



Correlation of Noninvasive Assessment of Lung Fluid Percentage with Invasively Measured Hemodynamics

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Background

- Remote dielectric sensing (ReDS) is a method for measuring lung content – expressed as a percent of lung volume.
- Currently being studied as a means of monitoring fluid status in heart failure patients.
- The correlation of ReDS readings with invasive hemodynamics (central venous pressure (CVP) and pulmonary capillary wedge pressure (PCWP) is unknown.

Aims

This study aims to investigate the utility of ReDS readings to predict volume status as defined by invasive hemodynamics.

Methods

- We prospectively enrolled consecutive heart failure patients undergoing clinically indicated right heart catheterization.
- Baseline demographic characteristics, laboratory data and hemodynamics were collected.
- Concomitant ReDS readings were obtained immediately prior to catheterization.
- Correlation of ReDS readings with CVP and PCWP were assessed with Pearson coefficients.
- The sensitivity and specificity of determining elevated filling pressures indicative of fluid overload was assessed using receiver operator curve analysis.

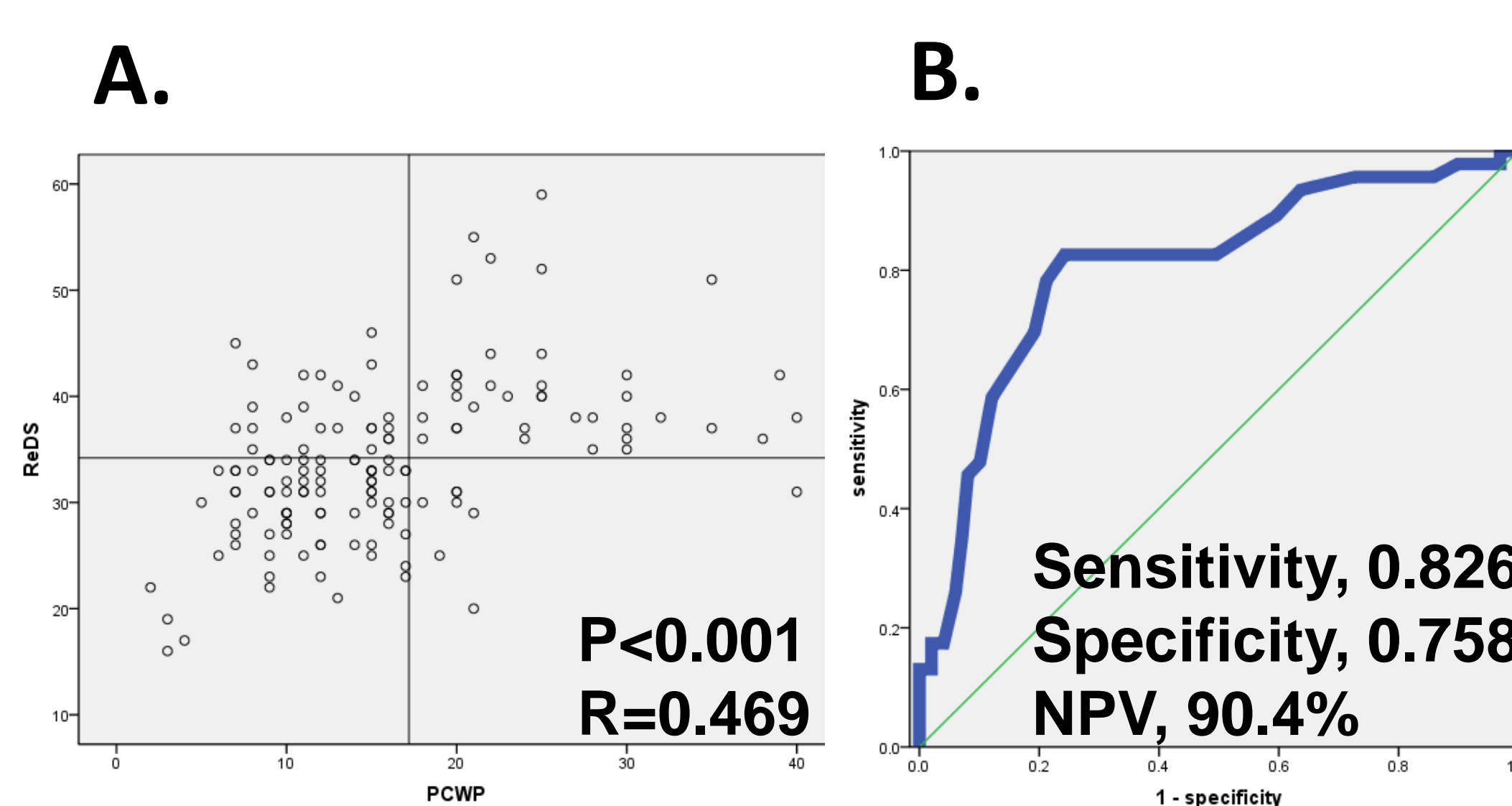
Disclosures

NU is consultant for St Jude and Medtronic. RA is employed by Sensible-Medical.

