Präeklampsie
1st Trimester

Peter Kozlowski
praenatal.de

Ultraschall an der Spree
Berlin 4./5. November 2022

Screening auf PE – AWMF 2Sk-LL 2018

2 Screening und Prädiktion

Konsensbasiertes Statement 2.S7	
Expertenkonsens	Konsensusstärke ++
Die Prädiktion einer Präeklampsie bietet unter mehreren Aspekten Vorteile: die Früherkennung (vor Manifestation der Erkrankung) erlaubt neben einer intensiveren Überwachung die gezielte Initiierung prophylaktischer Maßnahmen bei Frauen mit einem erhöhten Risiko.[7-9]	

Konsensbasiertes Empfehlung 2.E1	
Expertenkonsens	Konsensusstärke +++
Ein aussagekräftiger, alleiniger Test zur sicheren Früherkennung der Präeklampsie steht bislang nicht zur Verfügung.[4,10-16] Zur Risikoabschätzung können im I. oder II. Trimenon anamnestische Angaben (Mutterpass) und Risikofaktoren, mittlerer arterieller Blutdruck, biochemische Marker und Dopplersonographie herangezogen werden.[16,17]	

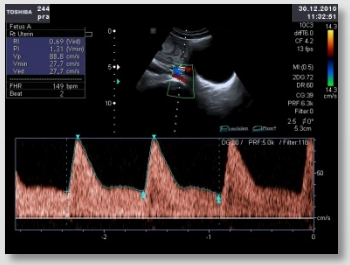
Ultrasound Obstet Gynecol 2007; **30**: 742–749
Published online in Wiley InterScience (www.interscience.wiley.com). **DOI:** 10.1002/uog.5157

Uterine artery Doppler at 11 + 0 to 13 + 6 weeks in the prediction of pre-eclampsia

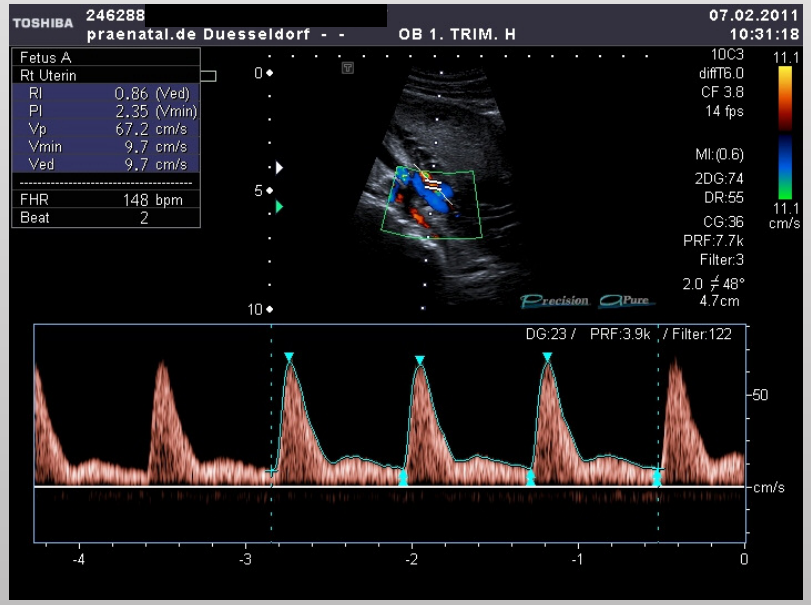
W. PLASENCIA, N. MAIZ, S. BONINO, C. KAIHURA and K. H. NICOLAIDES

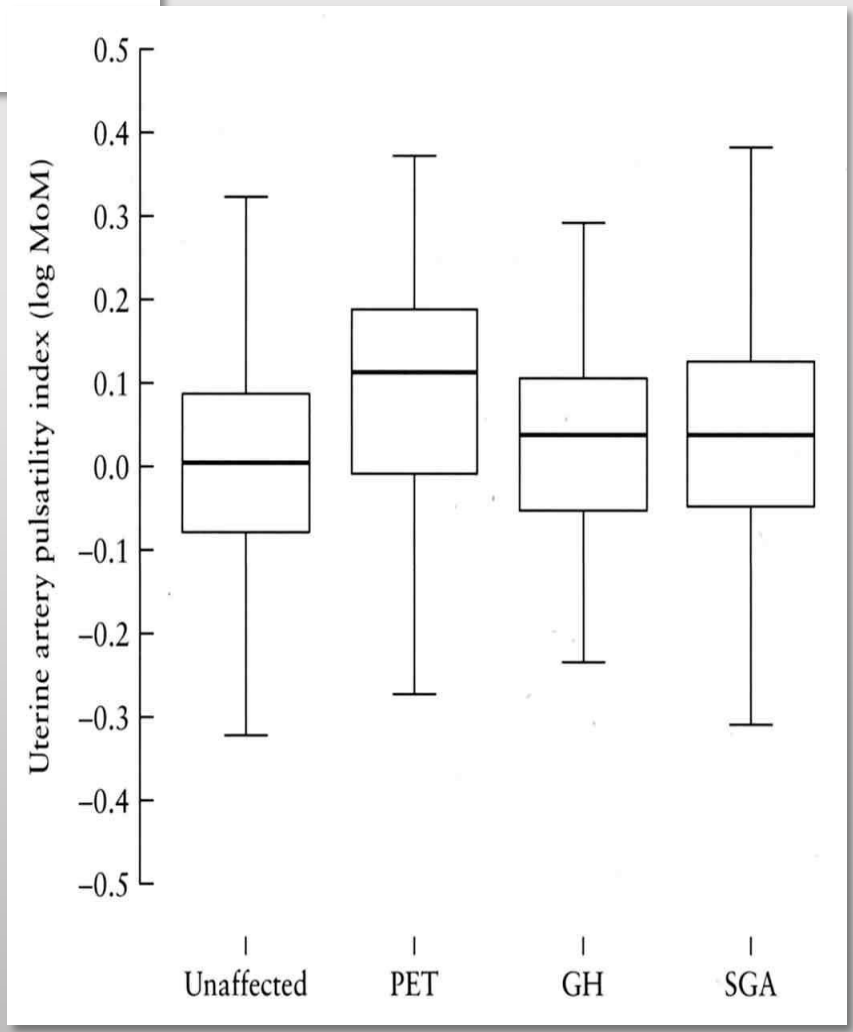
Harris Birthright Research Centre for Fetal Medicine, King's College Hospital, London, UK

KEYWORDS: Doppler; first trimester; high-risk pregnancy prediction; pre-eclampsia; uterine artery



$PI=(V_{max}-V_{min}) / V_{mean}$





Ultrasound Obstet Gynecol 2008; **32**: 877–883
Published online 7 November 2008 in Wiley InterScience (www.interscience.wiley.com). **DOI:** 10.1002/uog.6124

Prediction of pre-eclampsia by a combination of maternal history, uterine artery Doppler and mean arterial pressure

N. ONWUDIWE, C. K. H. YU, L. C. Y. POON, I. SPILIOPOULOS and K. H. NICOLAIDES
Harris Birthright Research Centre for Fetal Medicine, King's College Hospital Medical School, London, UK

KEYWORDS: blood pressure; Doppler; pre-eclampsia; screening

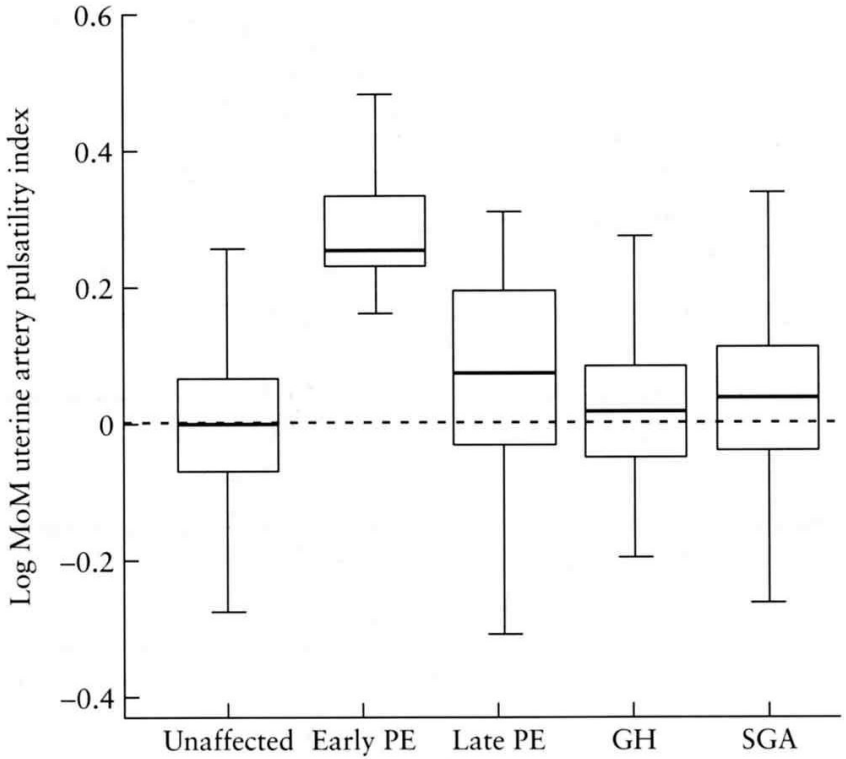


Figure 1 Box-and-whisker plot of log multiples of the median (MoM) uterine artery pulsatility index in unaffected pregnancies, and in those complicated by early and late pre-eclampsia (PE), gestational hypertension (GH) and delivery of small-for-gestational age (SGA) newborns. Median, 25th and 75th centiles, and range are shown.

