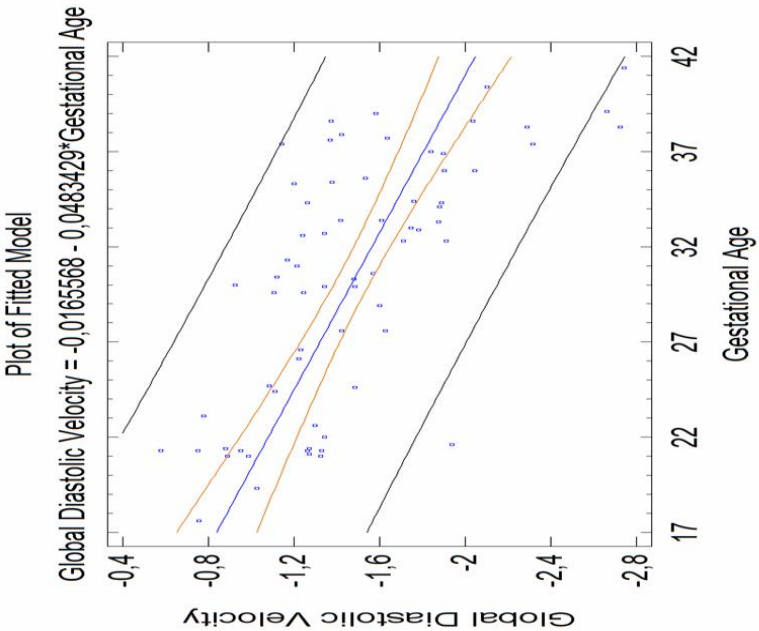
There is a statistically significant relationship between Global Systolic Velocity and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 35,6484% of the variability in Global Systolic Velocity. The correlation coefficient equals 0,597063, indicating a moderately strong relationship between the variables.

3.1.1.2. Global Diastolic Velocities

a) Left Ventricular Global Diastolic Velocity

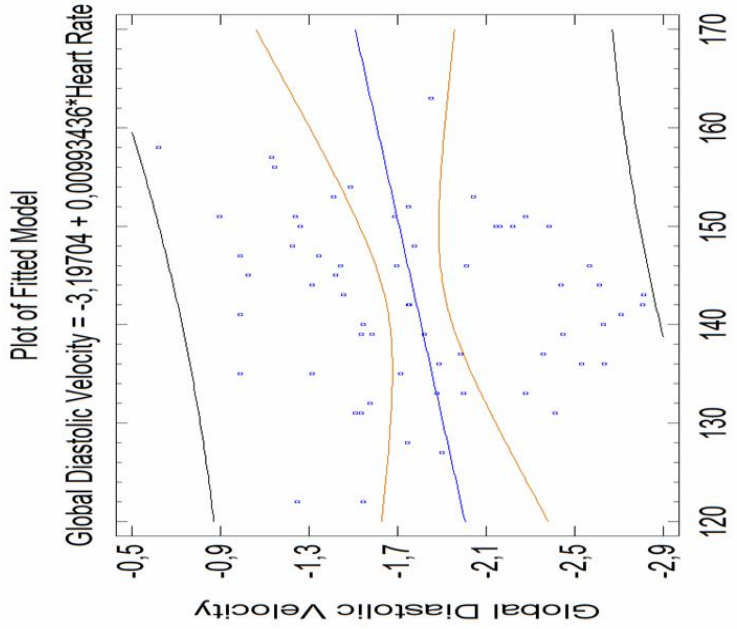


There is **not** a statistically significant relationship between Global Diastolic Velocity and Heart Rate at the 95,0% or higher confidence level. p=0,585. The R-Squared statistic indicates that the model as fitted explains 0,454298% of the variability in Global Diastolic Velocity. The correlation coefficient equals 0,0674016, indicating a relatively weak relationship between the variables.

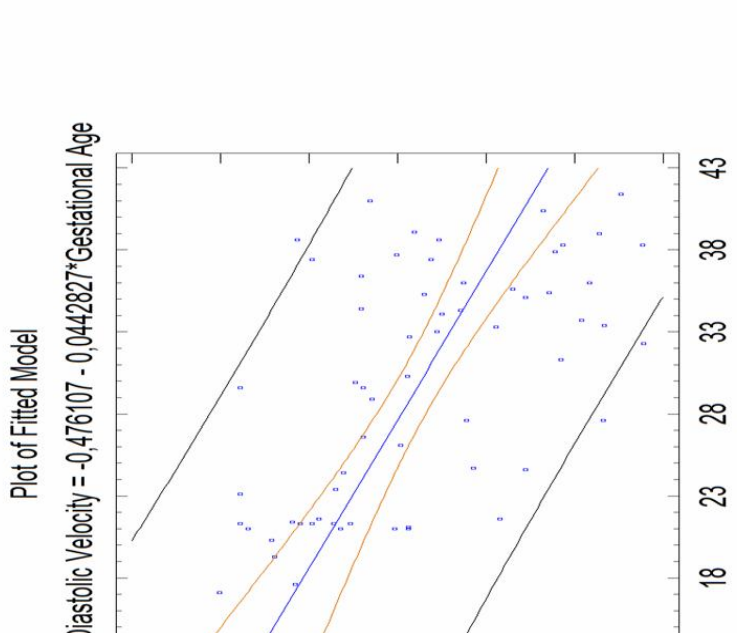


There is a statistically significant relationship between Global Diastolic Velocity and Gestational Age at the 95,0% confidence level. p<0,00005.The R-Squared statistic indicates that the model as fitted explains 46,8142% of the variability in Global Diastolic Velocity. The correlation coefficient equals -0,684209, indicating a moderately strong relationship between the variables.

b) Right Ventricular Global Diastolic Velocity



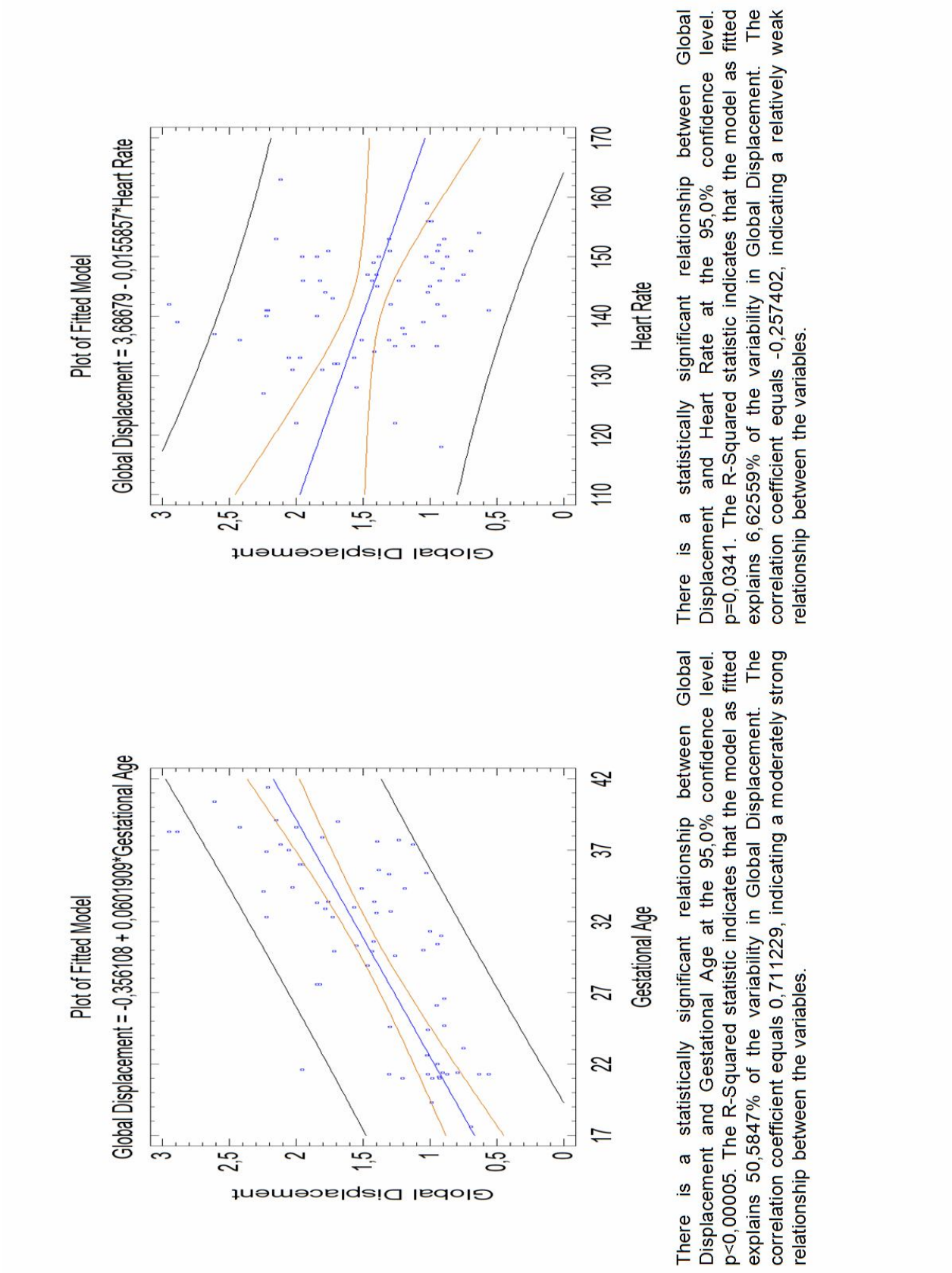
There is **not** a statistically significant relationship between Global Diastolic Velocity and Heart Rate at the 95,0% or higher confidence level. p=0,207. The R-Squared statistic indicates that the model as fitted explains 2,64076% of the variability in Global Diastolic Velocity. The correlation coefficient equals 0,162504, indicating a relatively weak relationship between the variables.



There is a statistically significant relationship between Global Diastolic Velocity and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 37,7197% of the variability in Global Diastolic Velocity. The correlation coefficient equals -0,614163, indicating a moderately strong relationship between the variables.

3.1.1.3. Global Displacement

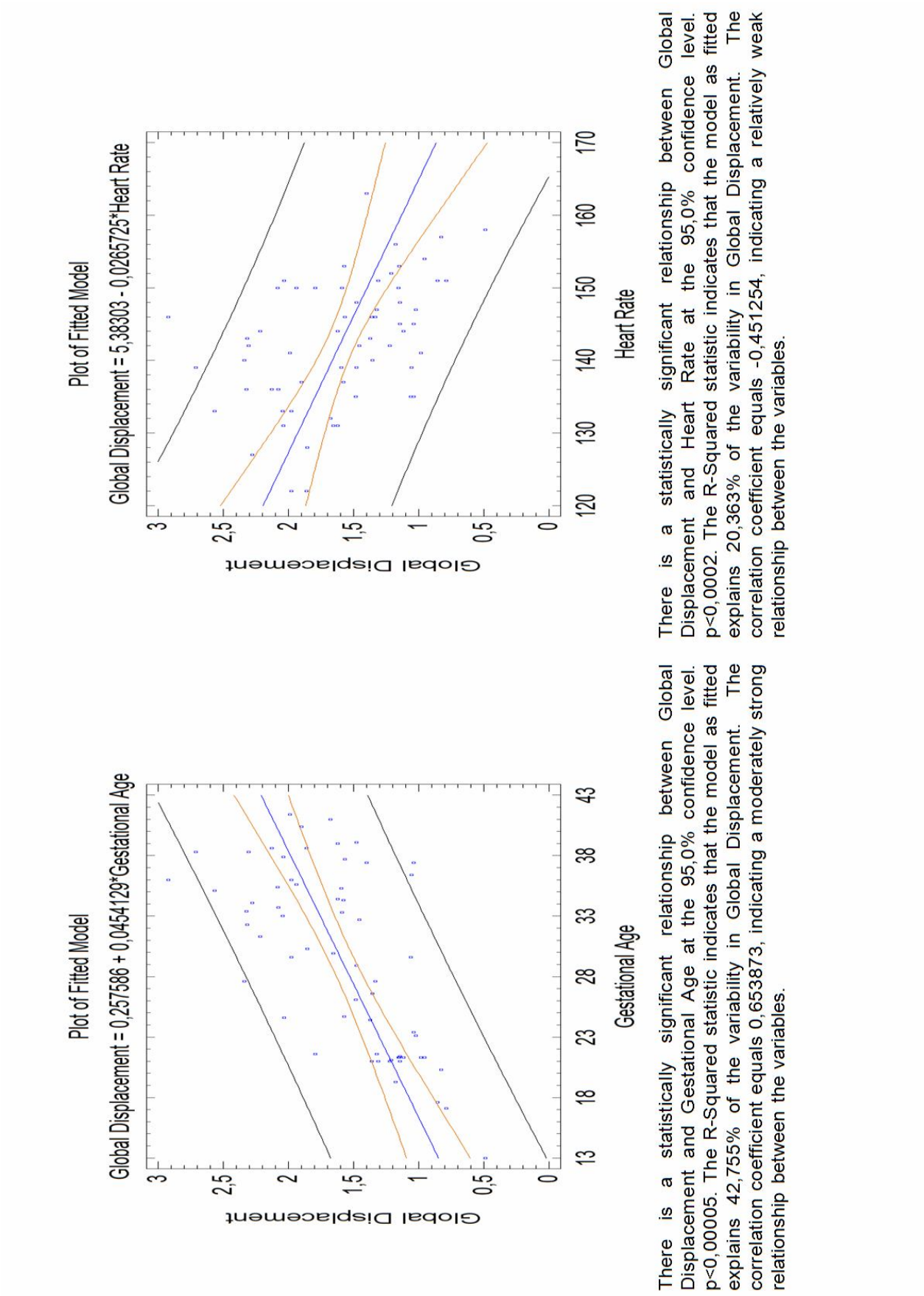
a) Left Ventricular Global Displacement



There is a statistically significant relationship between Global Displacement and Heart Rate at the 95,0% confidence level. p=0,0341. The R-Squared statistic indicates that the model as fitted explains 6,62559% of the variability in Global Displacement. The correlation coefficient equals -0,257402, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Displacement and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 50,5847% of the variability in Global Displacement. The correlation coefficient equals 0,711229, indicating a moderately strong relationship between the variables.

b) Right Ventricular Global Displacement



There is a statistically significant relationship between Global Displacement and Heart Rate at the 95,0% confidence level. p<0,0002. The R-Squared statistic indicates that the model as fitted explains 20,363% of the variability in Global Displacement. The correlation coefficient equals -0,451254, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Displacement and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 42,755% of the variability in Global Displacement. The correlation coefficient equals 0,653873, indicating a moderately strong relationship between the variables.

