



The Predictive Value of NT-proBNP in Early Pregnancy For Cardiovascular Complications in Pregnant Women with Congenital Heart Disease

Anne S. Siegmund, Marlies A.M. Kampman, MD, PhD, Barbara J.M. Mulder, MD, PhD, Martijn A. Oudijk, MD, PhD, Arie van Dijk, MD, PhD, Krystyna M. Sollic-Szarynska, MD, PhD, Gertjan Tj. Sieswerda, MD, PhD, Steven V. Koenen, MD, PhD, Caterina M. Bilardo, MD, PhD, Dirk J. van Veldhuisen, MD, PhD, Petronella G. Pieper, MD, PhD.

ZAHARA I: Drenthen et al – JACC 2007

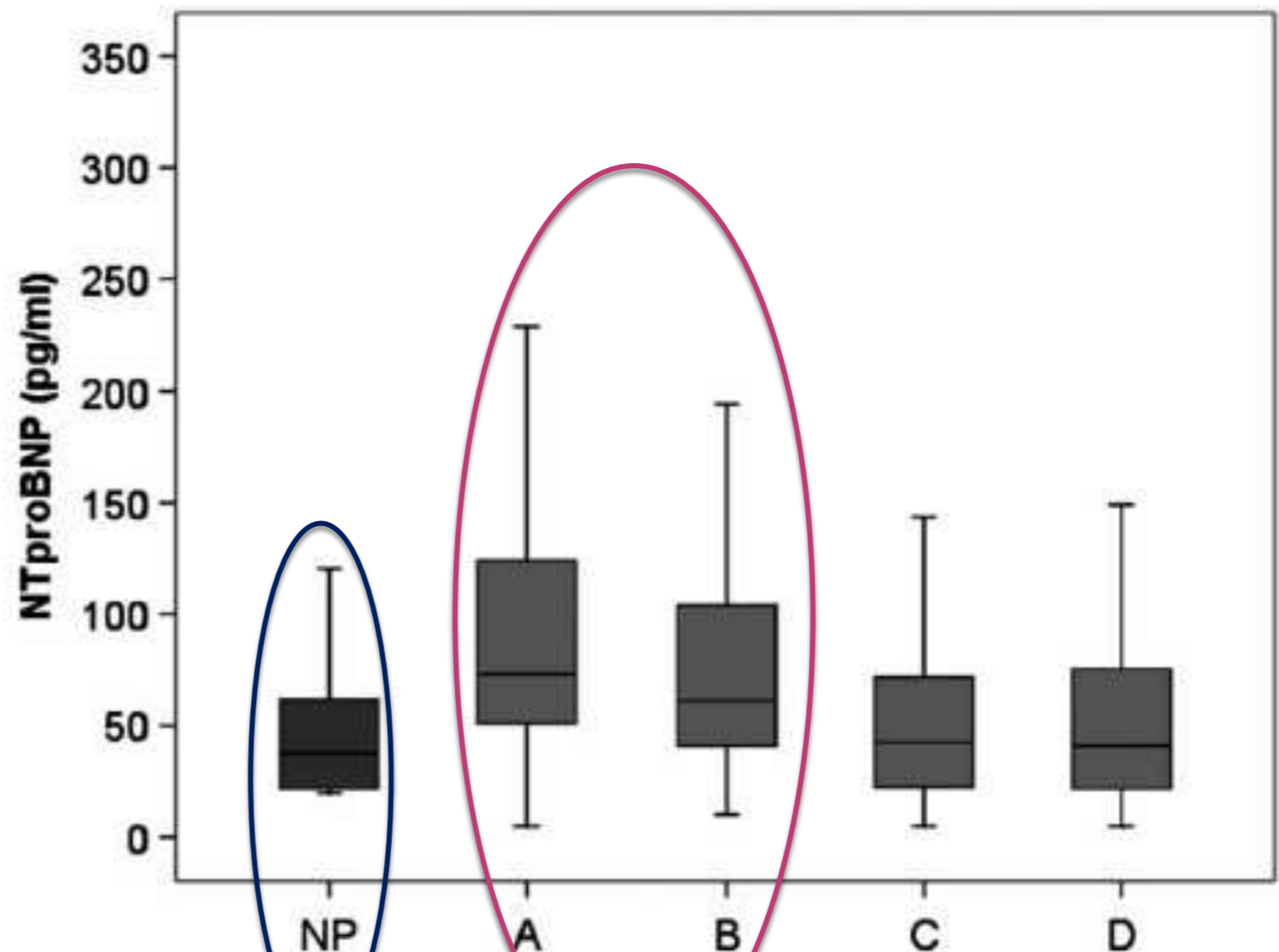
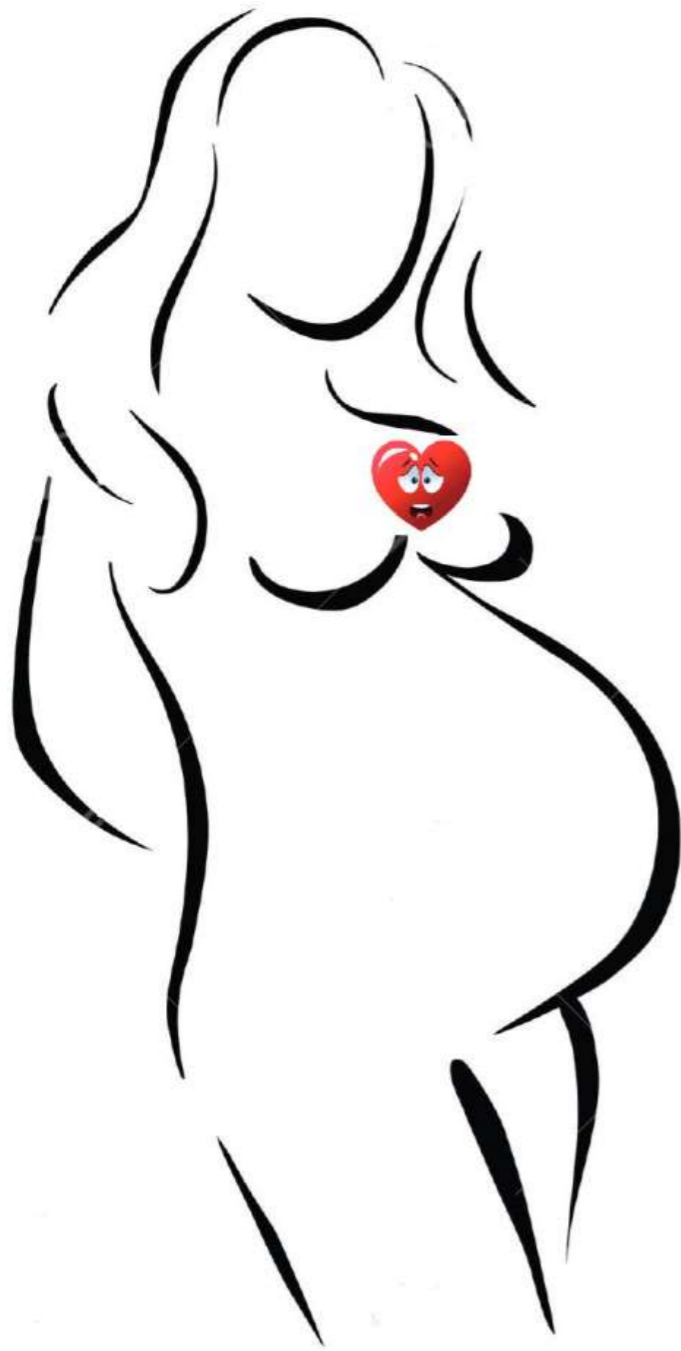
ZAHARA II: Pieper et al – Circulation 2013