Ultrasound Obstet Gynecol 2008; **32**: 128–132
Published online 6 May 2008 in Wiley InterScience (www.interscience.wiley.com). **DOI:** 10.1002/uog.5315

Reference ranges for uterine artery mean pulsatility index at 11–41 weeks of gestation

O. GÓMEZ, F. FIGUERAS, S. FERNÁNDEZ, M. BENNASAR, J. M. MARTÍNEZ, B. PUERTO and E. GRATACÓS

Fetal Growth and Pre-eclampsia Unit, Department of Maternal–Fetal Medicine, ICGON, Hospital Clínic, University of Barcelona and Center for Biomedical Research on Rare Diseases (CIBERER), Barcelona, Spain

KEYWORDS: Doppler ultrasonography parameters; pulsatility index; uterine arteries

Ut A

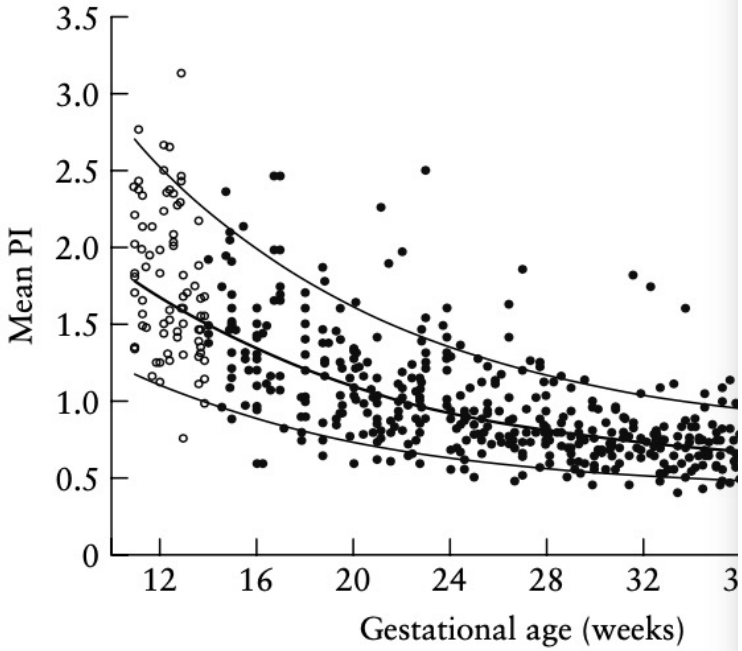


Figure 3 Scatterplot of the mean uterine artery pulsa
measured by transvaginal (○) and transabdominal (
examination vs. gestational age in our population. E
50th and 95th centiles are shown.

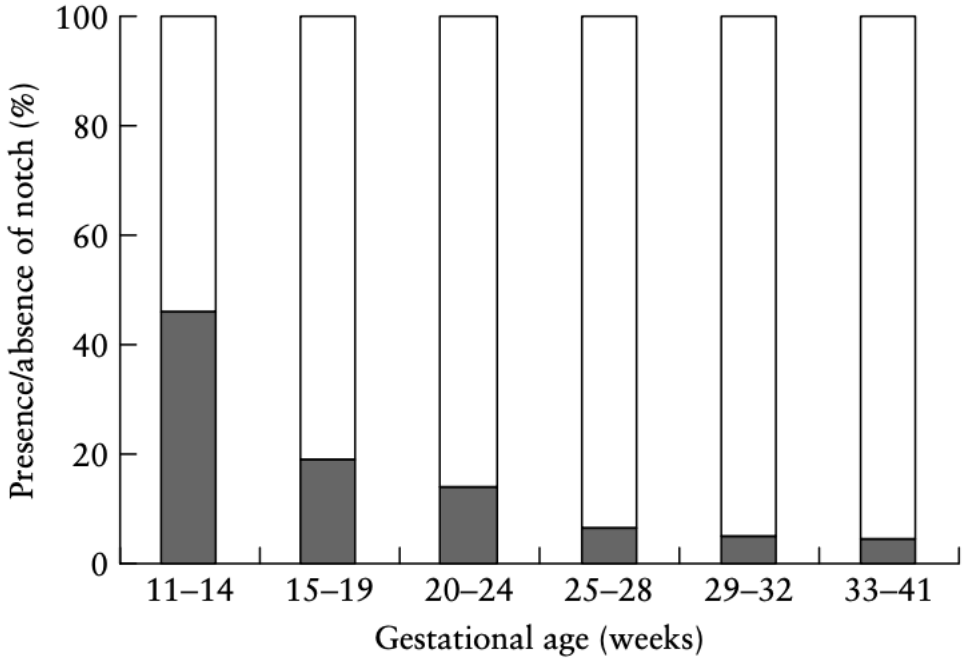
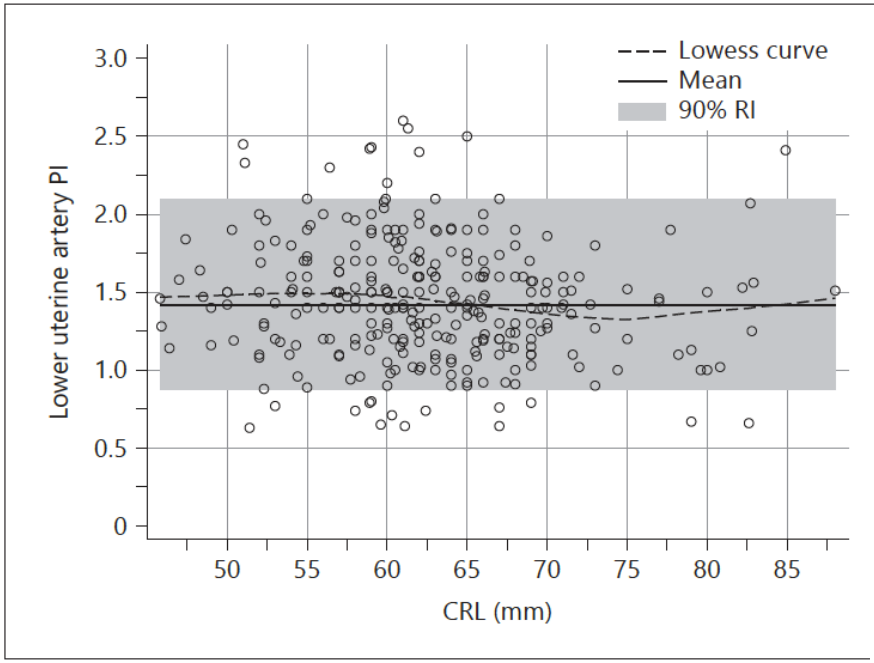


Figure 2 Prevalence of bilateral notching (■) or absence of notch (□) throughout gestation. Transvaginal and transabdominal ultrasound examinations were performed on pregnancies at 11–14 weeks and 15–41 weeks, respectively.