3.1.2. Deformation Parameters

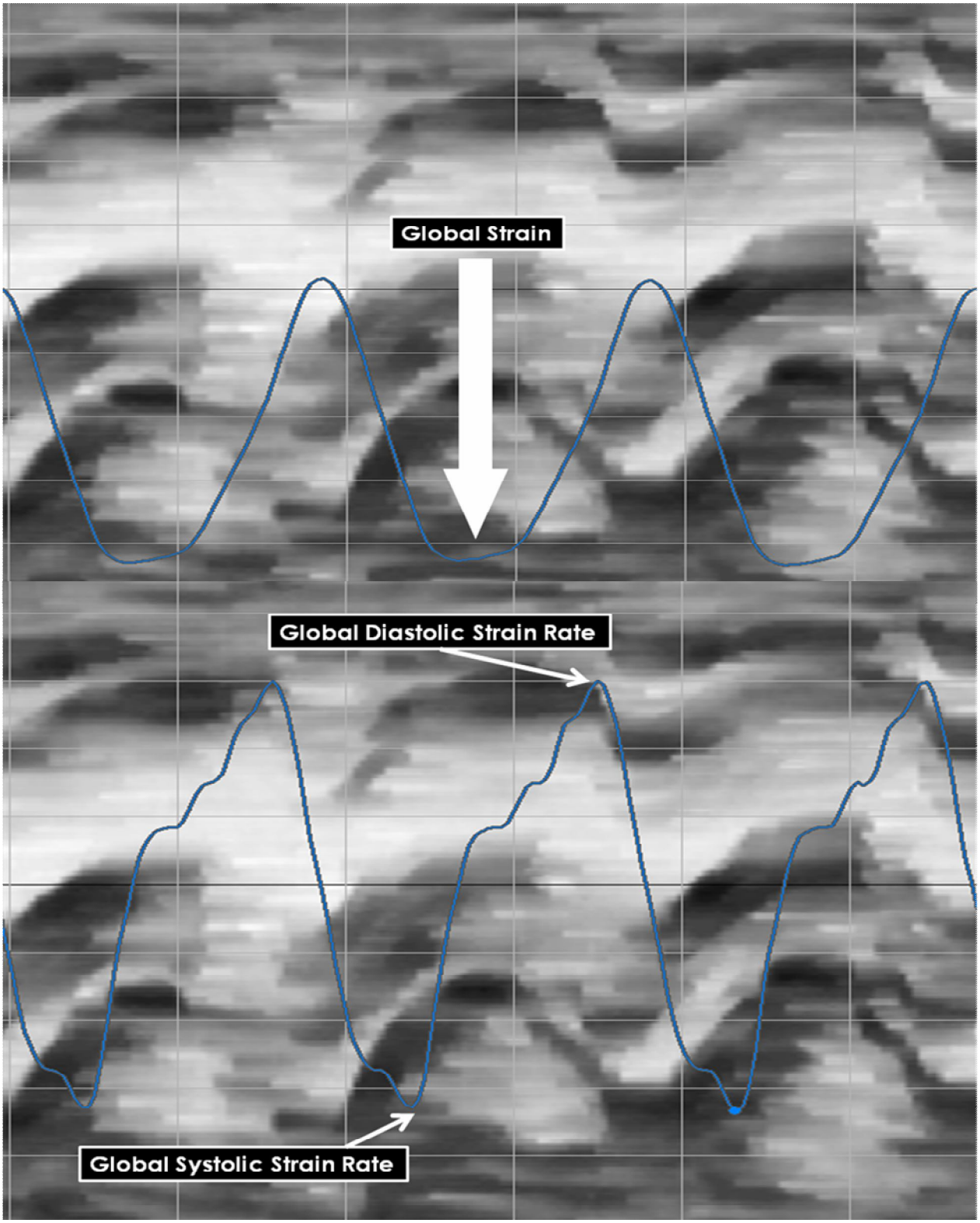
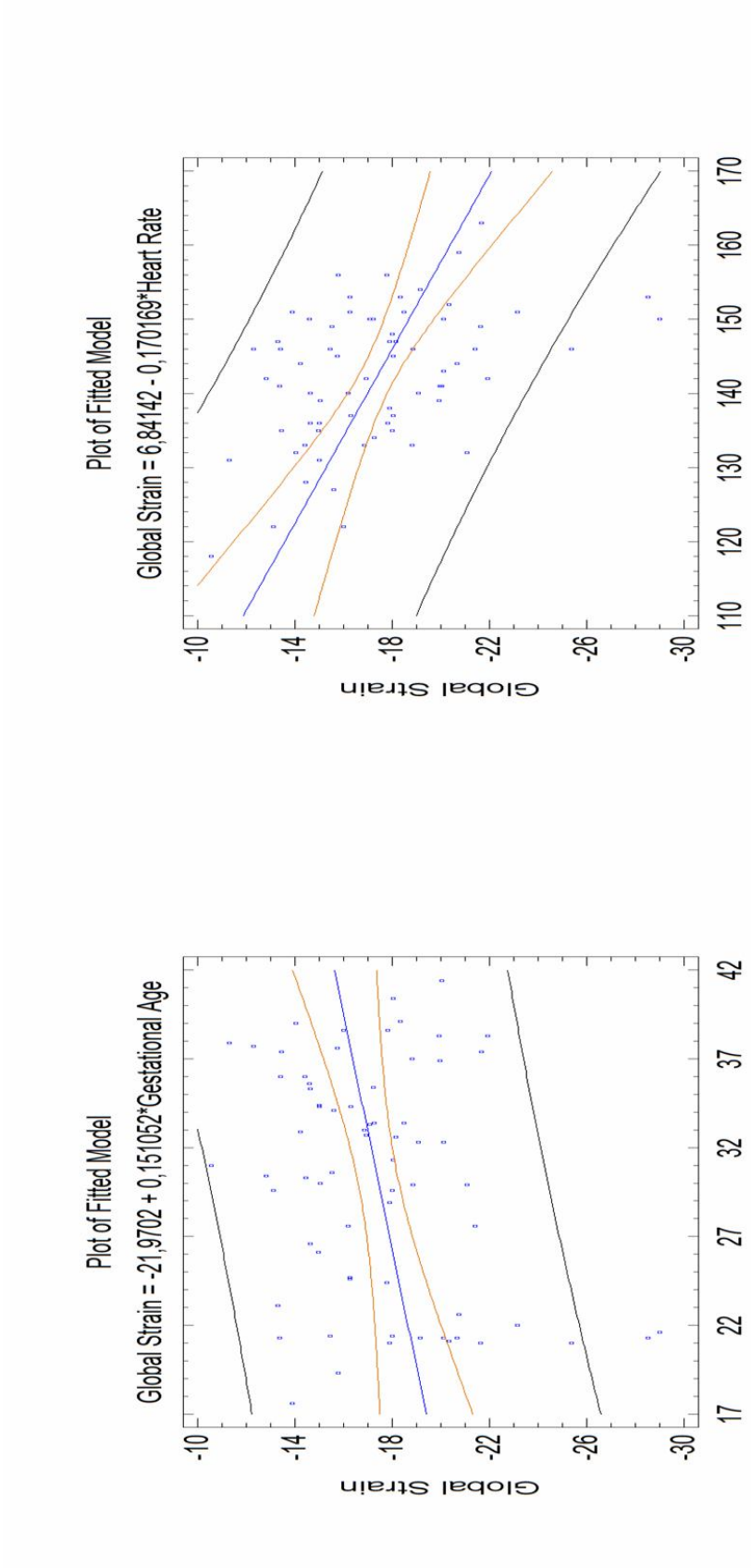


Fig. 34. Superimposed S and SR curves of the same heart cycle. S is the parameter which defines how much deformation undertaken by the myocardium during the cycle. In longitudinal axis myocardium shortens during systole and how quickly this shortening takes place is indicated by systolic SR. As myocardium relaxes during diastole the speed of the relaxation is shown by diastolic SR.

3.1.2.1. Global Strain

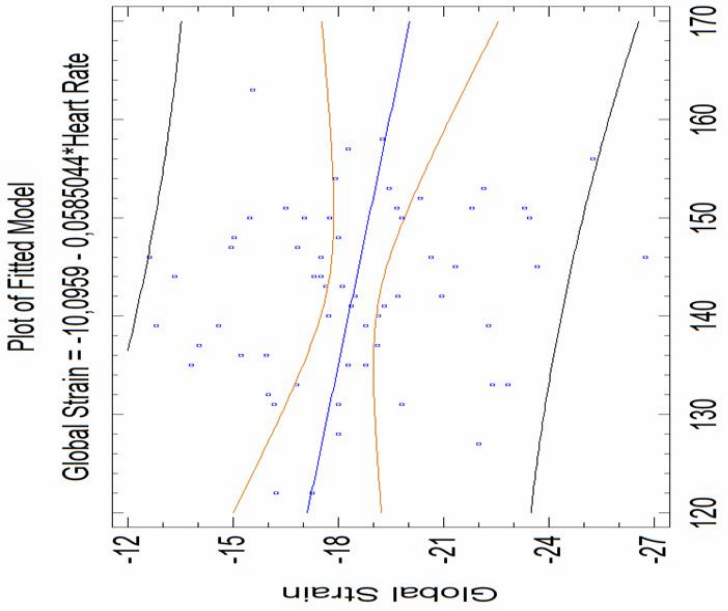
a) Left Ventricular Global Strain



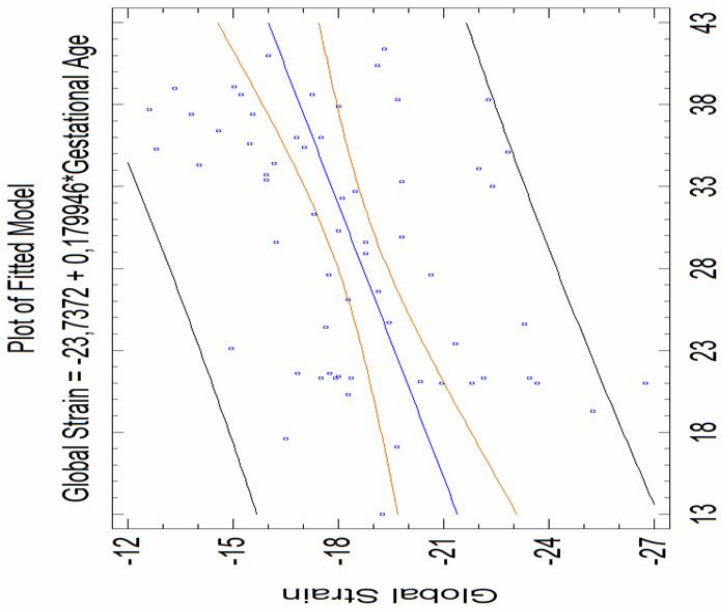
There is a statistically significant relationship between Global Strain and Heart Rate at the 95,0% confidence level. p=0,0002. The R-Squared statistic indicates that the model as fitted explains 18,8995% of the variability in Global Strain. The correlation coefficient equals -0,434735, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Strain and Gestational Age at the 95,0% confidence level. p=0,0227. The R-Squared statistic indicates that the model as fitted explains 7,6231% of the variability in Global Strain. The correlation coefficient equals 0,2761, indicating a relatively weak relationship between the variables.

b) Right Ventricular Global Strain



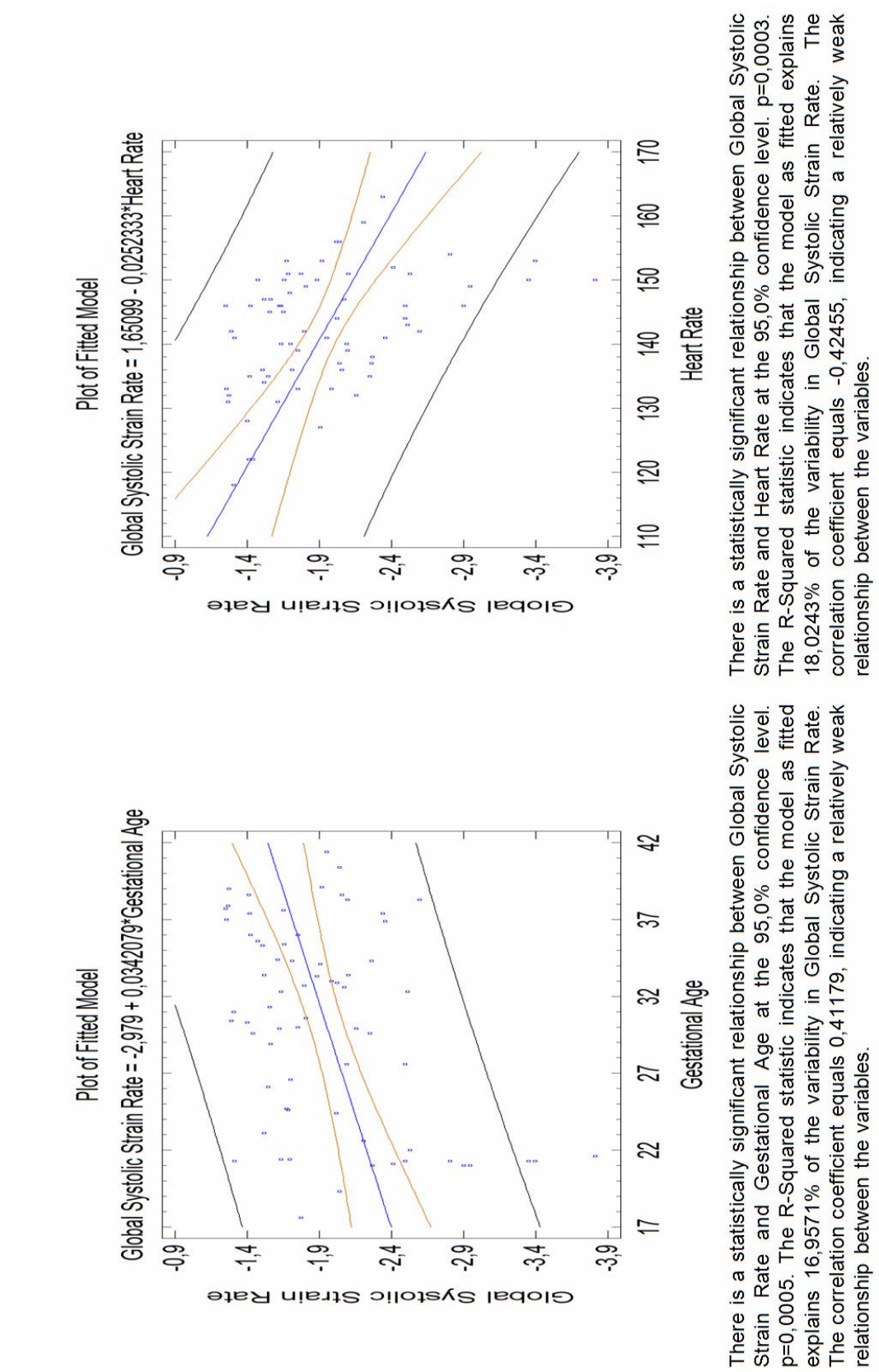
There is **not** a statistically significant relationship between Global Strain and Heart Rate at the 95,0% or higher confidence level. p=0,1857. The R-Squared statistic indicates that the model as fitted explains 2,90038% of the variability in Global Strain. The correlation coefficient equals -0,170305, indicating a relatively weak relationship between the variables.



There is a statistically significant relationship between Global Strain and Gestational Age at the 95,0% confidence level. P=0,0003. The R-Squared statistic indicates that the model as fitted explains 19,7249% of the variability in Global Strain. The correlation coefficient equals 0,444127, indicating a relatively weak relationship between the variables.