Table 1. Baseline characteristics

	N=145
Age (yrs), Mean ± SD	55.2±13.3
Male Gender, N (%)	101 (70%)
BMI, Mean ± SD	29.2±5.6
Race, N (%)	
Caucasian,	82 (56)
African american	52 (36)
Hispanic	7 (5)
Others	4 (3)
Ischemic, N (%)	47 (23%)
Afib, N (%)	41 (21%)
COPD, N (%)	8 (4%)
OSA, N (%)	34 (16%)

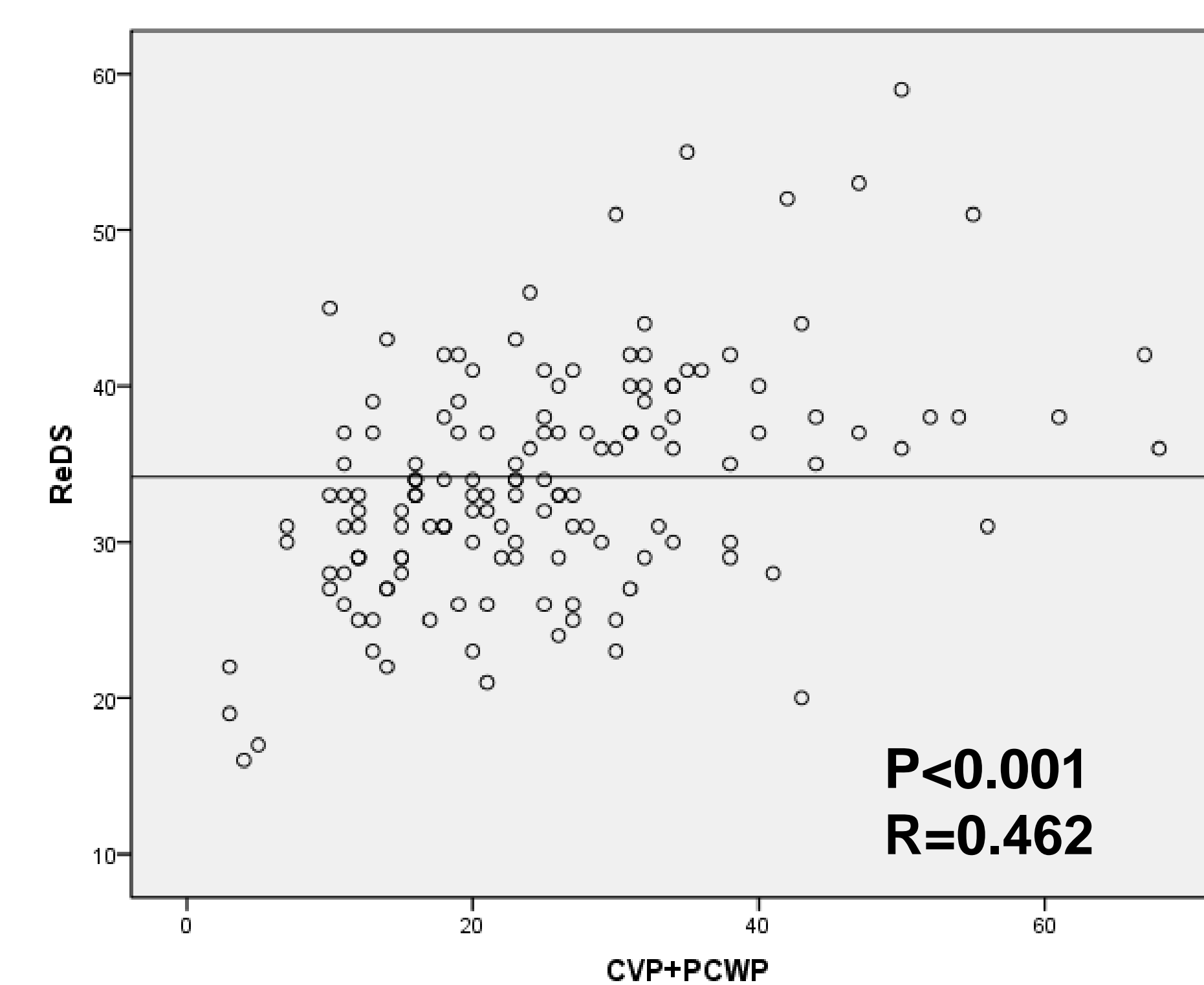
Figure 1.