Ut A

PI A. uterina im 1. Trimenon



Original Paper

Fetal Diagnosis and Therapy

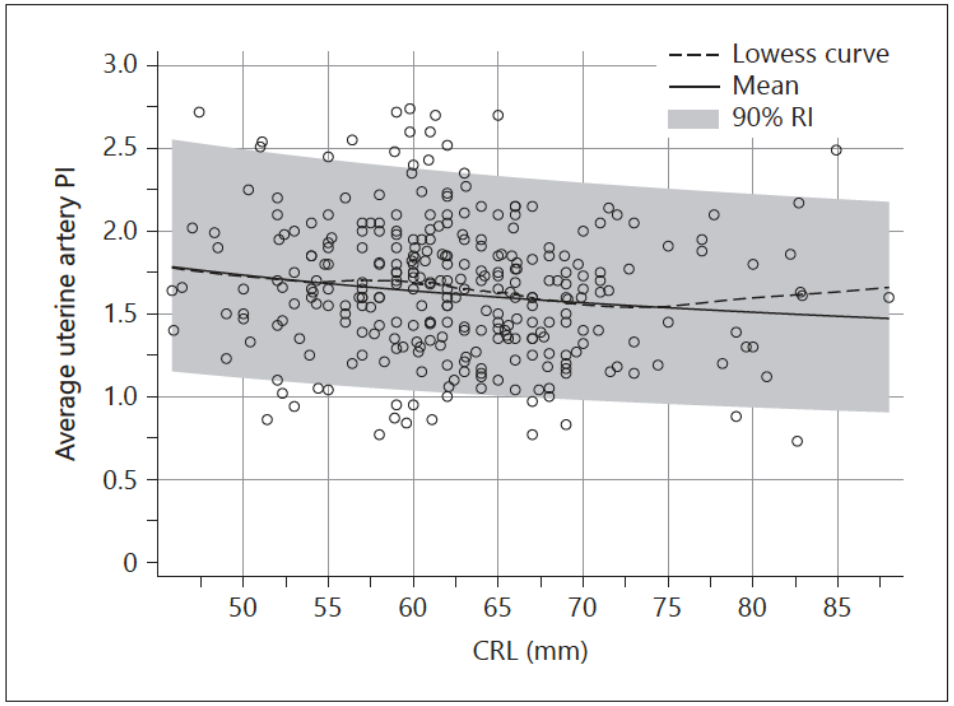
Fetal Diagn Ther 2014;36:299–304
DOI: 10.1159/000361021

Received: December 30, 2013
Accepted after revision: February 28, 2014
Published online: August 1, 2014

Uterine Artery Pulsatility Index Assessment at 11–13+6 Weeks' Gestation

Gus Ridding[a, b] Philip J. Schluter[f, g] Jon A. Hyett[c, d] Andrew C. McLennan[a, c, e]

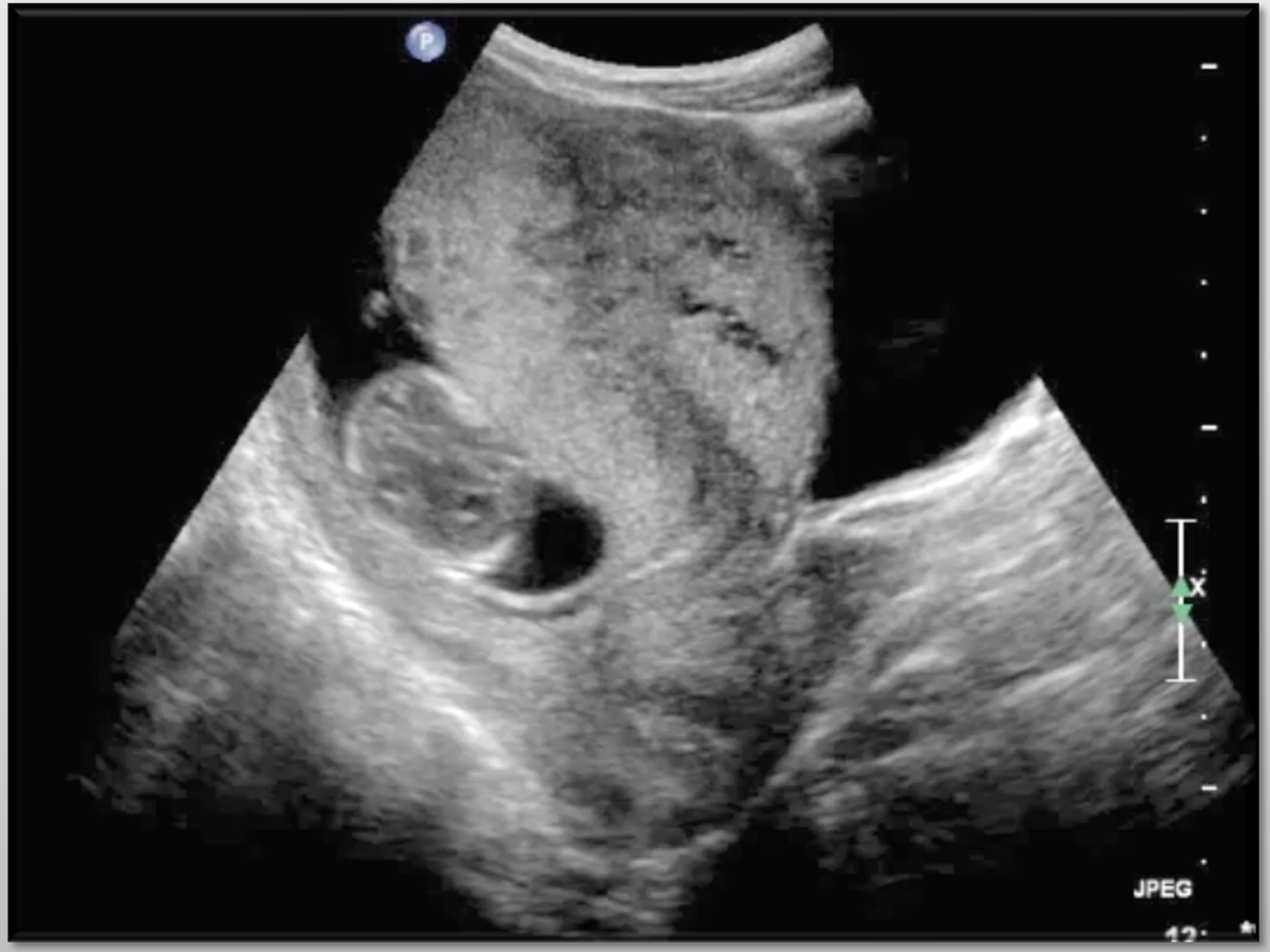
[a]Maternal Fetal Medicine Unit, Royal North Shore Hospital, [b]Northern Clinical School and [c]Faculty of Medicine, University of Sydney, [d]Maternal Fetal Medicine Unit, Royal Prince Alfred Hospital, [e]Sydney Ultrasound for Women, Sydney, N.S.W., and [f]School of Nursing and Midwifery, The University of Queensland, Brisbane, Qld., Australia; [g]School of Health Sciences, University of Canterbury, Christchurch, New Zealand