3.1.2.2. Global Systolic Strain Rate

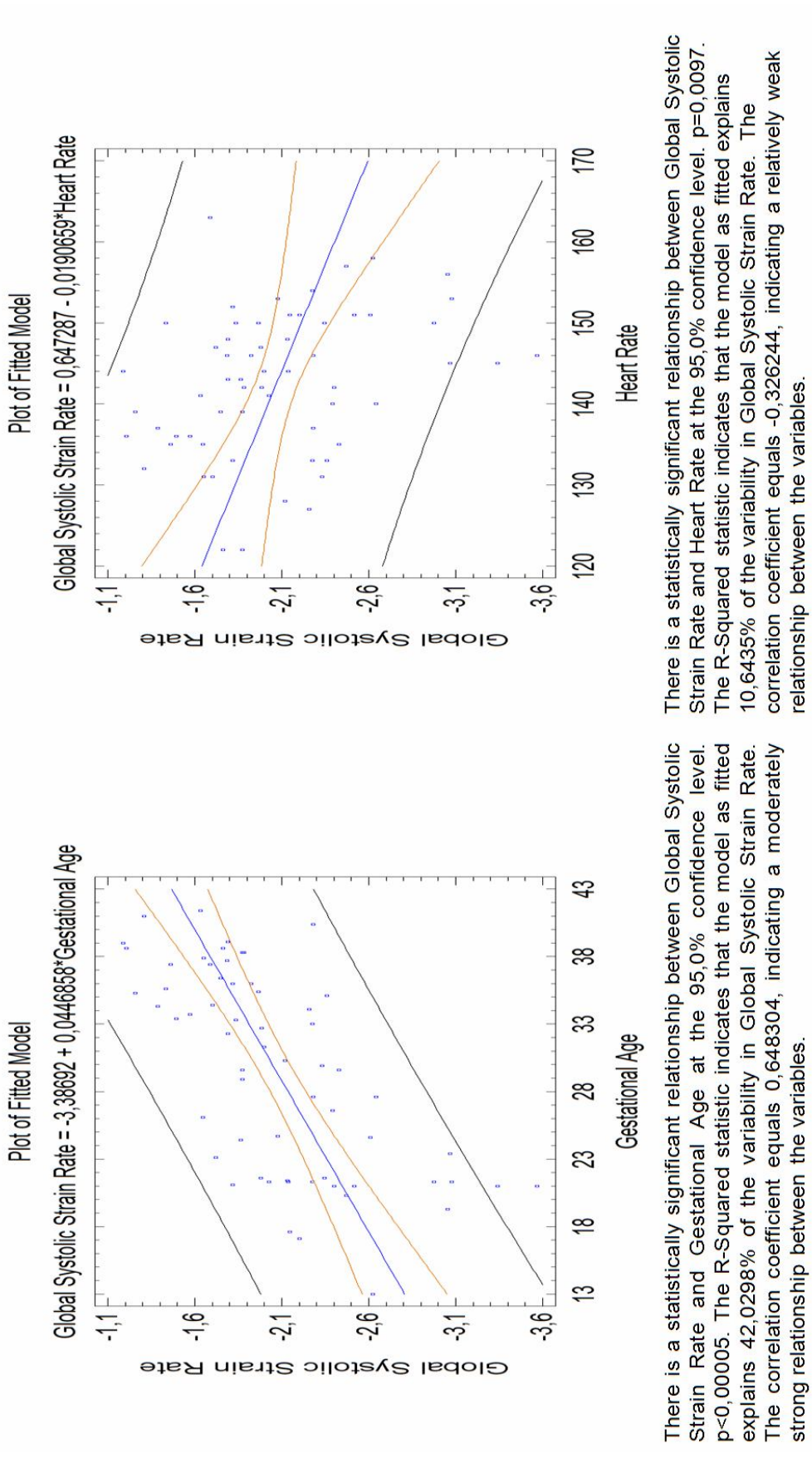
a) Left Ventricular Global Systolic Strain Rate



There is a statistically significant relationship between Global Systolic Strain Rate and Heart Rate at the 95,0% confidence level. p=0,0003. The R-Squared statistic indicates that the model as fitted explains 18,0243% of the variability in Global Systolic Strain Rate. The correlation coefficient equals -0,42455, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Systolic Strain Rate and Gestational Age at the 95,0% confidence level. p=0,0005. The R-Squared statistic indicates that the model as fitted explains 16,9571% of the variability in Global Systolic Strain Rate. The correlation coefficient equals 0,41179, indicating a relatively weak relationship between the variables.

b) Right Ventricular Global Systolic Strain Rate

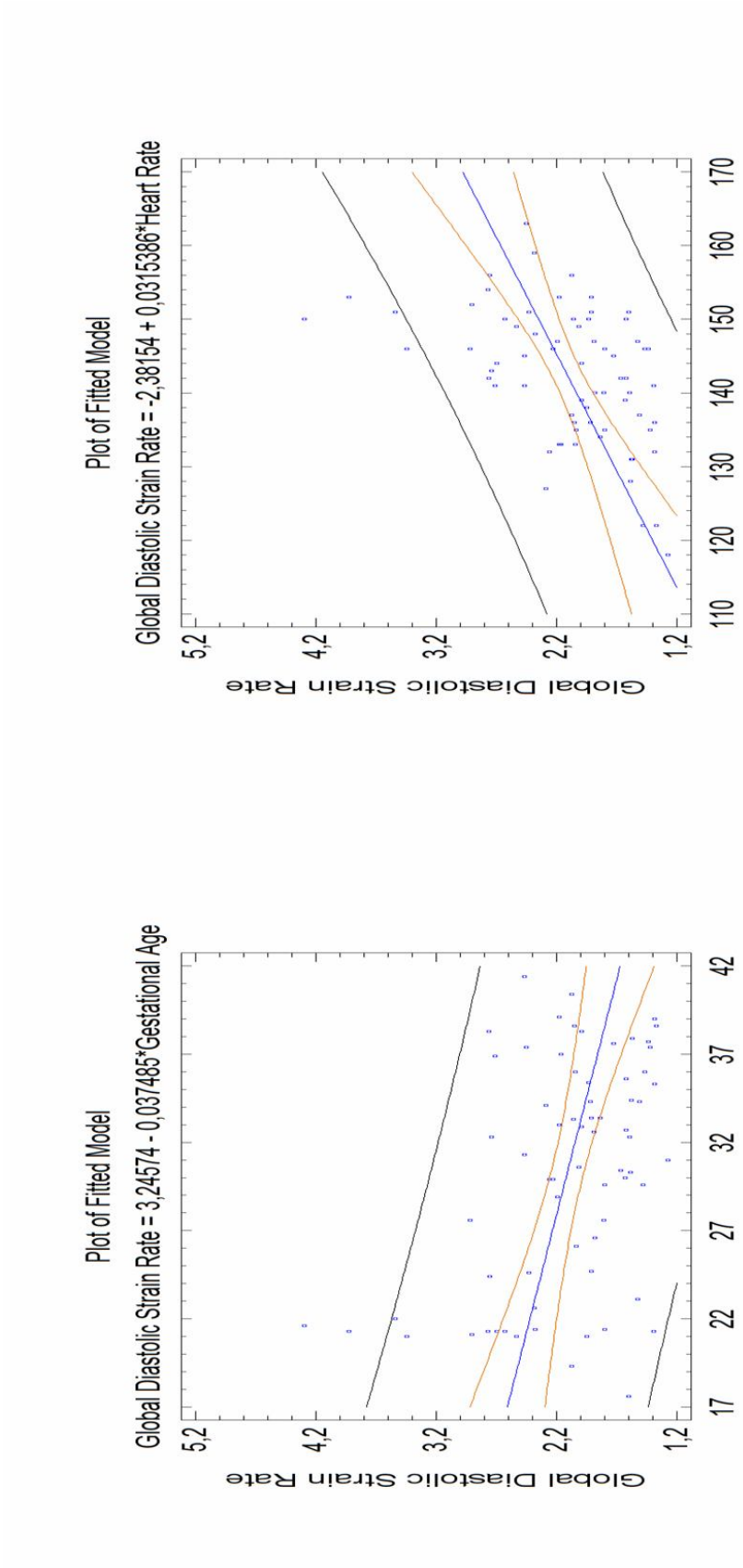


There is a statistically significant relationship between Global Systolic Strain Rate and Heart Rate at the 95,0% confidence level. p=0,0097. The R-Squared statistic indicates that the model as fitted explains 10,6435% of the variability in Global Systolic Strain Rate. The correlation coefficient equals -0,326244, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Systolic Strain Rate and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 42,0298% of the variability in Global Systolic Strain Rate. The correlation coefficient equals 0,648304, indicating a moderately strong relationship between the variables.

3.1.2.3. Global Diastolic Strain Rate

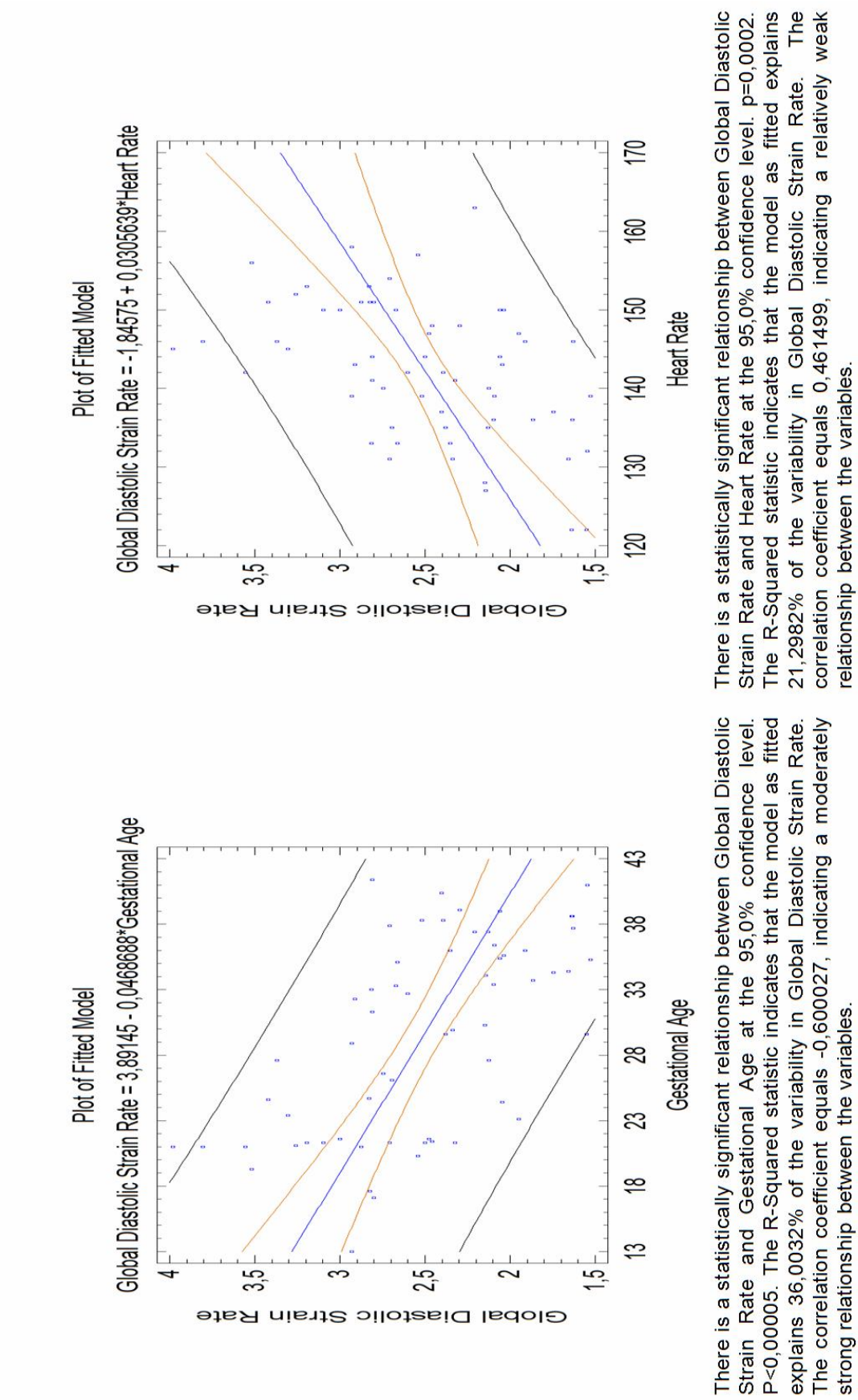
a) Left Ventricular Diastolic Strain Rate



There is a statistically significant relationship between Global Diastolic Strain Rate and Heart Rate at the 95,0% confidence level. p=0,0001.The R-Squared statistic indicates that the model as fitted explains 22,1545% of the variability in Global Diastolic Strain Rate. The correlation coefficient equals 0,470686, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Diastolic Strain Rate and Gestational Age at the 95,0% confidence level. p=0,0007. The R-Squared statistic indicates that the model as fitted explains 16,0207% of the variability in Global Diastolic Strain Rate. The correlation coefficient equals -0,400259, indicating a relatively weak relationship between the variables.

b) Right Ventricular Diastolic Strain Rate



There is a statistically significant relationship between Global Diastolic Strain Rate and Heart Rate at the 95,0% confidence level. p=0,0002. The R-Squared statistic indicates that the model as fitted explains 21,2982% of the variability in Global Diastolic Strain Rate. The correlation coefficient equals 0,461499, indicating a relatively weak relationship between the variables.

There is a statistically significant relationship between Global Diastolic Strain Rate and Gestational Age at the 95,0% confidence level. P<0,00005. The R-Squared statistic indicates that the model as fitted explains 36,0032% of the variability in Global Diastolic Strain Rate. The correlation coefficient equals -0,600027, indicating a moderately strong relationship between the variables.

Table 2. Velocity values are expressed as cm/sec, Strain values are expressed as percent change in lenght, Strain Rate values are expressed as rate of change in lenght (per second), Displacement is expressed in mm, CI: confidence interval, SD: Standard Deviation

Right Ventricular Peak Longitudinal Global Measurements in Normal Fetuses (n=62)

	RV Mean CI 95%	RV SD	RV Median	RV Range
Global Systolic Velocity	1,4379 (1,3287-1,547)	0,4298	1,3524	0,544 - 2,6765
Global Strain	-18,4337 (-19,2017 to -17,6657)	3,0242	-18,064	-26,7463 to -12,6114
Global Systolic Strain Rate	-2,0699 (-2,2 to -1,9392)	0,5144	-1,9818	-3,5672 to -1,1876
Global Displacement	1,596 (1,4643 - 1,7276)	0,5183	1,569	0,4874 - 2,9213
Global Diastolic Velocity	-1,7812 (-1,9179 to -1,6445)	0,5381	-1,7459	-2,8107 to -0,6183
Global Diastolic Strain Rate	2,5101 (2,362 - 2,6581)	0,583	2,4864	1,5285 - 3,9821

Table 3. Velocity values are expressed as cm/sec, Strain values are expressed as percent change in lenght, Strain Rate values are expressed as rate of change in lenght (per second), Displacement is expressed in mm, CI: confidence interval; SD: Standard Deviation

Left Ventricular Peak Longitudinal Global Measurements in Normal Fetuses (n=68)

	LV Mean CI 95%	LV SD	LV Median	LV Range
Global Systolic Velocity	1,415 (1,293 - 1,537)	0,5039	1,2821	0,5438 to 2,8938
Global Strain	-17,3951 (-18,2607 to -16,5294)	3,5762	-17,1629	-29,012 to -10,5617
Global Systolic Strain Rate	-1,9428 -2,0743 to -1,8114	0,543	-1,8	-3,8101 to -1,2494
Global Displacement	1,4669 (1,333 - 1,6008)	0,5532	1,3891	0,5631 to 2,9484
Global Diastolic Velocity	-1,4807 (-1,5925 to -1,3689)	0,4618	-1,3757	-2,7416 to -0,5767
Global Diastolic Strain Rate	2,1103 (1,9622 - 2,2585)	0,6121	2,0002	1,2767 to 4,2978

We compared LV and RV values and found no statistically significant difference in

- Global Systolic Velocities
- Global Displacement
- Global Strain
- Global Systolic Strain Rate, however

there was a statistically significant difference in

- Global Diastolic Velocities (RV > LV) p-Value = 0,0009 and
- Global Diastolic Strain Rate (RV > LV) p-Value = 0,0002.