Now ZAHARA III

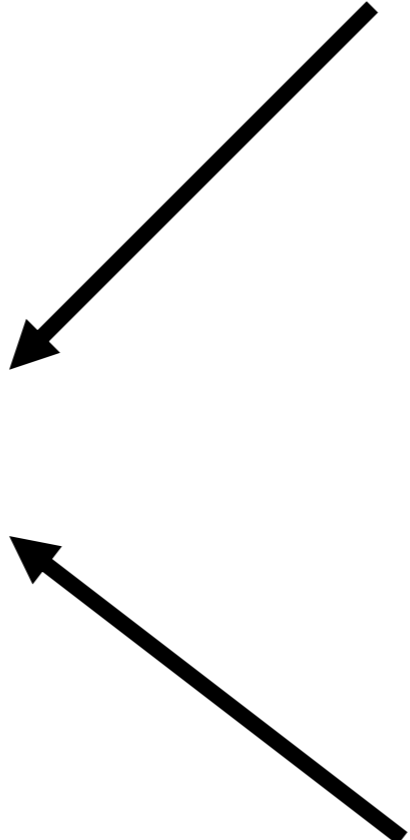
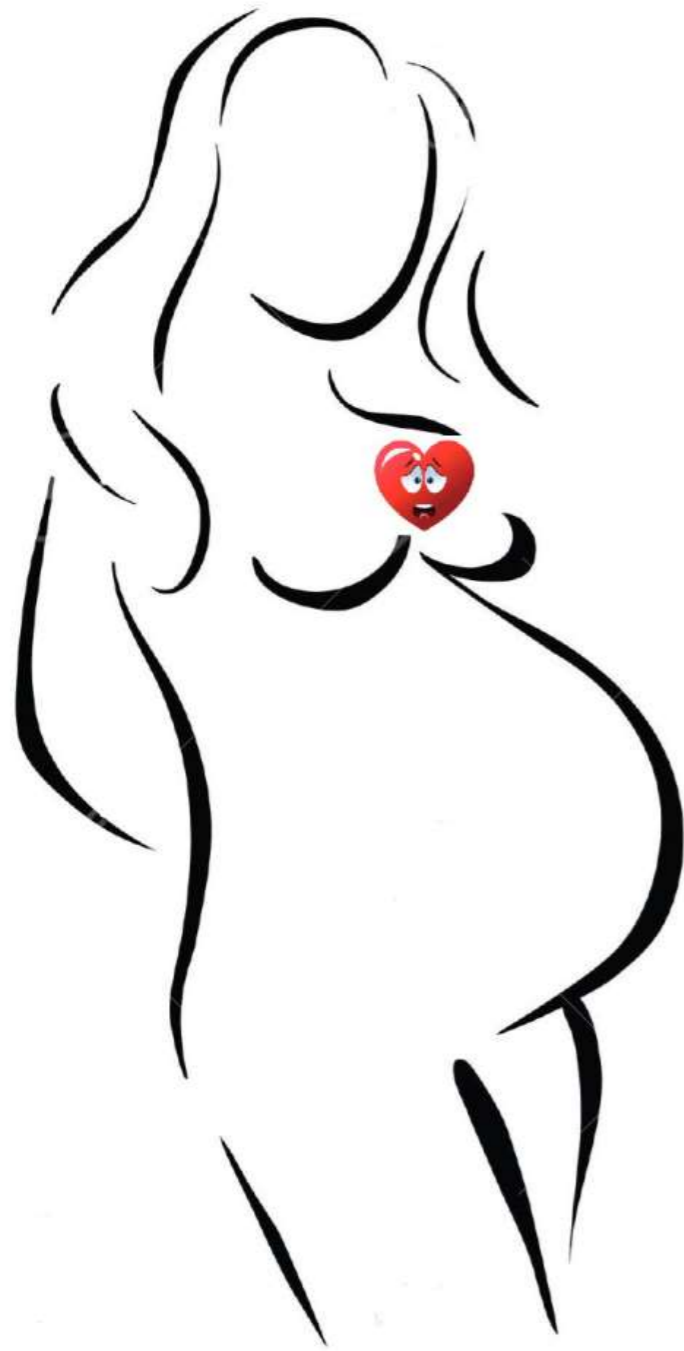