A) Pearson's correlation of ReDS values with PCWP. **B)** ROC analysis revealed that a ReDS value ≥ 35 predicts a PCWP of >17 with an AUC of 0.805 and with a sensitivity of 0.826 and specificity of 0.758.

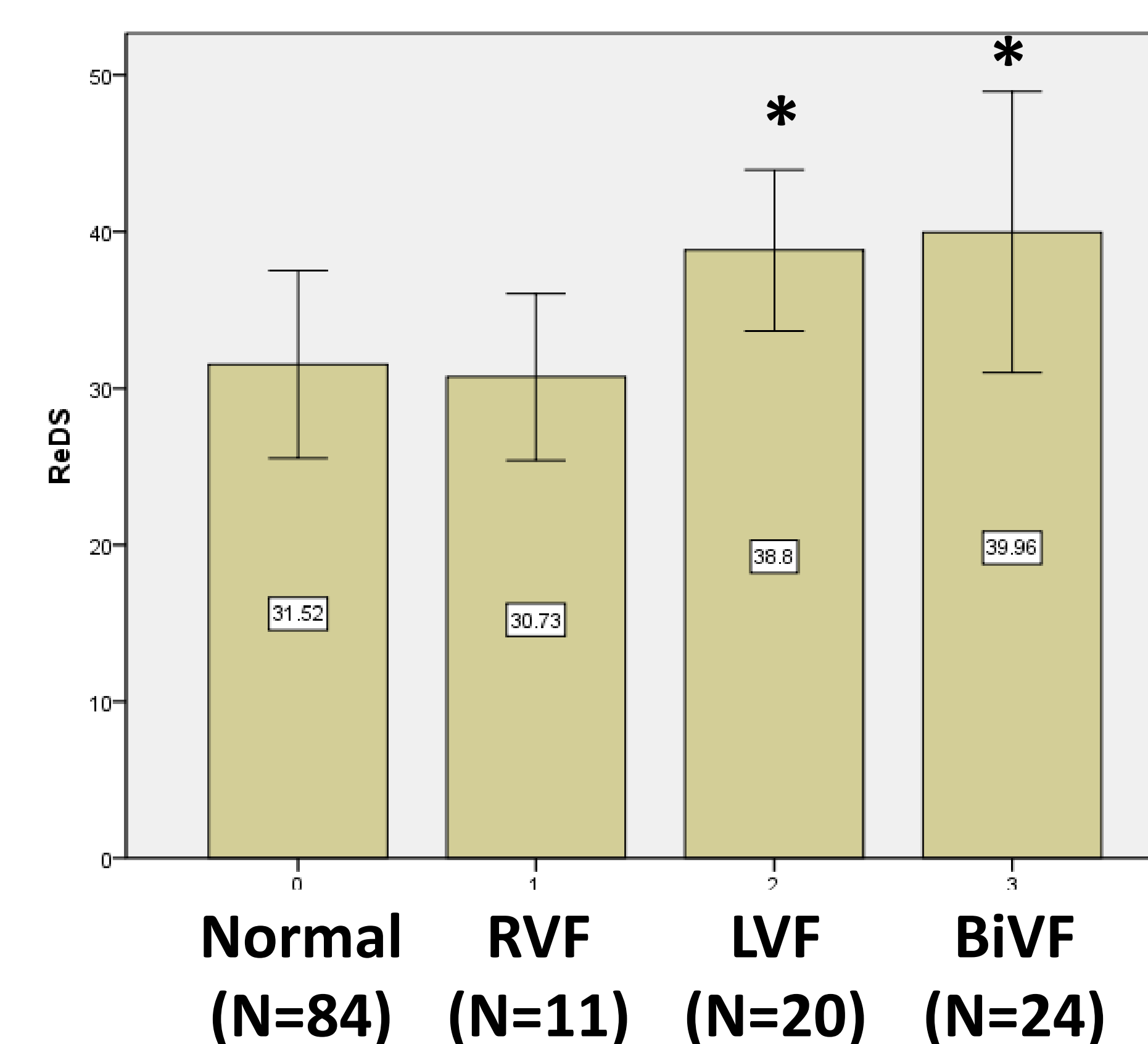
Results

Figure 2.



Pearson's correlation of ReDS values with combined CVP+PCWP.

Figure 3.