3.2. Correlation between Ejection Fraction and Global Strain

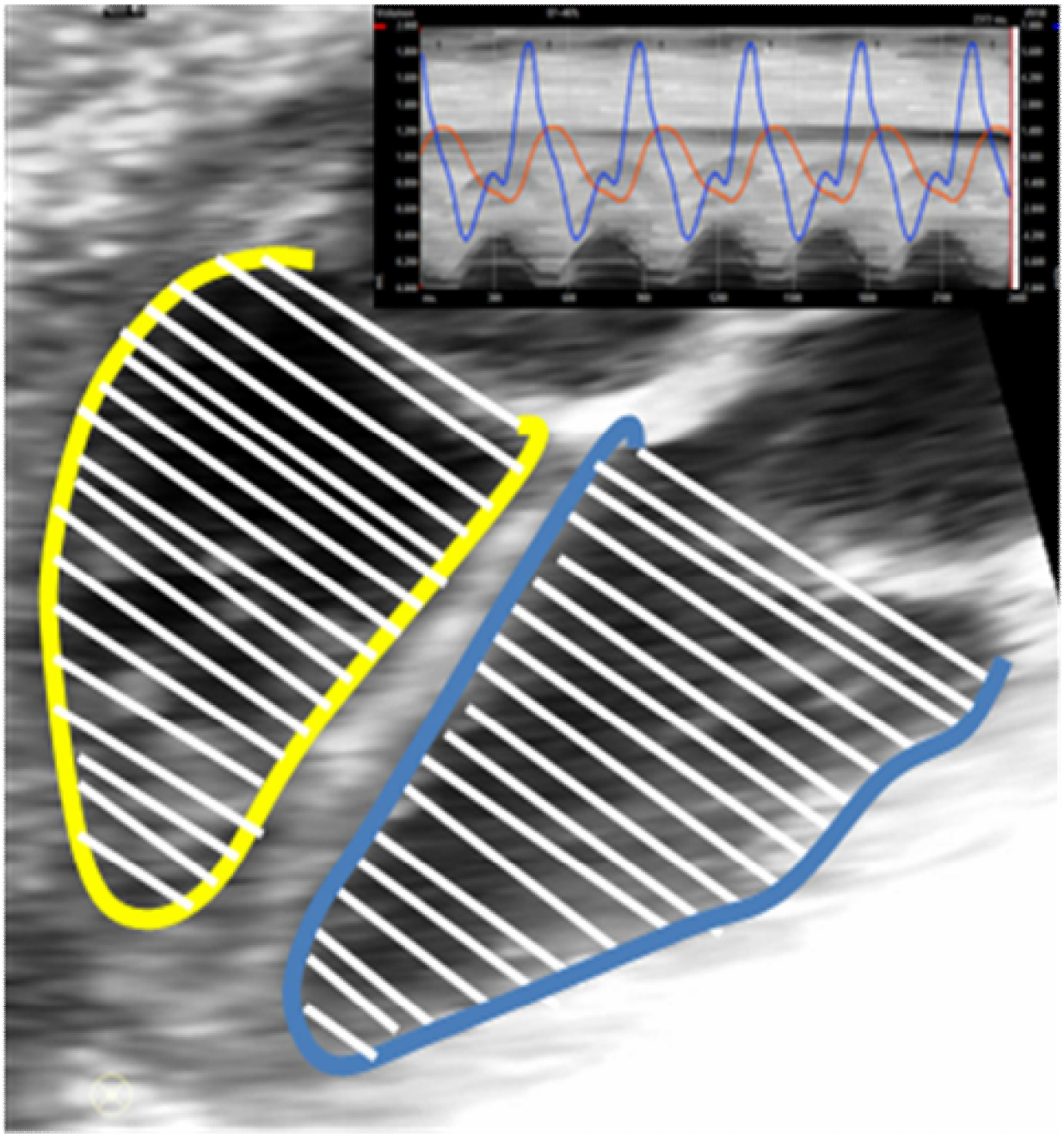
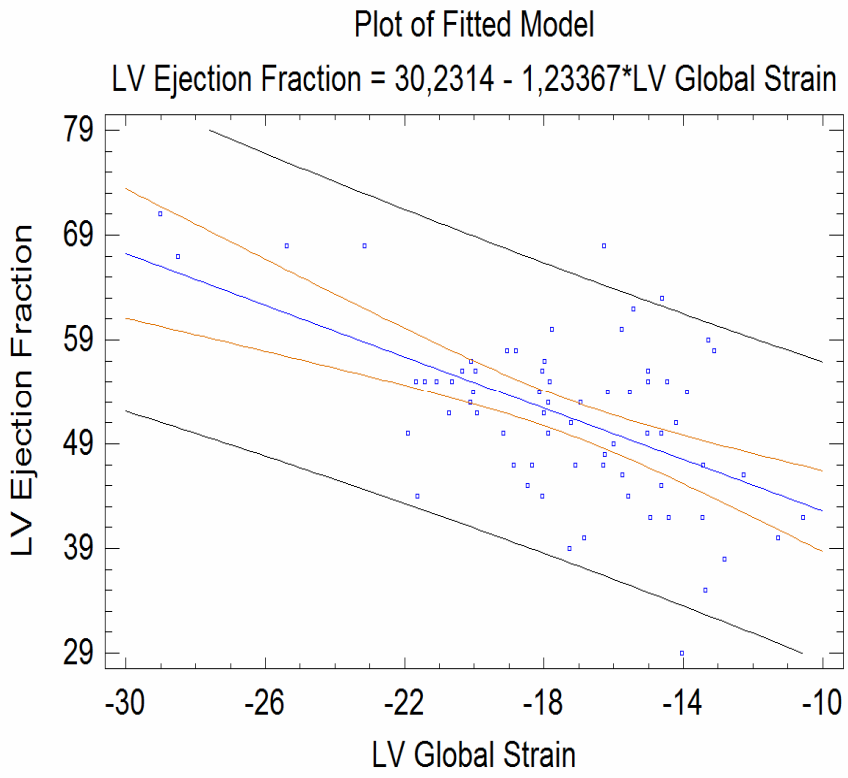


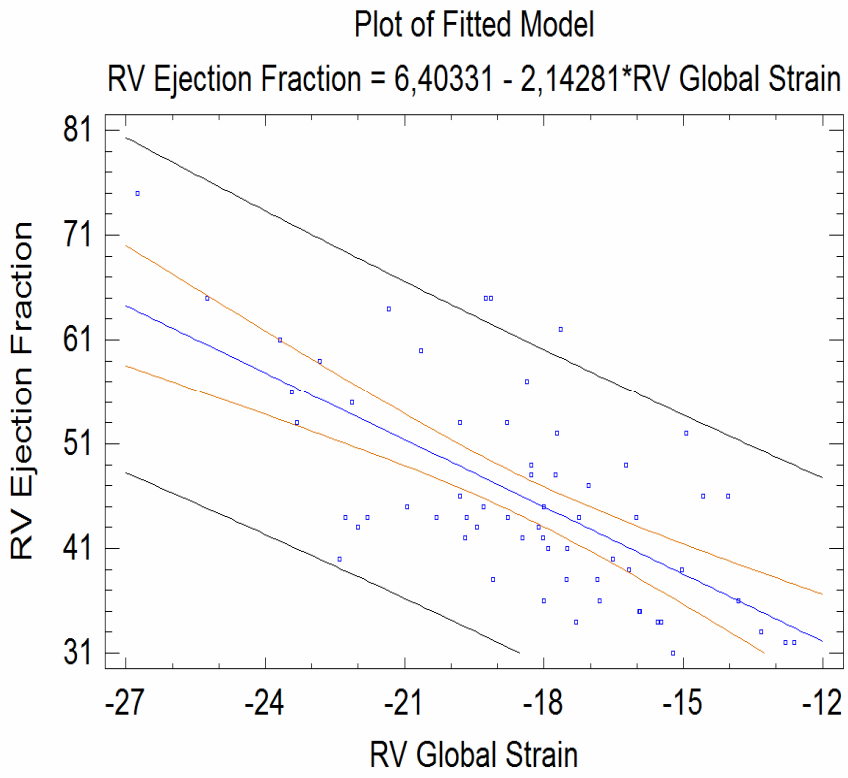
Fig. 35. VVI software can also calculate using modified monoplane Simpson method the ejection fraction (EF) derived from the 2D data in endsystole and enddiastole. In this figure enddiastolic 4 Ch-view is shown to illustrate this method.

3.2.1. Left Ventricular Ejection Fraction Versus Global Strain



There is a statistically significant relationship between LV Ejection Fraction and LV Global Strain at the 95,0% confidence level. p<0,0005. The R-Squared statistic indicates that the model as fitted explains 29,2504% of the variability in LV Ejection Fraction. The correlation coefficient equals -0,540837, indicating a moderately strong relationship between the variables.

3.2.2. Right Ventricular Ejection Fraction Versus Global Strain



There is a statistically significant relationship between RV Ejection Fraction and RV Global Strain at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 43,2752% of the variability in RV Ejection Fraction. The correlation coefficient equals -0,657839, indicating a moderately strong relationship between the variables.

3.3. Repeatability of VVI

To assess the repeatability of the feature tracking algorithm we performed two tracings for both ventricles consecutively. We illustrate them in Bland-Altman Plots.