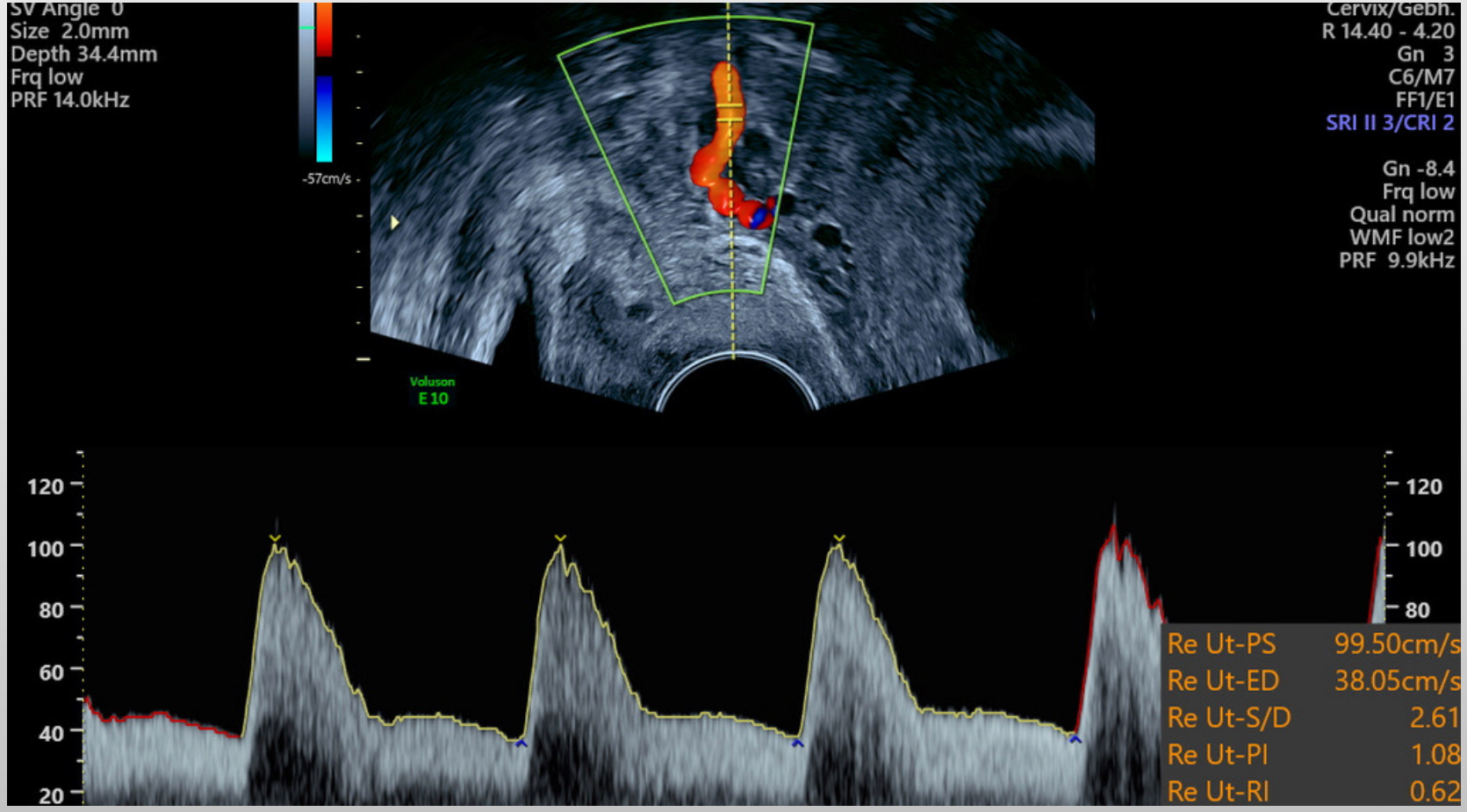
Ridding 2014 Fetal Diagn Ther

Ut A

Screening der Art. uterinae



Ut A


SV Angle 0
Size 2.0mm
Depth 34.4mm
Frq low
PRF 14.0kHz
-57cm/s
Voluson
E10
Cervix/Gebh.
R 14.40 - 4.20
Gn 3
C6/M7
FF1/E1
SRI II 3/CRI 2
Gn -8.4
Frq low
Qual norm
WMF low2
PRF 9.9kHz
120
100
80
60
40
20
Re Ut-PS 99.50cm/s
Re Ut-ED 38.05cm/s
Re Ut-S/D 2.61
Re Ut-PI 1.08
Re Ut-RI 0.62

PE-Risikofaktoren: Anamnese

x 9	Antiphospholipid-Syndrom Autoimmunerkrankungen
x 7	PE in Eigenanamnese
x 5	BMI > 30 Präexistenter Diabetes mellitus RR diastol > 110 mm Hg vor 20 w
x 3	PE bei Mutter der Schwangeren Präexistente Nierenerkrankung Chronische Hypertonie plus weiterer Faktor
x 2	Erstparität Alter > 40 Jahre Afroamerikanische Ethnizität

PE-Risikofaktoren: Aktuelle Gravidität

x 7

Bilaterales Notching / Widerstand Ut A (> 90. Perzentile) persistierend nach 24^{+0} w

x 3

Mehrlingsschwangerschaft

x ?

Artefizielle Reproduktion
Gestationsdiabetes
Hydrops fetalis
Trisomien
Blasenmole

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 17, 2017 VOL. 377 NO. 7

Aspirin versus Placebo in Pregnancies at High Risk for Preterm Preeclampsia

Daniel L. Rolnik, M.D., David Wright, Ph.D., Liona C. Poon, M.D., Neil O'Gorman, M.D., Argyro Syngelaki, Ph.D., Catalina de Paco Matallana, M.D., Ranjit Akolekar, M.D., Simona Cicero, M.D., Deepa Janga, M.D., Mandeep Singh, M.D., Francisca S. Molina, M.D., Nicola Persico, M.D., Jacques C. Jani, M.D., Walter Plasencia, M.D., George Papaioannou, M.D., Kinneret Tenenbaum-Gavish, M.D., Hamutal Meiri, Ph.D., Sveinbjorn Gizurarson, Ph.D., Kate Maclagan, Ph.D., and Kypros H. Nicolaides, M.D.

ASPRE Trial Rolnik - NEJM 2017

Table 2. Outcomes According to Trial Group.

Outcome	Aspirin Group (N=798)	Placebo Group (N=822)	Odds Ratio (95% or 99% CI)*
Primary outcome: preterm preeclampsia at <37 wk of gestation — no. (%)	13 (1.6)	35 (4.3)	0.38 (0.20–0.74)
Secondary outcomes according to gestational age			
Adverse outcomes at <34 wk of gestation			
Any — no. (%)	32 (4.0)	53 (6.4)	0.62 (0.34–1.14)
Preeclampsia — no. (%)	3 (0.4)	15 (1.8)	0.18 (0.03–1.03)
Gestational hypertension — no. (%)	2 (0.3)	2 (0.2)	1.02 (0.08–13.49)
Small-for-gestational-age status without preeclampsia — no./total no. (%)†	7/785 (0.9)	14/807 (1.7)	0.53 (0.16–1.77)
Miscarriage or stillbirth without preeclampsia — no. (%)	14 (1.8)	19 (2.3)	0.78 (0.31–1.95)
Abruption without preeclampsia — no. (%)	1 (0.1)	3 (0.4)	0.36 (0.02–7.14)
Spontaneous delivery without preeclampsia — no. (%)	12 (1.5)	12 (1.5)	1.07 (0.37–3.10)

Konsensbasierte Empfehlung 7.E43

Expertenkonsens	Konsensusstärke +++

Bei erhöhtem Risiko für eine Störung der uteroplazentaren Versorgung mit dem Risiko für eine IUGR sollte ≤ 16 SSW mit einer niedrig-dosierten Gabe von ASS prophylaktisch begonnen werden.

S2k-LL IUGR
2016-2022

Prevention of preeclampsia with aspirin

Daniel L. Rolnik, PhD; Kypros H. Nicolaides, MD; Liona C. Poon, MD

Check for updates

TABLE

Relative risk and number needed to treat with 95% CIs for different adverse pregnancy outcomes with the use of aspirin initiated before 16 weeks compared with placebo or no treatment

Outcome	Relative risk (95% CI)	Number needed to treat (95% CI)
Preeclampsia <37 wk[a]	0.38 (0.20–0.72)	38 (24–102)
Preeclampsia <34 wk[a]	0.20 (0.06–0.71)	69 (41–233)
Birthweight <10th percentile[b]	0.77 (0.65–0.91)	16 (10–43)
Birthweight <5th percentile[b]	0.73 (0.59–0.91)	19 (12–63)
Birthweight <3rd percentile[b]	0.77 (0.59–0.99)	30 (15–846)
Neonatal intensive care unit >14 d[b]	0.34 (0.15–0.75)	51 (30–167)
Stillbirth or neonatal death[c]	0.26 (0.11–0.60)	34 (22–80)

ASPRE, Aspirin for Evidence-Based Preeclampsia Prevention; *CI*, confidence interval; *SPREE*, Screening Program for Preeclampsia.

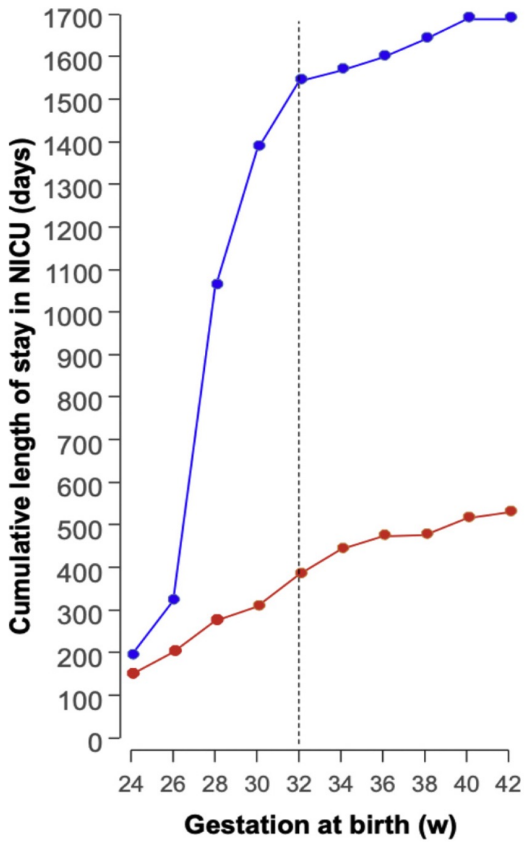
[a] Estimates calculated based on the ASPRE trial data[35]; [b] Estimates based on secondary analysis of data from the ASPRE trial and the SPREE study[70,71]; [c] Estimates calculated based on reported numbers in random effects meta-analysis of aspirin use initiated before 16 weeks of gestational age.[69]

Rolnik. Aspirin for the prevention of preeclampsia. Am J Obstet Gynecol 2022.

Rolnik 2022 AJOG

Aspirin und Neonatalperiode

FIGURE 4
Secondary analysis of the ASPRE trial[71]



Cumulative length of stay of neonates admitted to the NICU according to gestational age at birth for placebo (blue circles) and aspirin (red circles) groups.

NICU, neonatal intensive care unit.

Rolnik. Aspirin for the prevention of preeclampsia. Am J Obstet Gynecol 2022.

Wem nützt ASS (nicht)?

Am J Obstet Gynecol. 2017 Aug 4. pii: S0002-9378(17)30929-8. doi: 10.1016/j.ajog.2017.07.038. [Epub ahead of print]

ASPRE trial: effect of aspirin in prevention of preterm preeclampsia in subgroups of women according to their characteristics and medical and obstetrical history.