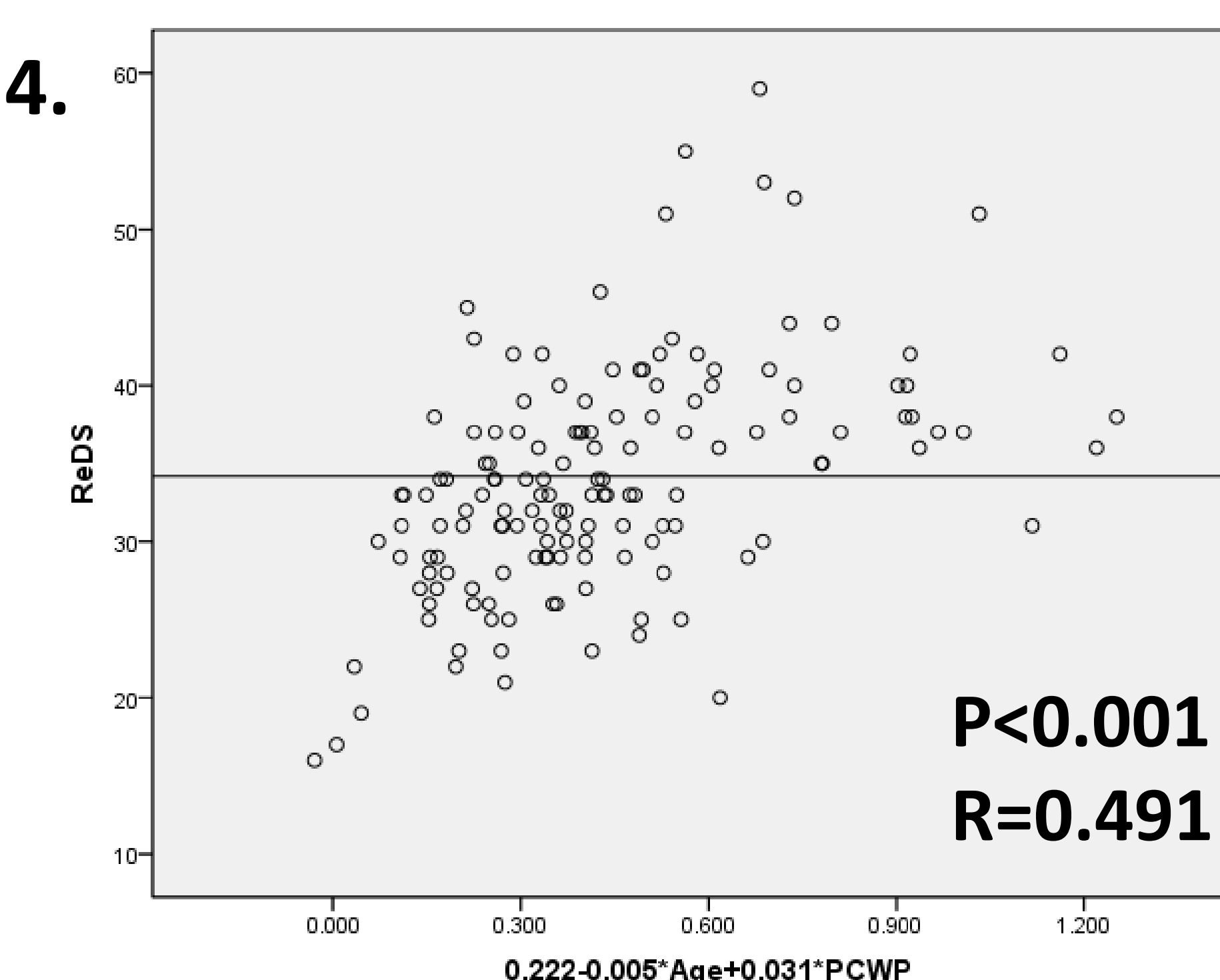


Progressive increases in ReDS values with PCWP > 17 mmHg, and combined increase in CVP and PCWP. * indicates $p < 0.05$.

Table 2. Univariate and Multivariate Analysis

	Univariate		Multivariate			
	B	P	B	P	B	P
CVP	0.029	<0.001	-0.005	0.564		
PAM	0.022	<0.001	0.009	0.171		
PCWP	0.032	<0.001	0.021	0.026	0.031	<0.001
CI	-0.237	<0.001	-0.081	0.180		
Age	-0.007	0.027	-0.006	0.044	-0.005	0.048
BMI	-0.004	0.645				

Figure 4.



ReDS value compared to a multivariate model using Age and PCWP shows an improved correlation compared to PCWP alone.

Conclusions

- Lung fluid content measured by ReDS correlated with invasively measured PCWP.
- The negative predictive value of a ReDS value of <35 and PCWP >17 was NPV, 90.4%.
- Given the high NPV, ReDS assessment may provide a noninvasive means to rule out elevated PCWP in heart failure patients.