3.3.1. Repeatability of Left Ventricular Parameters

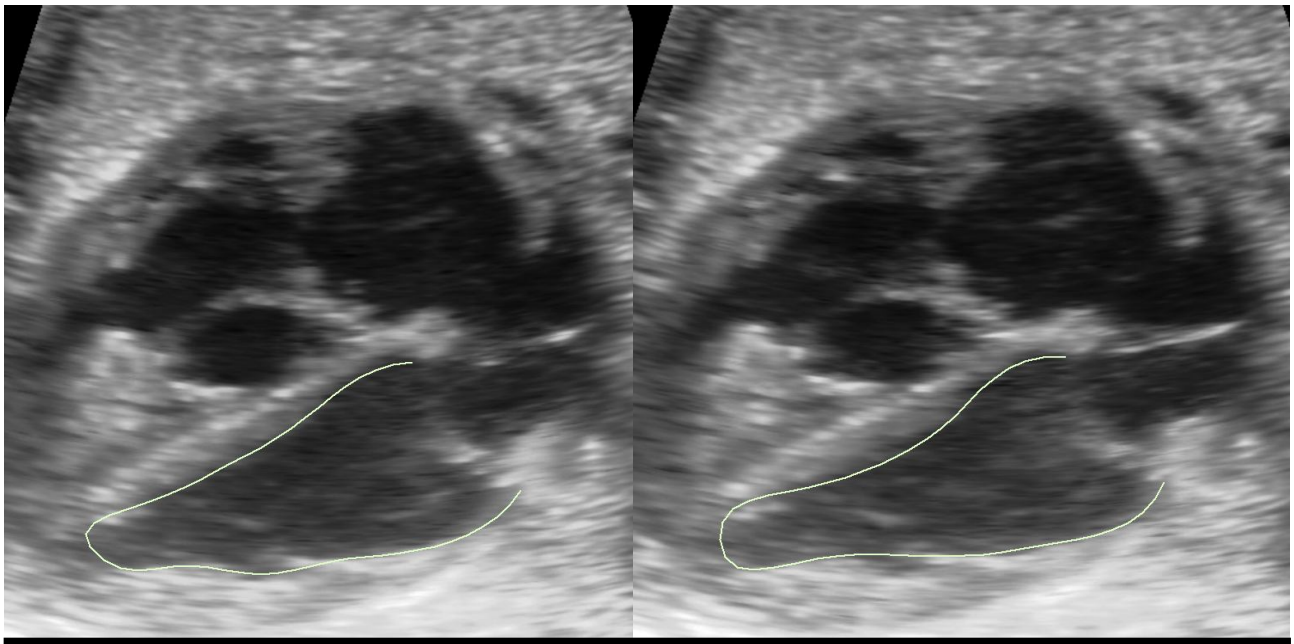
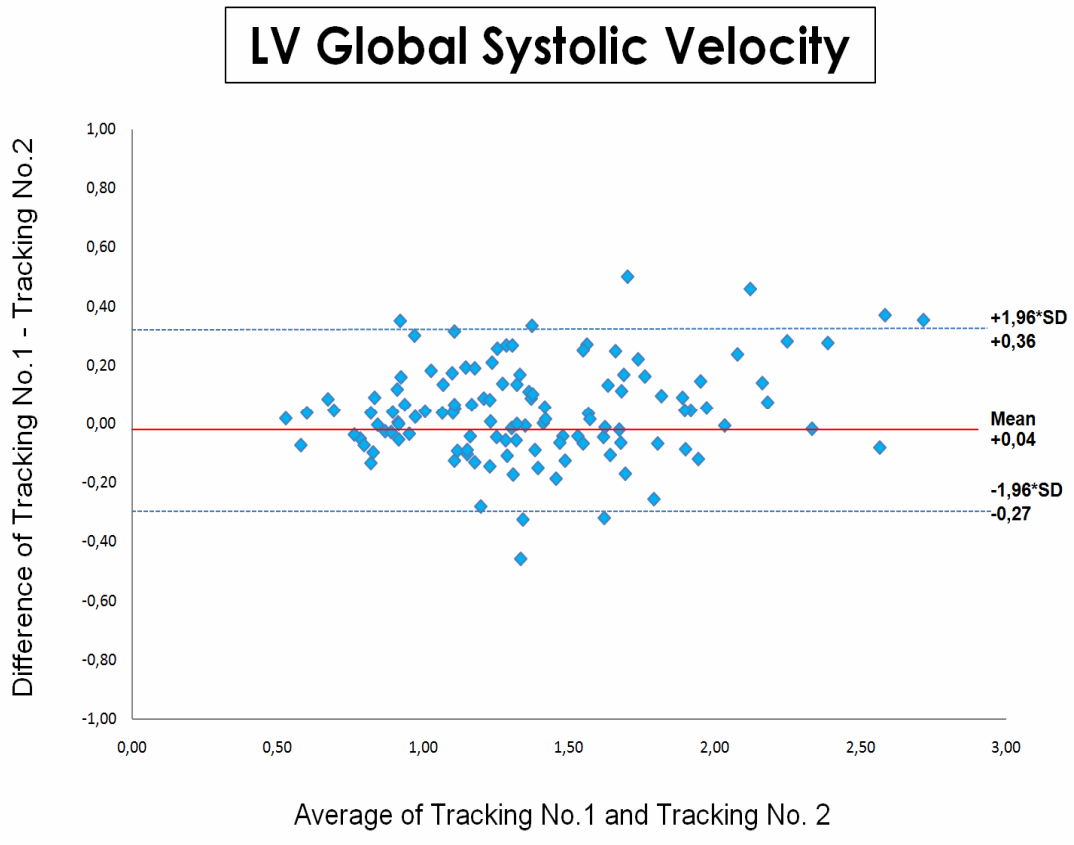
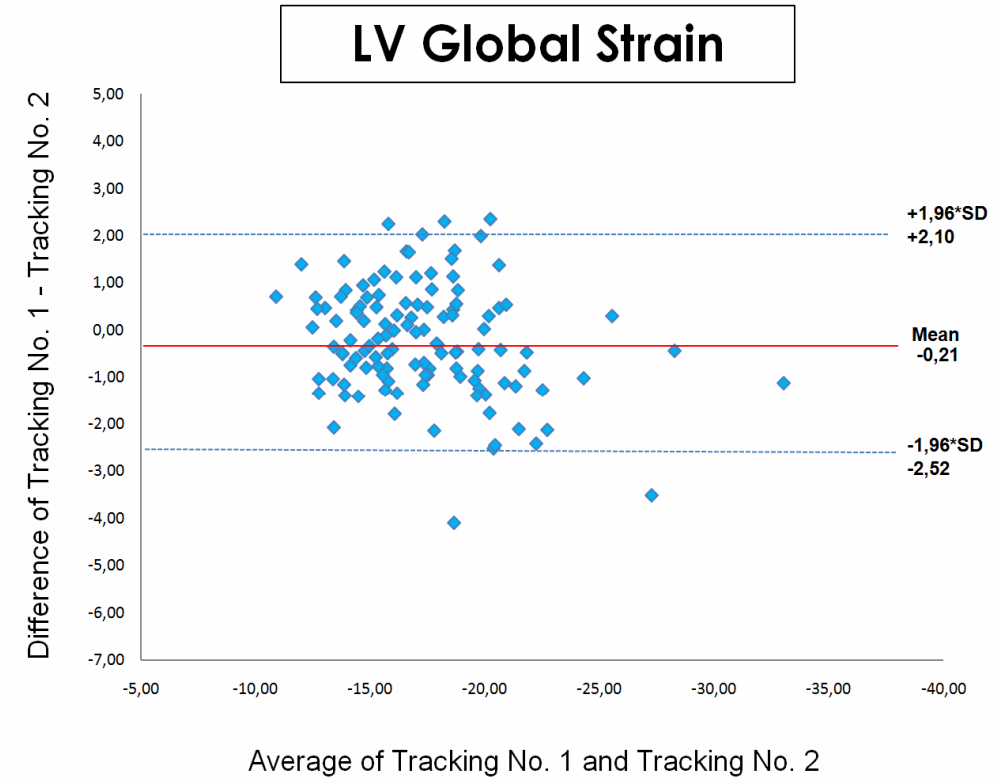
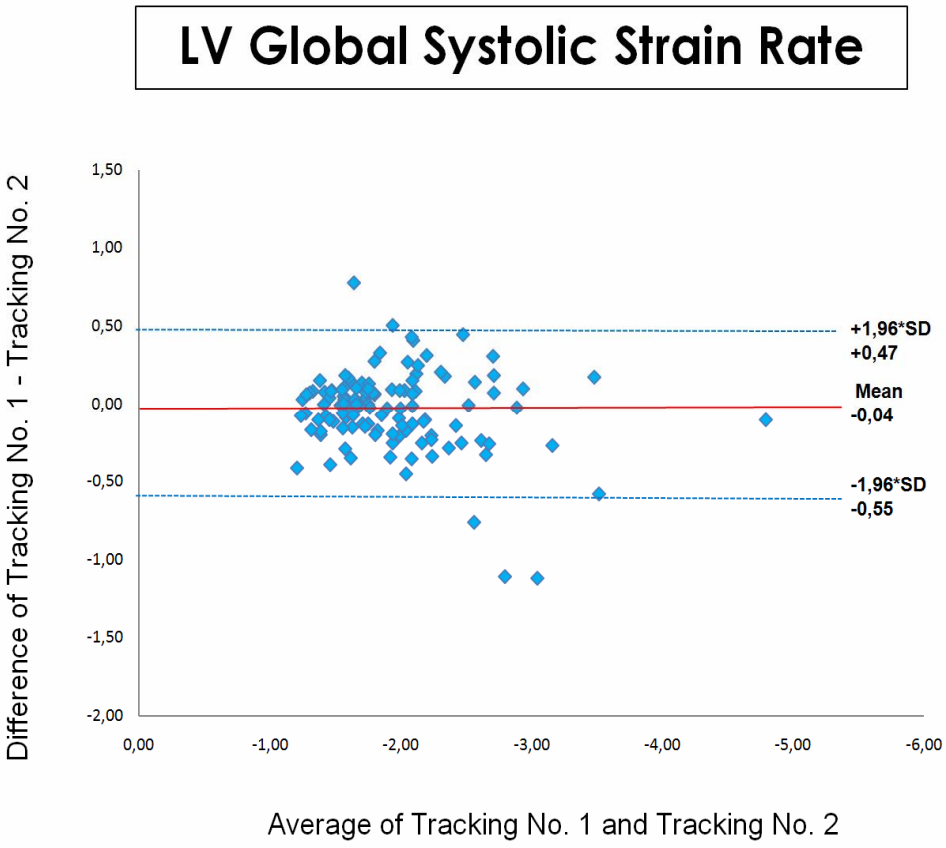
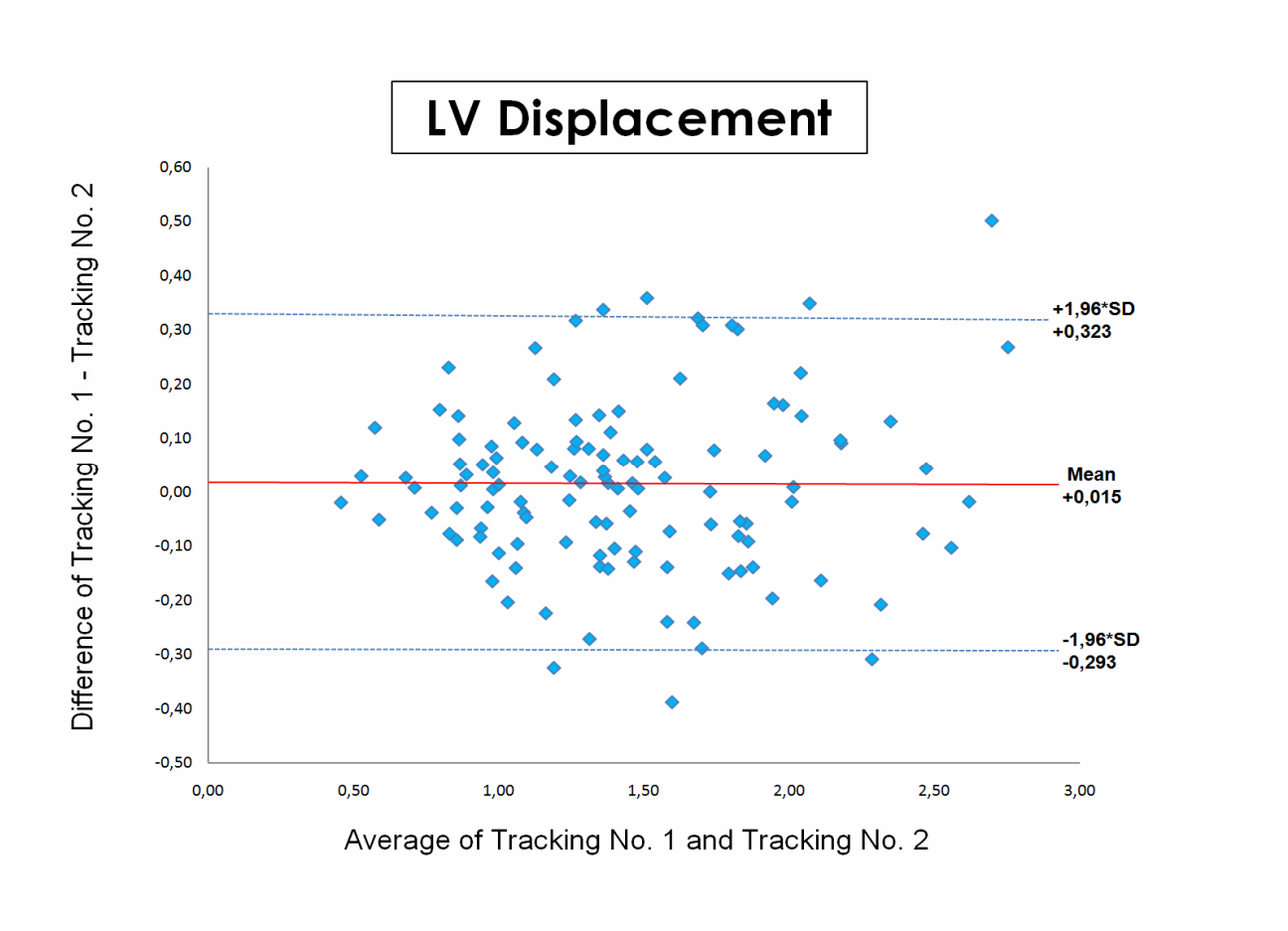


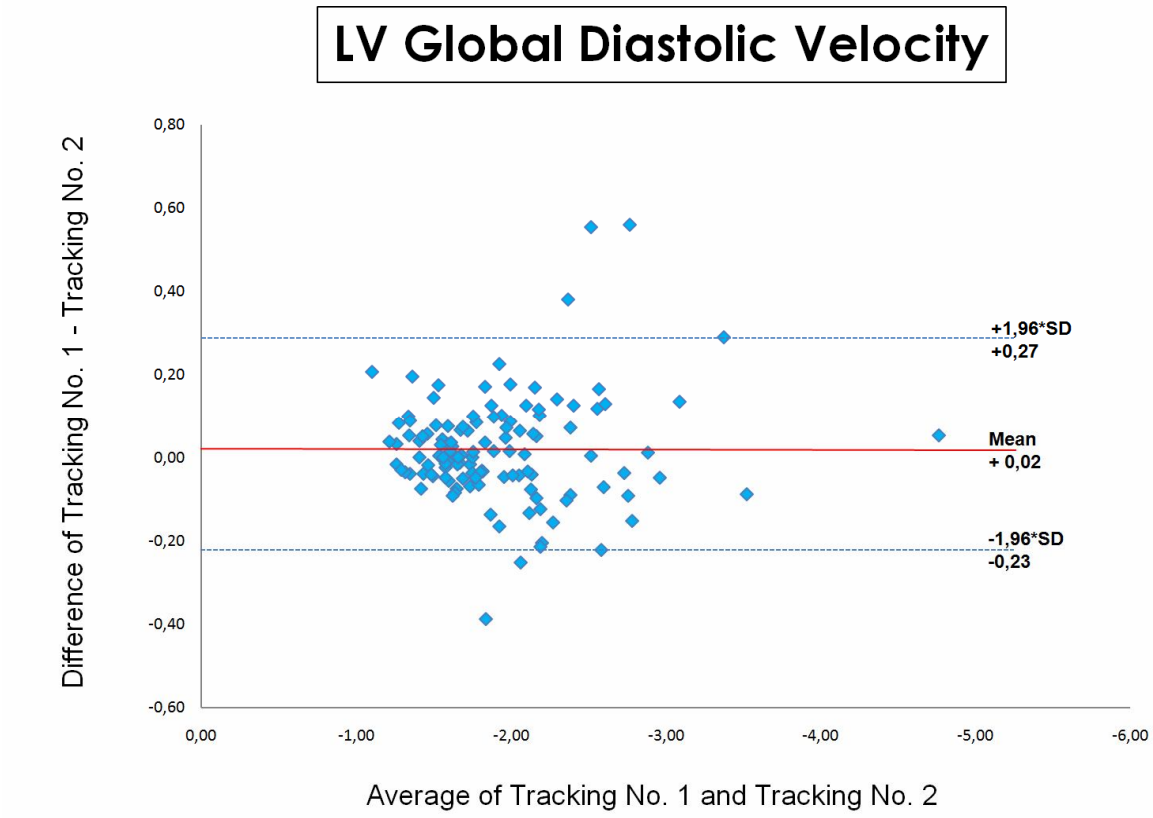
Fig. 36. This 4Ch-view presents two consecutive tracings of the left ventricle.