Healthy pregnant women

- Increased cardiac output
- Increased intravascular volume
- Increased NT-proBNP until mid-pregnancy



Franz et al. Acta Obstetrica et Gynecologica. 2009



Abnormal ventricular
wall stress



NT-proBNP



Abnormal loading





- Previous ZAHARA II study: increased NT-proBNP at 20 weeks is independent risk predictor of CV complications later in pregnancy
- Identification of predictors in early pregnancy remains highly needed
- **AIM:** To investigate the predictive role of NT-proBNP levels in early pregnancy to predict CV complications later in pregnancy in women with CHD





- ZAHARA III ; prospective national multicenter cohort study
- Pregnant women with CHD < 14 weeks pregnancy
- Evaluation pregnancy at 12, 20 and 32 weeks
 - Clinical evaluation
 - Echocardiography
 - NT-proBNP measurements
 - Retrospective prepregnancy echocardiograms



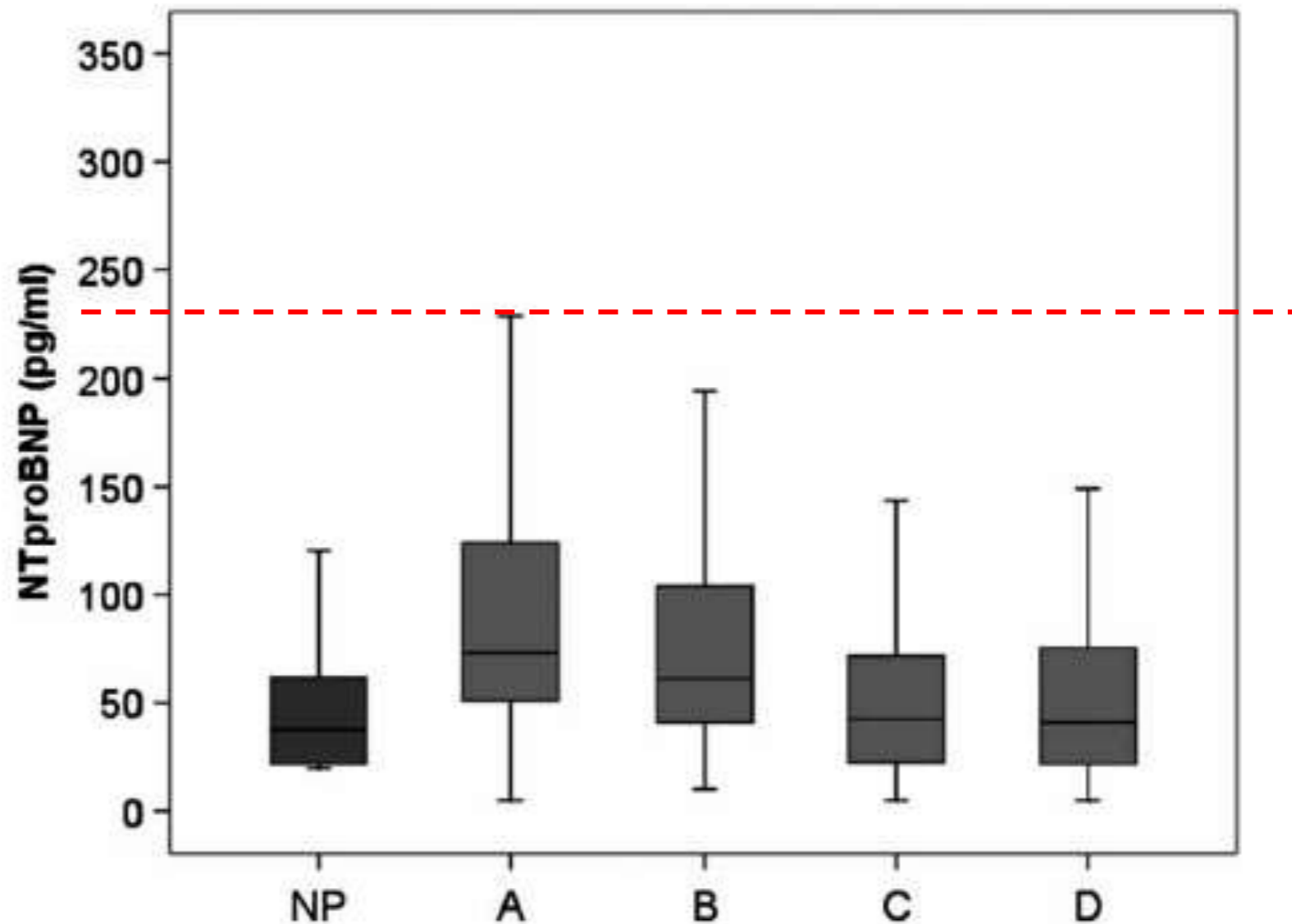


- 105 pregnant women with CHD
 - Left sided lesions 31%
 - Right sided lesions 28%
 - Shunt lesions 29%
 - Complex CHD 10%
- Early NT-proBNP measurement at 12 weeks [11-13]
- 5% (n=5) cardiovascular complications during pregnancy
 - Supraventricular tachycardia (n=2) *at 11 and 21 weeks*
 - Thromboembolic event (n=2) *at 23 and 38 weeks*
 - Heart failure (n=1) *at 1 day postpartum*





- Healthy pregnant women:
NT-proBNP levels at 12 weeks > 235 pg/mL is upper limit of normal