Poon LC[1], Wright D[2], Rolnik DL[3], Syngelaki A[4], Delgado JL[3], Tsokaki T[5], Leipold G[6], Akolekar R[7], Shearing S[8], De Stefani L[9], Jani JC[10], Plasencia W[11], Evangelinakis N[12], Gonzalez-Vanegas O[13], Persico N[14], Nicolaides KH[15].

Author information

Abstract

OBJECTIVE: We sought to examine whether there are differences in the effect of aspirin on the incidence of preterm preeclampsia in the ASPRE trial in subgroups defined according to maternal characteristics and medical and obstetrical history.

STUDY DESIGN: This was a secondary analysis of data from the ASPRE trial. In ASPRE, women with singleton pregnancies were screened by means of an algorithm that combines maternal factors and biomarkers at 11-13 weeks' gestation. Those with an estimated risk for preterm preeclampsia of >1 in 100 were invited to participate in a double-blind trial of aspirin (150 mg/d) vs placebo from 11-14 weeks' until 36 weeks' gestation. Aspirin was associated with a significant reduction in the incidence of preterm preeclampsia with delivery at <37 weeks' gestation, which was the primary outcome (odds ratio, 0.38; 95% confidence interval, 0.20-0.74; P = .004).

CONCLUSION: The beneficial effect of aspirin in the prevention of preterm preeclampsia may not apply in pregnancies with chronic hypertension. There was no evidence of heterogeneity in the aspirin effect in subgroups defined according to maternal characteristics and obstetrical history.

ASS prophylaktisch für alle?

Kohortenstudie über 5.7 Jahre

n=186.425 niedrigdosiertes ASS
n=186.425 Kontrollpersonen

Größere gastrointestinale *oder*
cerebrale Blutung

ASS	**5,58** Fälle auf 1.000 Personenjahre
Kontrolle	**3,60** Fälle auf 1.000 Personenjahre

De Berardis 2012 JAMA

Lancet. 2018 September 22; 392(10152): 1036–1046. doi:10.1016/S0140-6736(18)31924-X.

Use of aspirin to reduce risk of initial vascular events in patients at moderate risk of cardiovascular disease (ARRIVE): a randomised, double-blind, placebo-controlled trial

J Michael Gaziano, Carlos Brotons, Rosa Coppolecchia, Claudio Cricelli, Harald Darius, Philip B Gorelick, George Howard, Thomas A Pearson, Peter M Rothwell, Luis Miguel Ruilope, Michal Tendera, Gianni Tognoni the ARRIVE Executive Committee

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

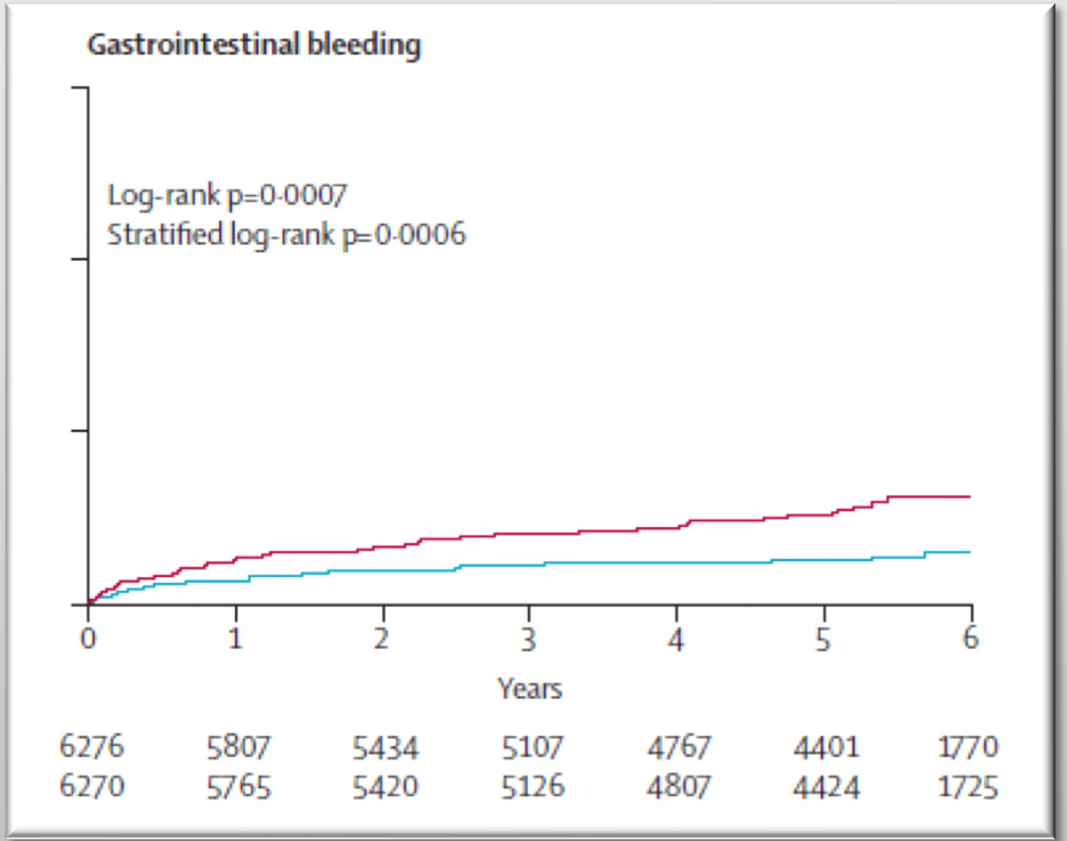
Effects of Aspirin for Primary Prevention in Persons with Diabetes Mellitus

The ASCEND Study Collaborative Group*

ABSTRACT

BACKGROUND

Diabetes mellitus is associated with an increased risk of cardiovascular events. Aspirin use reduces the risk of occlusive vascular events but increases the risk of bleeding; the balance of benefits and hazards for the prevention of first cardiovascular events in patients with diabetes is unclear.



ASS für alle Schwangeren?

- Kein Frühwarnsystem
- High risk Fälle nicht identifiziert
- Compliance fraglich

Prophylaxe > 16 Wochen?

ajog.org Systematic Reviews

Antiplatelet therapy before or after 16 weeks' gestation for preventing preeclampsia: an individual participant data meta-analysis

Shireen Meher, MD; Lelia Duley, MD; Kylie Hunter, BA(Hons); Lisa Askie, PhD

CONCLUSION: The effect of low-dose aspirin and other antiplatelet agents on pre-eclampsia and its complications is consistent, regardless of whether treatment is started before or after 16 weeks' gestation. Women at an increased risk of preeclampsia should be offered antiplatelet therapy, regardless of whether they are first seen before or after 16 weeks' gestation.

Meher 2016 AJOG

First trimester preeclampsia screening and prediction

Piya Chaemsaithong, MD, PhD; Daljit Singh Sahota, PhD; Liona C. Poon, MBBS

TABLE 1
Maternal risk factors for preeclampsia according to professional organizations

ACOG 2018[48] (United States of America)	NICE 2019[49] (United Kingdom)	SOGC 2014[50] (Canada)	SOMANZ 2014[51] (Australia)	ISSHP 2018[52]	WHO 2011[53]
High-risk factors	High-risk factors	High-risk factors	Risk factors	High-risk factors	Risk factors
☐ Previous pregnancy with PE ☐ Chronic hypertension ☐ Systemic lupus erythematosus ☐ Type 1 or type 2 diabetes mellitus ☐ Renal disease ☐ Multifetal gestation ☐ Antiphospholipid syndrome	• Previous pregnancy with PE • Chronic hypertension • Autoimmune disease • Type 1 or type 2 diabetes mellitus • Chronic kidney disease • Antiphospholipid syndrome	• Previous pregnancy with PE • Antiphospholipid syndrome • Preexisting diabetes mellitus • Renal disease or proteinuria • Chronic hypertension or booking diastolic BP, ≥90 mm Hg	• Nulliparity • Multiple pregnancy • Previous history of PE • Family history of PE • Overweight • Obesity (BMI, ≥30 kg/m^2) • Age, ≥40 y • Systolic BP, >130 mm Hg or diastolic BP, >80 mm Hg before 20 wk • Antiphospholipid syndrome • Preexisting diabetes mellitus • Underlying renal disease • Chronic autoimmune disease • Interpregnancy interval, >10 y	• Prior PE • Chronic hypertension • Pregestational diabetes mellitus • BMI, >30 kg/m^2 • Chronic kidney disease • Antiphospholipid syndrome	• Previous PE • Diabetes • Chronic hypertension • Renal disease • Autoimmune disease • Multifetal pregnancy
Moderate risk factors	Moderate risk factors	Moderate risk factors (first trimester)		Moderate risk factors	
☐ Nulliparity ☐ Age, ≥35 y ☐ Interpregnancy interval, >10 y ☐ BMI, >30 kg/m^2 • Family history of PE (mother or sister) • History of SGA or adverse outcome • Sociodemographic characteristics (African American race or low socioeconomic status)	• Nulliparity • Age, ≥40 y • Interpregnancy interval, >10 y • BMI at first visit, ≥35 kg/m^2 • Family history of PE • Multifetal pregnancy	☐ Age, 40 y ☐ Family history of PE (mother or sister) ☐ Family history of early-onset cardiovascular disease ☐ Lower maternal birthweight or preterm delivery ☐ Heritable thrombophilia ☐ Nonsmoking ☐ Increased prepregnancy triglycerides ☐ Previous miscarriage of <10 wk with same partner ☐ Cocaine and methamphetamine use ☐ Booking systolic of BP ≥130 mm Hg or diastolic BP of ≥90 mm Hg ☐ Vaginal bleeding in early pregnancy ☐ Gestational trophoblastic disease ☐ Abnormal PAPP-A or free beta-hCG		☐ Advanced maternal age, >35 y ☐ Family history of preeclampsia ☐ Short duration of sexual relationship (<6 mo) before the pregnancy ☐ Primiparity ☐ Primipaternity (both changed paternity and an interpregnancy interval of >5 y have been associated with an increased risk for preeclampsia) ☐ Connective tissue disorder	

Chaemsaithong. First trimester preeclampsia screening and prediction. Am J Obstet Gynecol 2022.