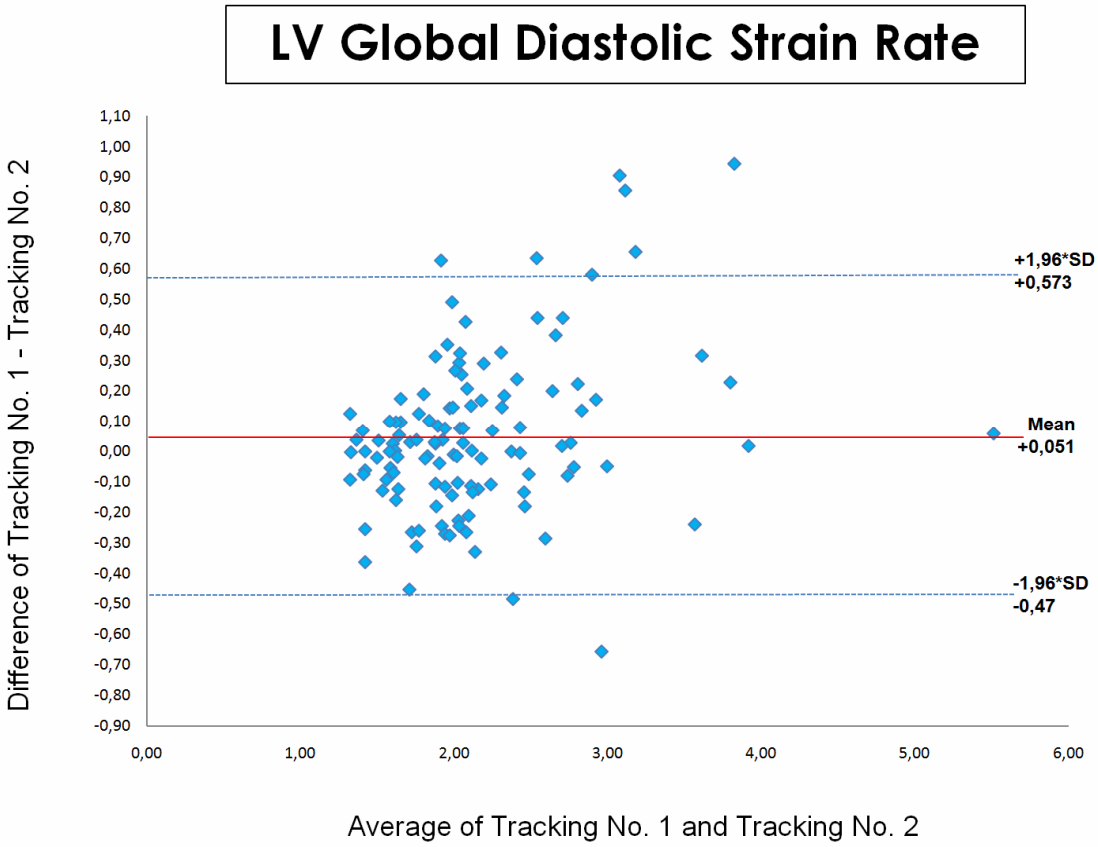



LV Global Strain
Difference of Tracking No. 1 - Tracking No. 2
5,00
4,00
3,00
2,00
1,00
0,00
-1,00
-2,00
-3,00
-4,00
-5,00
-6,00
-7,00
-5,00
-10,00
-15,00
-20,00
-25,00
-30,00
-35,00
-40,00
+1,96*SD
+2,10
Mean
-0,21
-1,96*SD
-2,52
Average of Tracking No. 1 and Tracking No. 2


LV Global Systolic Strain Rate
Difference of Tracking No. 1 - Tracking No. 2
1,50
1,00
0,50
0,00
-0,50
-1,00
-1,50
-2,00
0,00
-1,00
-2,00
-3,00
-4,00
-5,00
-6,00
+1,96*SD
+0,47
Mean
-0,04
-1,96*SD
-0,55
Average of Tracking No. 1 and Tracking No. 2

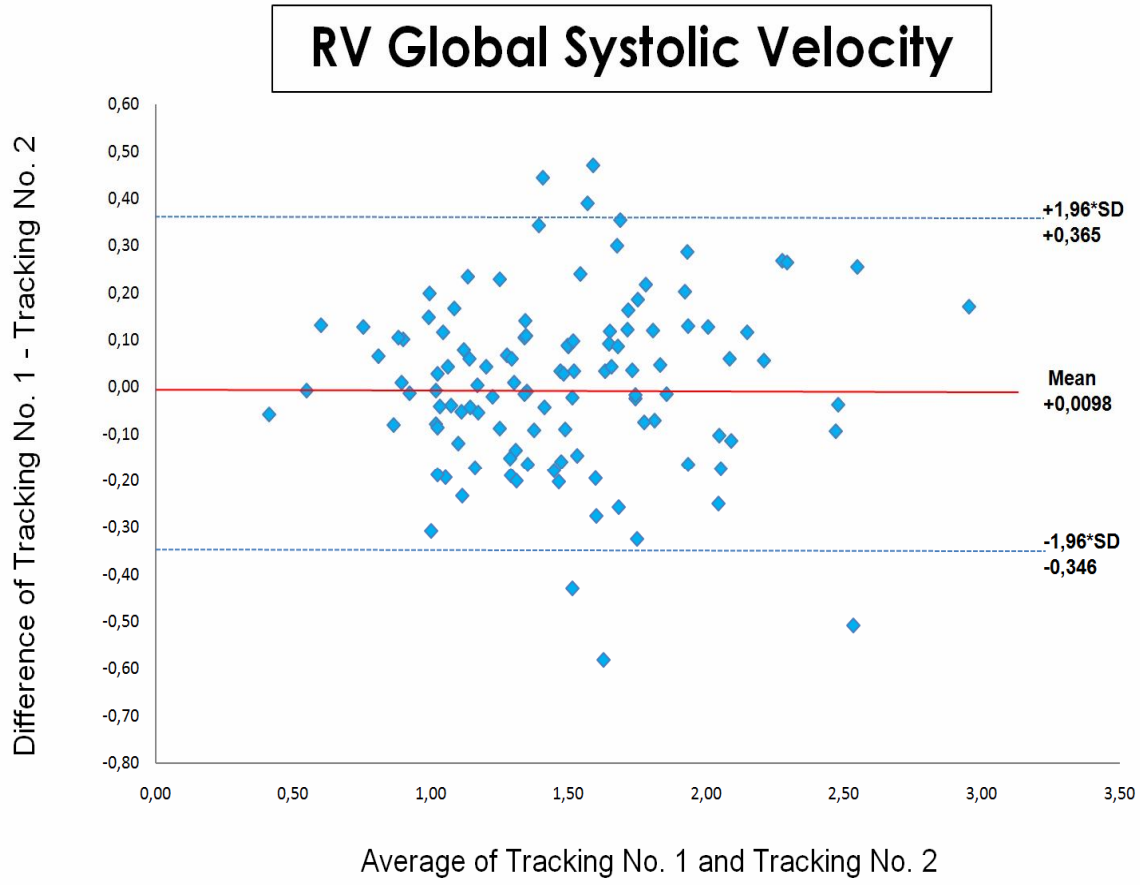

LV Displacement
Difference of Tracking No. 1 - Tracking No. 2
0,60
0,50
0,40
0,30
0,20
0,10
0,00
-0,10
-0,20
-0,30
-0,40
-0,50
0,00
0,50
1,00
1,50
2,00
2,50
3,00
+1,96*SD
+0,323
Mean
+0,015
-1,96*SD
-0,293
Average of Tracking No. 1 and Tracking No. 2

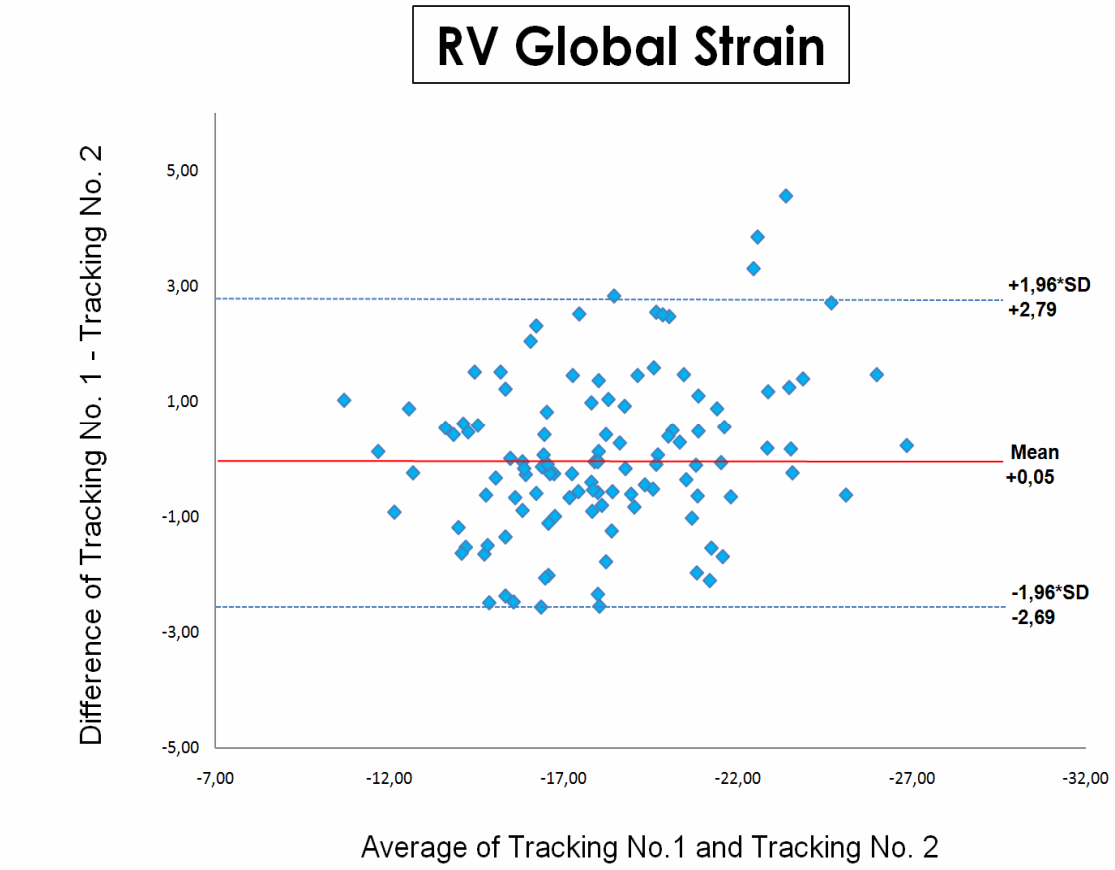

LV Global Diastolic Velocity
Difference of Tracking No. 1 - Tracking No. 2
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
0,00
-1,00
-2,00
-3,00
-4,00
-5,00
-6,00
+1,96*SD
+0,27
Mean
+ 0,02
-1,96*SD
-0,23
Average of Tracking No. 1 and Tracking No. 2

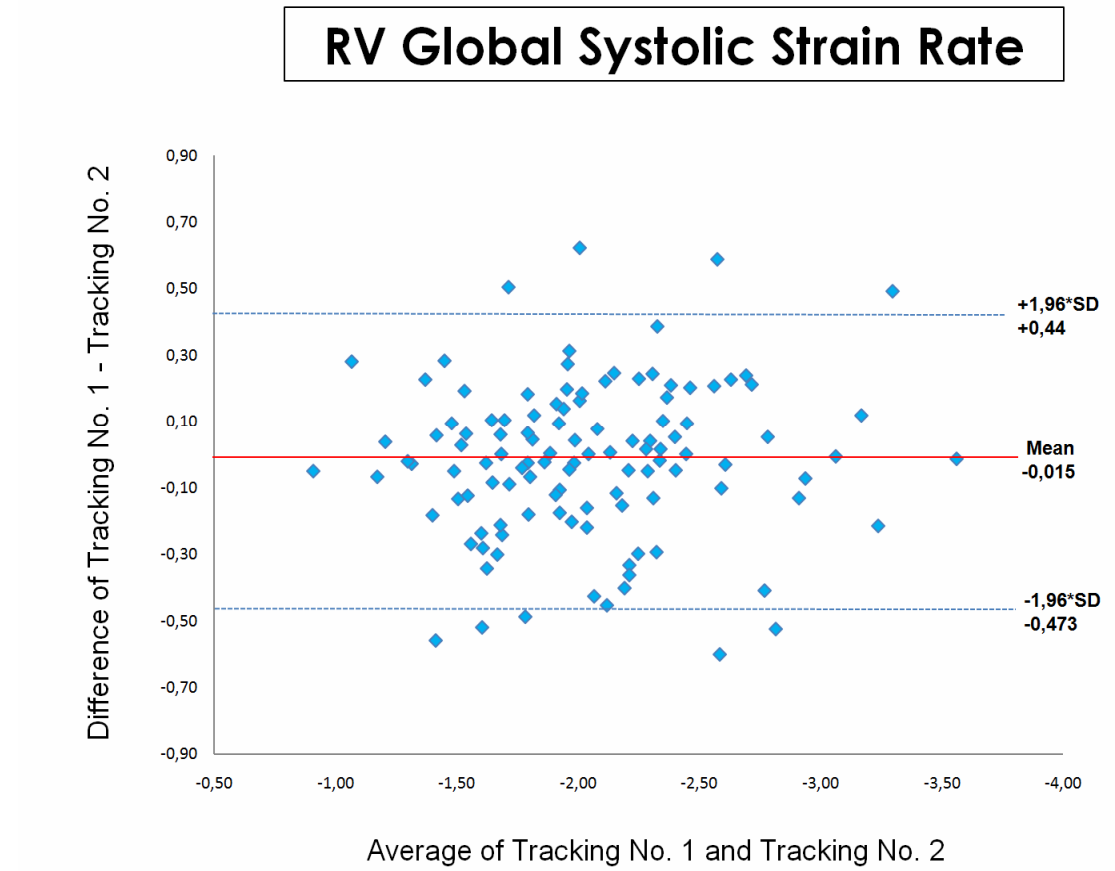

LV Global Diastolic Strain Rate
Difference of Tracking No. 1 - Tracking No. 2
1,10
1,00
0,90
0,80
0,70
0,60
0,50
0,40
0,30
0,20
0,10
0,00
-0,10
-0,20
-0,30
-0,40
-0,50
-0,60
-0,70
-0,80
-0,90
0,00
1,00
2,00
3,00
4,00
5,00
6,00
+1,96*SD
+0,573
Mean
+0,051
-1,96*SD
-0,47
Average of Tracking No. 1 and Tracking No. 2

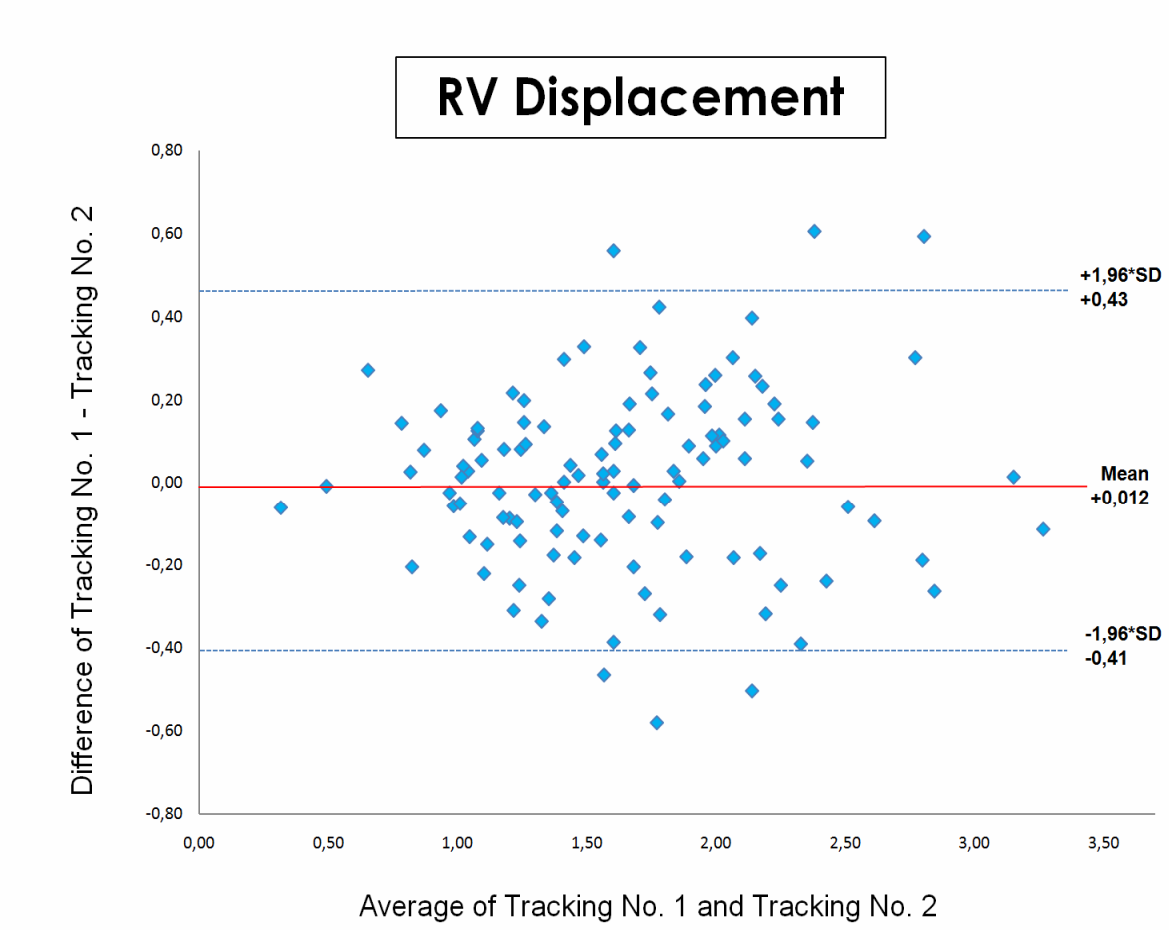
3.3.2. Repeatability of Right Ventricular Parameters