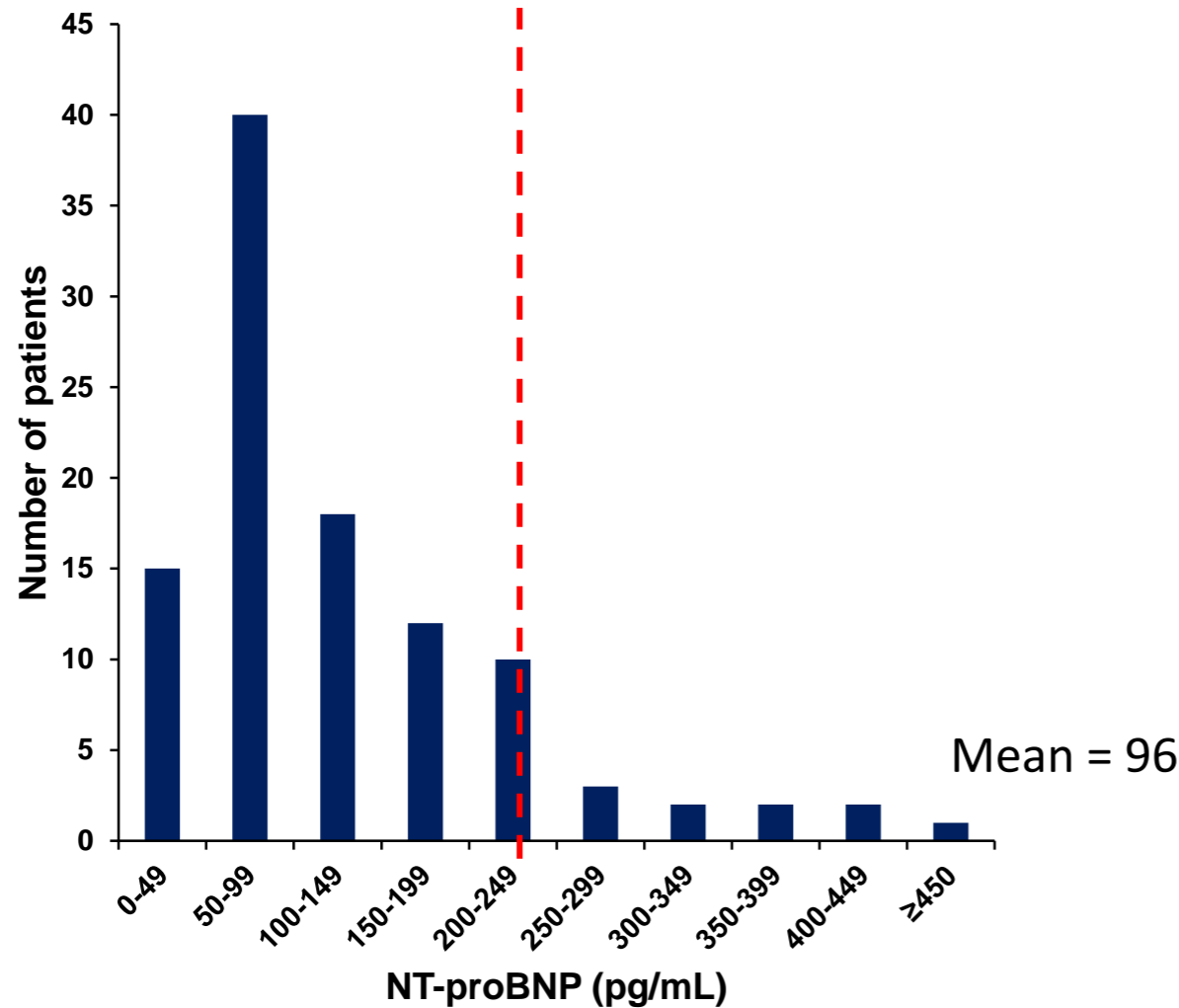


Franz et al. Acta Obstetrica et Gynecologica. 2009

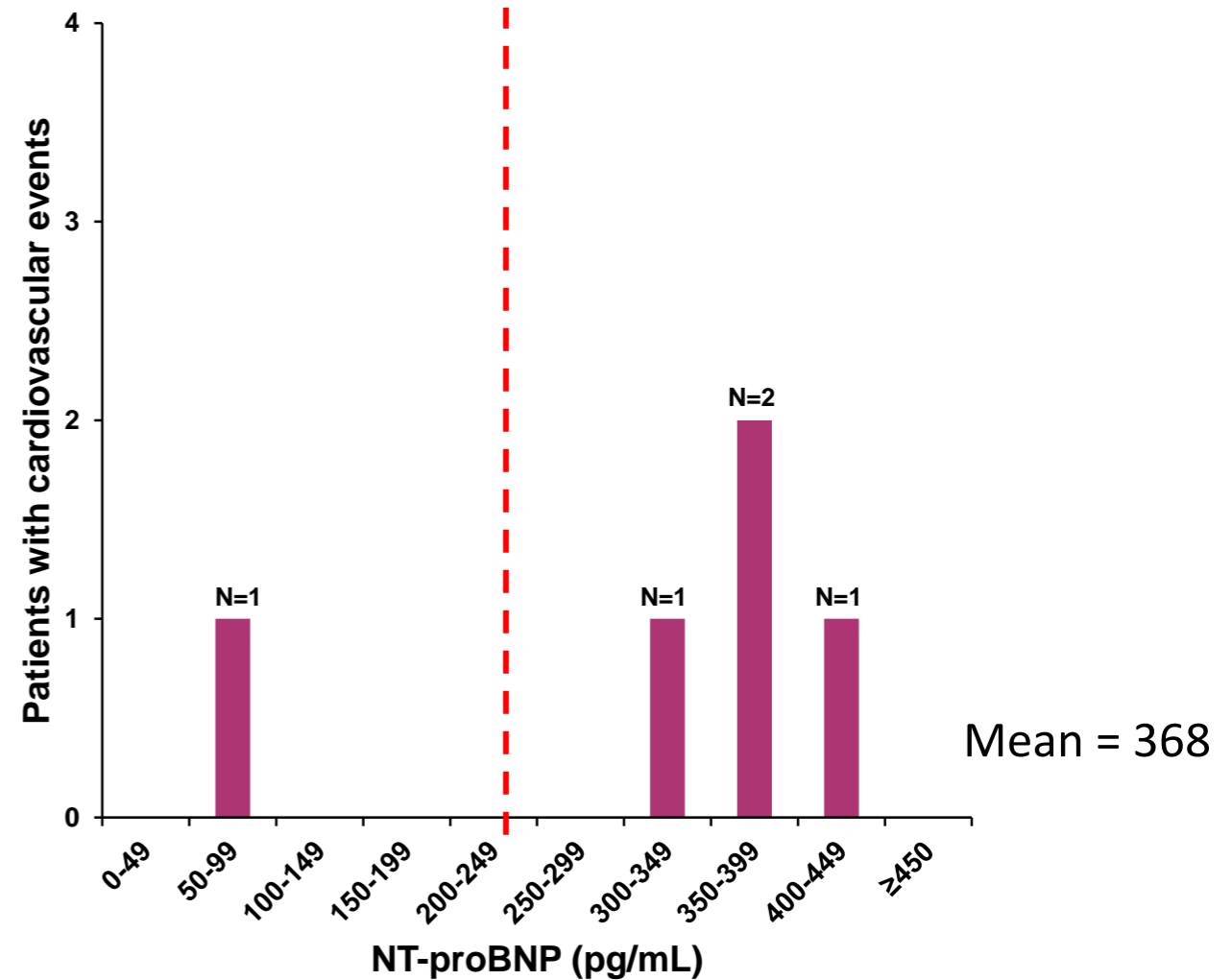




Whole study population



Patients with CV complications



- NT-proBNP significantly higher in women with complications **368.0 [50 – 447]** vs. **96.0 [29 – 511]** pg/mL, **p=0.016**





Predictive value of NT-proBNP in early pregnancy:

- 4/5 with CV complications had NT-proBNP values >235 pg/mL
- Negative predictive value: 98.9%
 - 1 patient with abdominal aortic thrombosis, NT-proBNP was 50pg/mL
- Positive predictive value: 33.3%





- Identify predictors for CV complications in pregnancy

Logistic regression

Predictors	OR (95% CI)	P-value