(continued)

First trimester preeclampsia screening and prediction

Piya Chaemsaithong, MD, PhD; Daljit Singh Sahota, PhD; Liona C. Poon, MBBS

TABLE 1
Maternal risk factors for preeclampsia according to professional organizations *(continued)*

ACOG 2018[48] (United States of America)	NICE 2019[49] (United Kingdom)	SOGC 2014[50] (Canada)	SOMANZ 2014[51] (Australia)	ISSHP 2018[52]	WHO 2011[53]
Indications for aspirin	Indications for aspirin	Indications for aspirin	Indication for aspirin	Indications for aspirin	Indications for aspirin
• 1 or more high-risk factors • Consider if 2 or more moderate risk factors • Dose: 81 mg/d initiated between 12 and 28 wk, optimally before 16 wk • Continue daily until delivery	• 1 or more high-risk factors • 2 or more moderate risk factors • Dose: 75 to 150 mg/d from 12 wk • Continue daily until delivery	• 1 or more high-risk factors • 2 or more moderate risk factors • Dose: 81 to 162 mg/d from before 16 wk • Continue daily until delivery	• Women with at least moderate- to high-risk of PE • Dose: unclear • Continue until 37 wk or delivery	• 1 or more high-risk factors • 2 or more moderate risk factors • Dose: 100 to 150 mg/d before 16 wk • Continue daily until 37 wk	• 1 or more risk factors • Dose: 75 mg before 20 wk, and, if possible, as early as 12 wk of gestation

ACOG, American College of Obstetricians and Gynecologists; *BMI*, body mass index; *BP*, blood pressure; *hCG*, human chorionic gonadotrophin; *ISSHP*, International Society for the Study of Hypertension in Pregnancy; *NICE*, National Institute for Health and Care Excellence; *PAPP-A*, pregnancy-associated plasma protein A; *PE*, preeclampsia; *SGA*, small-for-gestational-age; *SOGC*, Society of Obstetricians and Gynaecologists of Canada; *SOMANZ*, Society of Obstetric Medicine of Australia and New Zealand; *WHO*, World Health Organization.

Chaemsaithong. First trimester preeclampsia screening and prediction. Am J Obstet Gynecol 2022.

Chaemsaithong 2022 AJOG

Risikofaktoren für PE

- Alter > 40
- BMI > 30 kg/m^2
- IVF
- PE in Anamnese
- Chronische Hypertonie
- Diabetes
- Thrombophilie
- Autoimmun-erkrankungen

Empfehlungen aufgrund maternaler Anamnese und Status:

ACOG

DR 90% FPR 64%

NICE

DR 41% FPR 10%

PE-Risikoevaluation im 1. Trimenon

Mater-naler Faktor

Parität, PE-Anamnese, Ethnizität, BMI, Diabetes, Nikotin

MAP

Standardisierte Messung

Ut A

Eigene Unschärfe und Interobserver-Streuung berücksichtigen

PAPP-A

Pl GF

Ultrasound Obstet Gynecol 2017; **49**: 751–755
Published online 14 May 2017 in Wiley Online Library (wileyonlinelibrary.com). **DOI:** 10.1002/uog.17399

Accuracy of competing-risks model in screening for pre-eclampsia by maternal factors and biomarkers at 11–13 weeks' gestation

N. O'GORMAN[1], D. WRIGHT[2], L. C. POON[1,3#], D. L. ROLNIK[1], A. SYNGELAKI[1], A. WRIGHT[2], R. AKOLEKAR[1,4], S. CICERO[5], D. JANGA[6], J. JANI[7], F. S. MOLINA[8], C. DE PACO MATALLANA[9], N. PAPANTONIOU[10], N. PERSICO[11], W. PLASENCIA[12], M. SINGH[13] and K. H. NICOLAIDES[1#]

[1]*Harris Birthright Centre for Fetal Medicine, King's College Hospital, London, UK;* [2]*Institute of Health Research, University of Exeter, Exeter, UK;* [3]*Chinese University of Hong Kong, Hong Kong, China;* [4]*Medway Maritime Hospital, Gillingham, UK;* [5]*Homerton University Hospital, London, UK;* [6]*North Middlesex University Hospital, London, UK;* [7]*Centre Hospitalier Universitaire Brugmann, Université Libre de Bruxelles, Brussels, Belgium;* [8]*Hospital Universitario San Cecilio, Granada, Spain;* [9]*Hospital Clínico Universitario Virgen de la Arrixaca, Murcia, Spain;* [10]*Attikon University Hospital, Athens, Greece;* [11]*Ospedale Maggiore Policlinico, Milan, Italy;* [12]*Hospiten Group, Tenerife, Canary Islands, Spain;* [13]*Southend University Hospital, Essex, UK*

O´Gorman 2017 UOG

Table 2 Performance of screening for delivery with pre-eclampsia (PE) < 32, < 37 or ≥ 37 weeks' gestation in validation dataset of 8775 singleton pregnancies using previously developed algorithm based on maternal factors and combinations of biomarkers

	PE with delivery < 32 weeks (n = 17)			*PE with delivery < 37 weeks (n = 59)*			*PE with delivery ≥ 37 weeks (n = 180)*		
		DR (%) at:			*DR (%) at:*			*DR (%) at:*	
Screening method	*AUC*	*FPR = 5%*	*FPR = 10%*	*AUC*	*FPR = 5%*	*FPR = 10%*	*AUC*	*FPR = 5%*	*FPR = 10%*
Maternal factors	0.8045	41 (18–67)	53 (28–77)	0.7583	29 (18–42)	41 (28–54)	0.7449	18 (13–25)	37 (30–45)
Maternal factors plus:									
MAP	0.9071	59 (33–82)	71 (44–90)	0.8243	36 (24–49)	47 (34–61)	0.7789	26 (20–33)	37 (30–45)
UtA-PI	0.9309	71 (44–90)	82 (57–96)	0.8537	47 (34–61)	61 (47–73)	0.7539	22 (16–29)	39 (32–47)
PAPP-A	0.8546	47 (23–72)	59 (33–82)	0.7825	37 (25–51)	47 (34–61)	0.7504	21 (15–28)	37 (30–44)
PlGF	0.9506	65 (38–86)	88 (64–99)	0.8722	49 (36–63)	63 (49–75)	0.7578	20 (14–27)	39 (32–46)
MAP, UtA-PI	0.9667	82 (57–96)	94 (71–100)	0.8958	53 (39–66)	71 (58–82)	0.7875	27 (20–34)	41 (34–49)
MAP, PAPP-A	0.9133	65 (38–86)	76 (50–93)	0.8342	41 (28–54)	49 (36–63)	0.7827	28 (21–35)	40 (33–48)
MAP, PlGF	0.9674	76 (50–93)	88 (64–99)	0.8985	53 (39–66)	69 (56–81)	0.7870	29 (22–36)	43 (36–51)
UtA-PI, PAPP-A	0.9339	71 (44–90)	82 (57–96)	0.8583	49 (36–63)	66 (53–78)	0.7571	24 (18–31)	40 (33–48)
UtA-PI, PlGF	0.9772	82 (57–96)	100 (80–100)	0.9000	61 (47–73)	75 (62–85)	0.7619	22 (16–29)	39 (32–47)
PlGF, PAPP-A	0.9510	65 (38–86)	88 (64–99)	0.8741	51 (37–64)	66 (53–78)	0.7589	20 (14–27)	39 (32–47)
MAP, UtA-PI, PAPP-A	0.9644	88 (64–99)	94 (71–100)	0.8956	61 (47–73)	69 (56–81)	0.7892	29 (22–36)	42 (35–50)
MAP, PAPP-A, PlGF	0.9672	76 (50–93)	88 (64–99)	0.8998	54 (41–67)	69 (56–81)	0.7882	29 (22–36)	43 (36–51)
MAP, UtA-PI, PlGF	0.9870	94 (71–100)	100 (80–100)	0.9242	66 (53–78)	75 (62–85)	0.7916	32 (25–39)	43 (35–50)
UtA-PI, PAPP-A, PlGF	0.9769	82 (57–96)	100 (80–100)	0.9004	61 (47–73)	75 (62–85)	0.7626	23 (17–30)	38 (31–46)
MAP, UtA-PI, PAPP-A, PlGF	0.9865	94 (71–100)	100 (80–100)	0.9241	66 (53–78)	80 (67–89)	0.7923	31 (24–38)	43 (35–50)