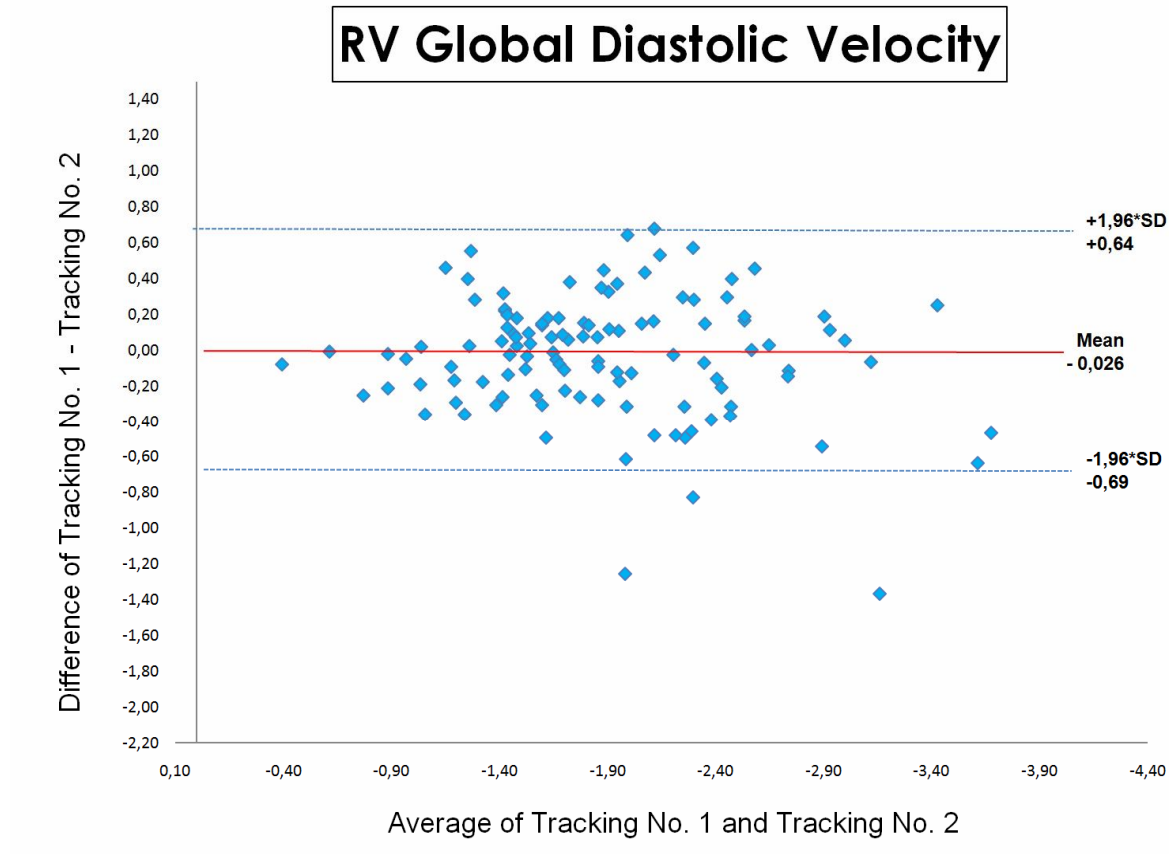
Fig. 37. This 4Ch-view presents two consecutive tracings of the right ventricle.

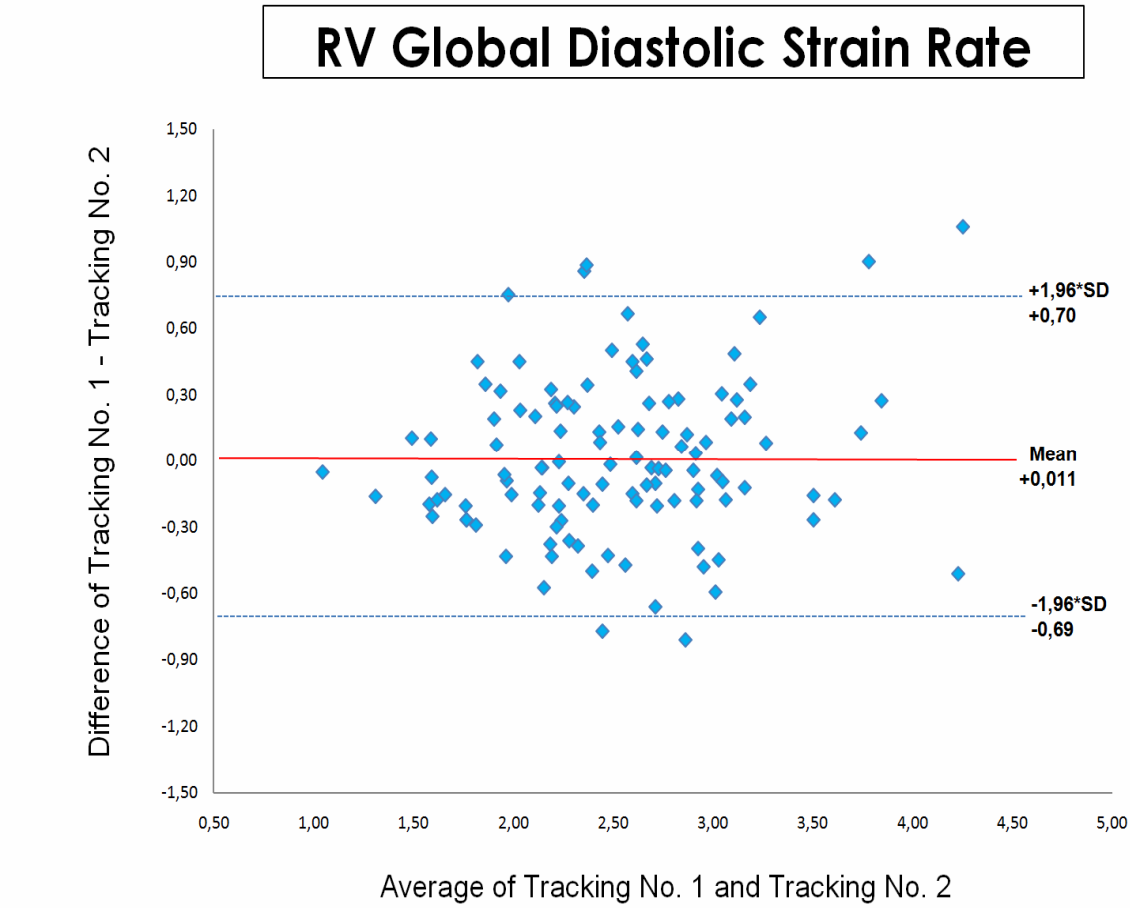



RV Global Strain
Difference of Tracking No. 1 - Tracking No. 2
5,00
3,00
1,00
-1,00
-3,00
-5,00
-7,00
-12,00
-17,00
-22,00
-27,00
-32,00
+1,96*SD
+2,79
Mean
+0,05
-1,96*SD
-2,69
Average of Tracking No.1 and Tracking No. 2


RV Global Systolic Strain Rate
Difference of Tracking No. 1 - Tracking No. 2
0,90
0,70
0,50
0,30
0,10
-0,10
-0,30
-0,50
-0,70
-0,90
-0,50
-1,00
-1,50
-2,00
-2,50
-3,00
-3,50
-4,00
+1,96*SD
+0,44
Mean
-0,015
-1,96*SD
-0,473
Average of Tracking No. 1 and Tracking No. 2


RV Displacement
Difference of Tracking No. 1 - Tracking No. 2
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
-0,80
+1,96*SD
+0,43
Mean
+0,012
-1,96*SD
-0,41
0,00
0,50
1,00
1,50
2,00
2,50
3,00
3,50
Average of Tracking No. 1 and Tracking No. 2

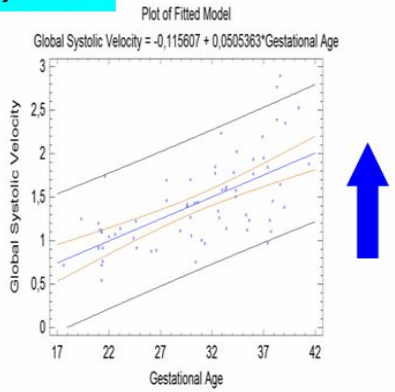

RV Global Diastolic Velocity
Difference of Tracking No. 1 - Tracking No. 2
1,40
1,20
1,00
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
-0,80
-1,00
-1,20
-1,40
-1,60
-1,80
-2,00
-2,20
+1,96*SD
+0,64
Mean
- 0,026
-1,96*SD
-0,69
0,10
-0,40
-0,90
-1,40
-1,90
-2,40
-2,90
-3,40
-3,90
-4,40
Average of Tracking No. 1 and Tracking No. 2



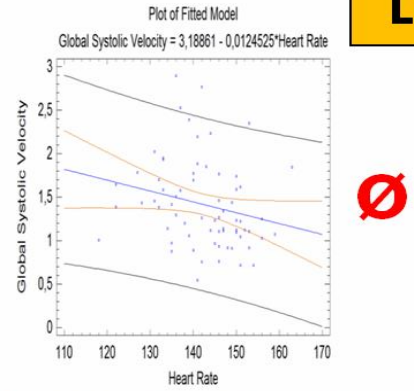
3.4. Overview of the Results

Figures 38-41 summarize our findings.

Systole

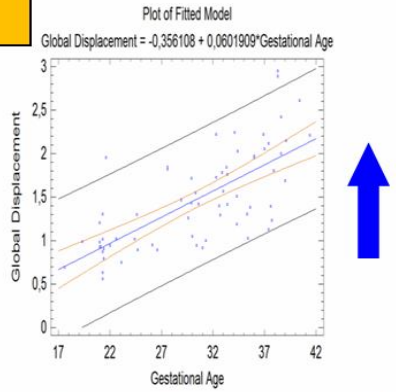


There is a statistically significant relationship between Global Systolic Velocity and Gestational Age at the 95,0% confidence level. P<0,00005. The R-Squared statistic indicates that the model as fitted explains 42,9745% of the variability in Global Systolic Velocity. The correlation coefficient equals 0,65555, indicating a moderately strong relationship between the variables.

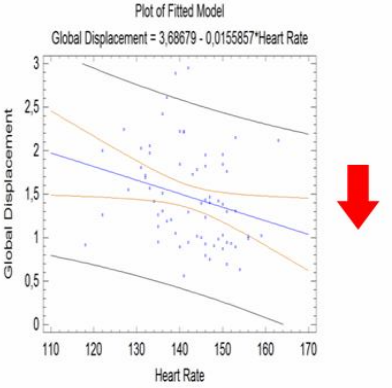


There is **not** a statistically significant relationship between Global Systolic Velocity and Heart Rate at the 95,0% or higher confidence level. p=0,0641. The R-Squared statistic indicates that the model as fitted explains 5,09715% of the variability in Global Systolic Velocity. The correlation coefficient equals -0,225769, indicating a relatively weak relationship between the variables.

LV

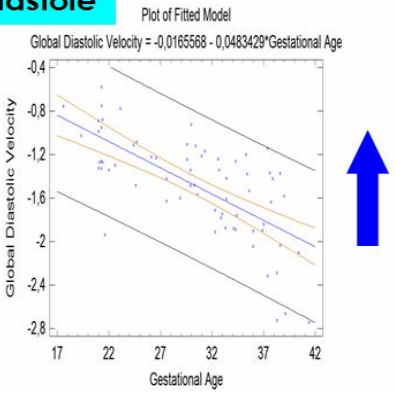


There is a statistically significant relationship between Global Displacement and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 50,5847% of the variability in Global Displacement. The correlation coefficient equals 0,711229, indicating a moderately strong relationship between the variables.

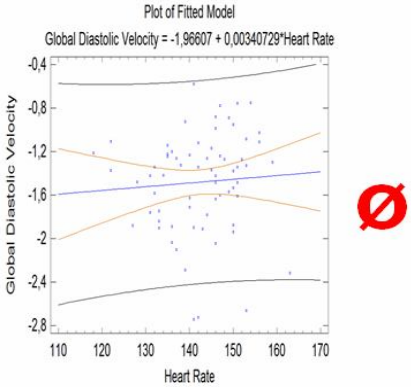


There is a statistically significant relationship between Global Displacement and Heart Rate at the 95,0% confidence level. p=0,0341. The R-Squared statistic indicates that the model as fitted explains 6,62559% of the variability in Global Displacement. The correlation coefficient equals -0,257402, indicating a relatively weak relationship between the variables.

Diastole



There is a statistically significant relationship between Global Diastolic Velocity and Gestational Age at the 95,0% confidence level. p<0,00005.The R-Squared statistic indicates that the model as fitted explains 46,8142% of the variability in Global Diastolic Velocity. The correlation coefficient equals -0,684209, indicating a moderately strong relationship between the variables.