WHO class 3 preconception	21.1 (2.2 – 200.4)	0.008
Mechanic valve prosthesis	16.0 (2.1 – 124.3)	0.008
Elevated NT-proBNP early pregnancy	46.1 (4.6 – 462.2)	0.001



- Pre-pregnancy cardiac function and NT-proBNP levels in early pregnancy

Multivariable regression analyses^a

Variables preconception	N	Beta	95% CI	P-value
Age	58	0.039	0.001 – 0.077	0.042
LVESD/BSA	58	0.032	-0.015 – 0.079	0.182
LVEF	58	-0.009	-0.034 – 0.016	0.485
TAPSE	58	-0.048	-0.076 – -0.020	0.001

^aPatients with systemic RV excluded from analyses.



Conclusion

Increased NT-proBNP levels (>235) in early pregnancy is indicative for cardiovascular complications later in pregnancy in CHD women.

- Low NT-proBNP: less intensive follow-up during pregnancy may be considered depending on underlying heart disease.
- Elevated NT-proBNP: echocardiography with focus on RV function is advisable to identify high risk pregnancies.





The 5th International Congress on Cardiac Problems in Pregnancy (CPP 2018)

Acknowledgements
12/12

University Medical Center Groningen

P.G. Pieper (Project leader)

D.J. van Veldhuisen

C.M. Bilardo

M.A.M. Kampman

K.M. Sollie-Szarynska



umcg

Academic Medical Center

B.J.M. Mulder

M.A. Oudijk

B.M. Bouma

C. Ris-Stalpers

M.W.M. de Laat



University Medical Center Utrecht

G.T. Sieswerda

S.V. Koenen

K.Y. Heida



UMC Utrecht

Radboud University Medical Center Nijmegen

A.P.J. van Dijk

O van der Heijden

Radboudumc