Original Research ajog.org

OBSTETRICS

Competing risks model in screening for preeclampsia by maternal factors and biomarkers at 11-13 weeks gestation

Neil O'Gorman, MD; David Wright, PhD; Argyro Syngelaki, RM; Ranjit Akolekar, MD; Alan Wright, PhD; Leona C. Poon, MD; Kypros H. Nicolaides, MD

Combined screening by maternal factors, uterine artery pulsatility index, mean arterial pressure, and placental growth factor predicted 75% (95% confidence interval, 70-80%) of preterm-preeclampsia and 47% (95% confidence interval, 44-51%) of term-preeclampsia, at a false-positive rate of 10%; inclusion of pregnancy-associated plasma protein-A did not improve the performance of screening. Such detection rates are superior to the respective values of 49% (95% confidence interval, 43-55%) and 38% (34-41%) that were achieved by screening with maternal factors alone.

O´Gormann 2016 AJOG

S2k-Leitlinie
Hypertensive Erkrankungen
in der Schwangerschaft

		PE < 34 SSW	PE < 37 SSW	PE gesamt
Test	**FPR**	**Detektionsrate (% (95% CI))**		
PI-AUT, MAP, PIGF	5	80 (72-87)	66 (60-72)	42 (38-45)
	10	89 (81-94)	77 (71-82)	54 (51-57)
PI-AUT, MAP, PAPP-A, PIGF	5	76 (68-83)	63 (57-69)	40 (36-43)
	10	88 (81-93)	75 (69-80)	54 (50-56)
MAP, PI AUT	5	63 (54-72)	53 (47-59)	38 (35-41)
	10	80 (71-86)	70 (65-76)	52 (49-55)

Konsensbasiertes Empfehlung 2.E2

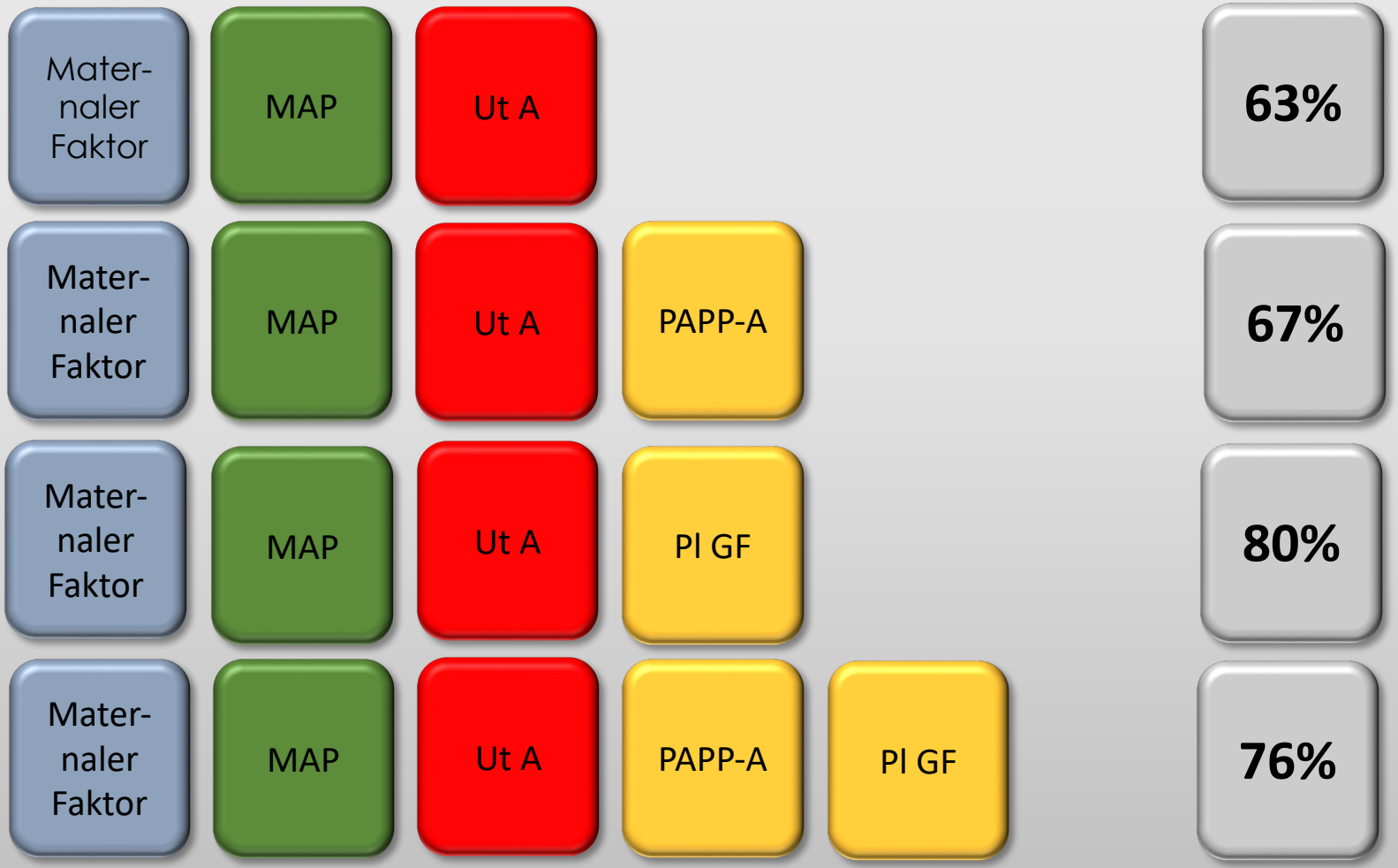
Der prädiktive Wert der einzelnen biophysikalischen und biochemischen Methoden **als alleiniger Screeningtest** ist gering. Für die Prädiktion der Präeklampsie sollten daher Einzeltests nicht angewandt werden.[4,5,7,13,18-28]

Hervorzuheben ist allerdings der hohe negative Vorhersagewert (>97 %) dieser Testverfahren für die early-onset Präeklampsie oder die Entwicklung einer intrauterinen Wachstumsrestriktion.[26,29-31]

Test	FPR (%)	Detektionsrate (% (95% CI))		
		PE < 34 SSW	PE < 37 SSW	PE gesamt
Anamnese plus	5	42 (33-51)	36 (30-42)	30 (27-33)
	10	58 (49-67)	50 (44-56)	41 (38-44)
PI AUT	5	57 (47-66)	46 (40-53)	33 (30-36)
	10	70 (61-78)	59 (53-65)	44 (41-47)
MAP	5	49 (40-58)	45 (39-52)	35 (31-37)
	10	65 (56-73)	60 (54-66)	48 (45-51)
PAPP-A	5	48 (38-57)	42 (36-48)	31 (28-34)
	10	60 (51-69)	55 (49-61)	44 (40-47)
PIGF	5	57 (48-66)	50 (44-56)	35 (32-38)
	10	73 (64-81)	66 (60-72)	47 (43-50)
MAP, PI AUT	5	63 (54-72)	53 (47-59)	38 (35-41)
	10	80 (71-86)	70 (65-76)	52 (49-55)
PAPP-A, PIGF	5	57 (48-66)	49 (43-56)	33 (30-36)
	10	77 (69-84)	67 (61-73)	48 (45-51)
PI-AUT, MAP, PAPP-A	5	67 (58-75)	56 (50-62)	38 (34-40)
	10	80 (71-86)	68 (62-74)	52 (48-55)