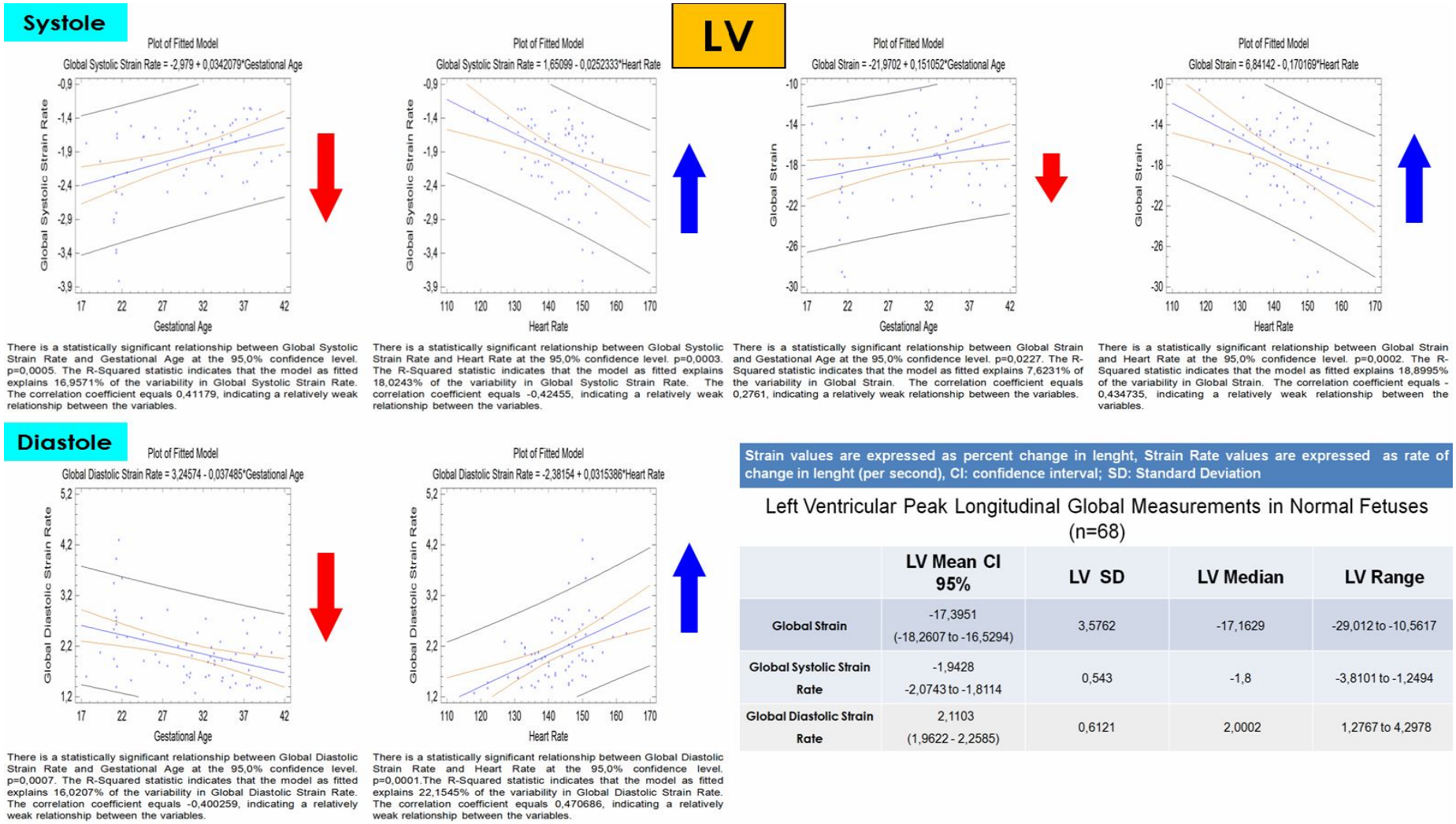
There is **not** a statistically significant relationship between Global Diastolic Velocity and Heart Rate at the 95,0% or higher confidence level. p=0,585. The R-Squared statistic indicates that the model as fitted explains 0,454298% of the variability in Global Diastolic Velocity. The correlation coefficient equals 0,0674016, indicating a relatively weak relationship between the variables.

Velocity values are expressed as cm/sec, Displacement is expressed in mm, CI: confidence interval; SD: Standard Deviation

Left Ventricular Peak Longitudinal Global Measurements in Normal Fetuses (n=68)

	LV Mean CI 95%	LV SD	LV Median	LV Range
Global Systolic Velocity	1,415 (1,293 - 1,537)	0,5039	1,2821	0,5438 to 2,8938
Global Displacement	1,4669 (1,333 - 1,6008)	0,5532	1,3891	0,5631 to 2,9484
Global Diastolic Velocity	-1,4807 (-1,5925 to -1,3689)	0,4618	-1,3757	-2,7416 to -0,5767

Fig. 38. Overview of left ventricular motion parameters. There is statistically significant increases in all parameters as pregnancy advances. With increasing heart rate there are no significant changes in both systolic and diastolic velocities but displacement shows significant decrease with heart rate.



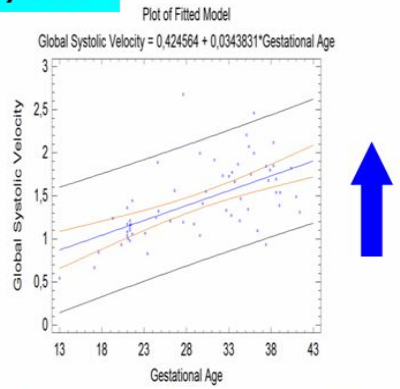
Strain values are expressed as percent change in lenght, Strain Rate values are expressed as rate of change in lenght (per second), CI: confidence interval; SD: Standard Deviation

Left Ventricular Peak Longitudinal Global Measurements in Normal Fetuses (n=68)

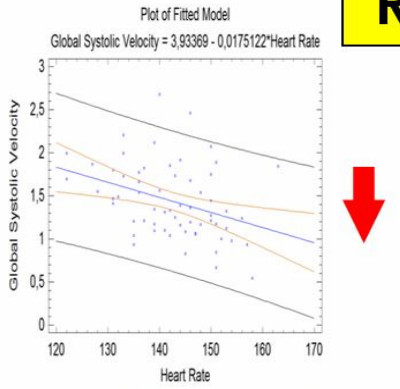
	LV Mean CI 95%	LV SD	LV Median	LV Range
Global Strain	-17,3951 (-18,2607 to -16,5294)	3,5762	-17,1629	-29,012 to -10,5617
Global Systolic Strain Rate	-1,9428 -2,0743 to -1,8114	0,543	-1,8	-3,8101 to -1,2494
Global Diastolic Strain Rate	2,1103 (1,9622 - 2,2585)	0,6121	2,0002	1,2767 to 4,2978

Fig. 39. Overview of left ventricular deformation parameters. There are statistically significant decreases in all parameters as pregnancy advances. With increasing heart rate there are significant increases in all deformation parameters.

Systole

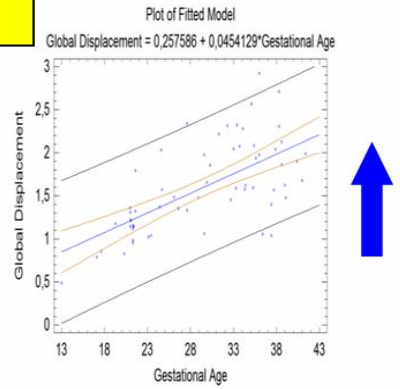


There is a statistically significant relationship between Global Systolic Velocity and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 35,6484% of the variability in Global Systolic Velocity. The correlation coefficient equals 0,597063, indicating a moderately strong relationship between the variables.

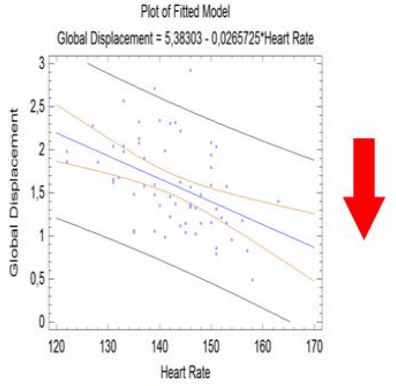


There is a statistically significant relationship between Global Systolic Velocity and Heart Rate at the 95,0% confidence level. p=0,0042. The R-Squared statistic indicates that the model as fitted explains 12,8641% of the variability in Global Systolic Velocity. The correlation coefficient equals -0,358666, indicating a relatively weak relationship between the variables.

RV

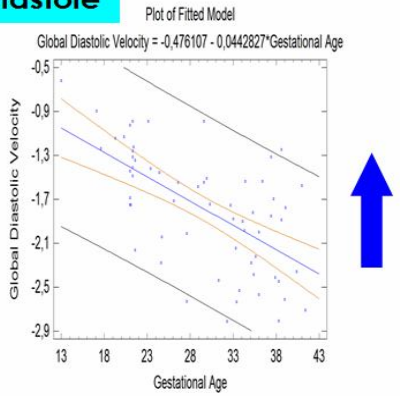


There is a statistically significant relationship between Global Displacement and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 42,755% of the variability in Global Displacement. The correlation coefficient equals 0,653873, indicating a moderately strong relationship between the variables.

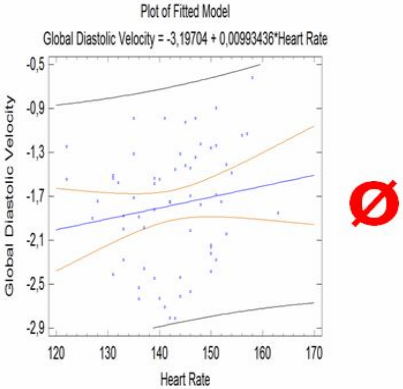


There is a statistically significant relationship between Global Displacement and Heart Rate at the 95,0% confidence level. p<0,0002. The R-Squared statistic indicates that the model as fitted explains 20,363% of the variability in Global Displacement. The correlation coefficient equals -0,451254, indicating a relatively weak relationship between the variables.

Diastole



There is a statistically significant relationship between Global Diastolic Velocity and Gestational Age at the 95,0% confidence level. p<0,00005. The R-Squared statistic indicates that the model as fitted explains 37,7197% of the variability in Global Diastolic Velocity. The correlation coefficient equals -0,614163, indicating a moderately strong relationship between the variables.



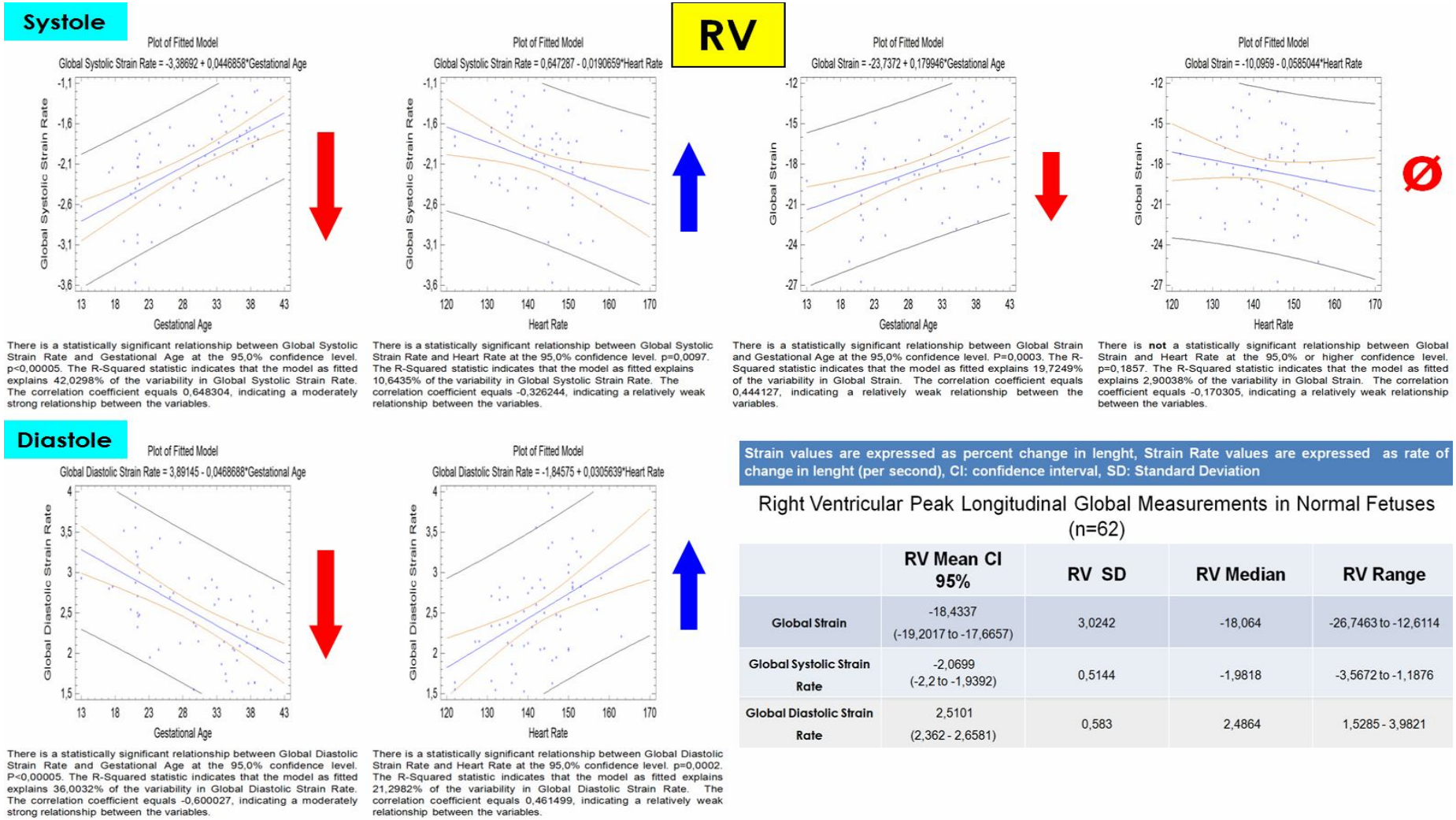
There is **not** a statistically significant relationship between Global Diastolic Velocity and Heart Rate at the 95,0% or higher confidence level. p=0,207. The R-Squared statistic indicates that the model as fitted explains 2,64076% of the variability in Global Diastolic Velocity. The correlation coefficient equals 0,162504, indicating a relatively weak relationship between the variables.

Velocity values are expressed as cm/sec, Displacement is expressed in mm, CI: confidence interval, SD: Standard Deviation

Right Ventricular Peak Longitudinal Global Measurements in Normal Fetuses (n=62)

	RV Mean CI 95%	RV SD	RV Median	RV Range
Global Systolic Velocity	1,4379 (1,3287-1,547)	0,4298	1,3524	0,544 - 2,6765
Global Displacement	1,596 (1,4643 - 1,7276)	0,5183	1,569	0,4874 - 2,9213
Global Diastolic Velocity	-1,7812 (-1,9179 to -1,6445)	0,5381	-1,7459	-2,8107 to -0,6183

Fig. 40. Overview of right ventricular motion parameters. There are statistically significant increases in all parameters as pregnancy advances. With increasing heart rate there are significant decreases in systolic velocity and displacement but there is no significant relationship between diastolic velocity and heart rate.



Strain values are expressed as percent change in lenght, Strain Rate values are expressed as rate of change in lenght (per second), CI: confidence interval, SD: Standard Deviation

Right Ventricular Peak Longitudinal Global Measurements in Normal Fetuses (n=62)

	RV Mean CI 95%	RV SD	RV Median	RV Range
Global Strain	-18,4337 (-19,2017 to -17,6657)	3,0242	-18,064	-26,7463 to -12,6114
Global Systolic Strain Rate	-2,0699 (-2,2 to -1,9392)	0,5144	-1,9818	-3,5672 to -1,1876
Global Diastolic Strain Rate	2,5101 (2,362 - 2,6581)	0,583	2,4864	1,5285 - 3,9821

Fig. 41. Overview of right ventricular deformation parameters. There are statistically significant decreases in all parameters as pregnancy advances. With increasing heart rate there are significant increases in systolic and diastolic Strain Rate but there is no significant relationship between Strain and heart rate.

In the following section we will discuss our results and take other studies into account which utilized speckle or feature tracking algorithm in fetal echocardiography. Furthermore we will put our study and its pitfalls in perspective and give some future prospects.