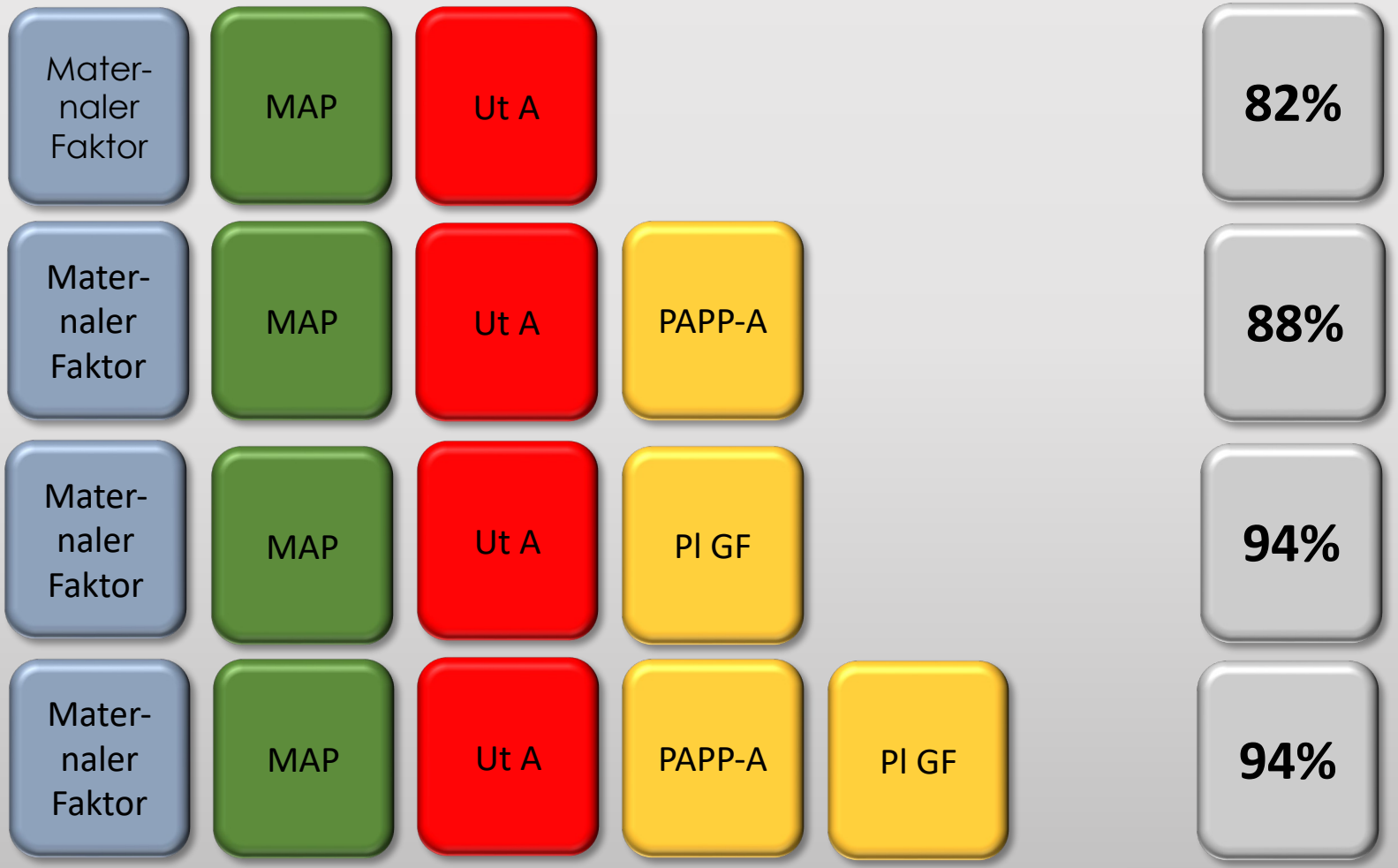
S2k-Leitlinie
Hypertensive Erkrankungen in der Schwangerschaft

Detektionsrate PE < 34 SSW (5% FPR)



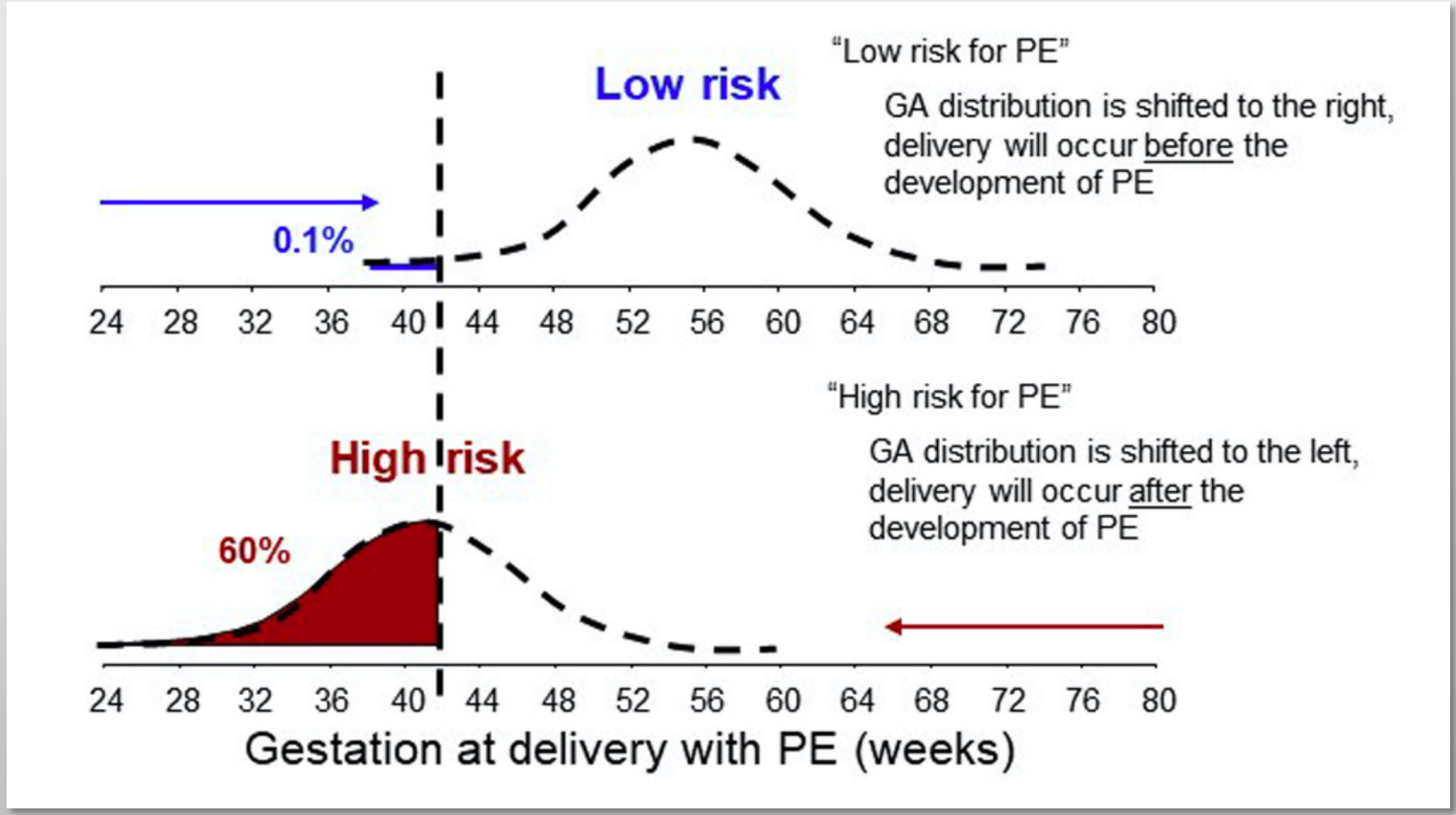
O´Gorman 2017 UOG

Detektionsrate PE < 32 SSW (5% FPR)



O´Gorman 2017 UOG

PE-Entwicklung als Kontinuum



The International Federation of Gynecology and Obstetrics (FIGO) Initiative on Preeclampsia (PE): A Pragmatic Guide for First Trimester Screening and Prevention

Liona C. Poon[1], Andrew Shennan[2], Jonathan A. Hyett[3], Anil Kapur[4], Eran Hadar[5], Hema Divakar[6], Fionnuala McAuliffe[7], Fabricio da Silva Costa[8], Peter von Dadelszen[2], Harold David McIntyre[9], Anne B. Kihara[10], Gian Carlo Di Renzo[11], Roberto Romero[12], Mary D'Alton[13], Vincenzo Berghella[14], Kypros H. Nicolaides[15], Moshe Hod[5]

Universal screening: All pregnant women should be screened for preterm PE during early pregnancy by the first-trimester combined test with maternal risk factors and biomarkers as a one-step procedure. The risk calculator is available free of charge at https://fetalmedicine.org/research/assess/preeclampsia. FIGO encourages all countries and its member associations to adopt and promote strategies to ensure this. The best combined test is one that includes maternal risk factors, measurements of mean arterial pressure (MAP), serum placental growth factor (PLGF) and uterine artery pulsatility index (UTPI). Where it is not possible to measure the PLGF and / or UTPI, the baseline screening test should be a combination of maternal risk factors with MAP, and not maternal risk factors alone. If maternal serum pregnancy-associated plasma protein A (PAPP-A) is measured for routine first-trimester screening for fetal aneuploidies, the result can be included for PE risk assessment. Variations to the full combined test would lead to a reduction in the performance screening. A woman is considered high risk when the risk is 1 in 100 based on the first-trimester combined test with maternal risk factors, MAP, PLGF and UTPI.

fetalmedicine.org - Kalkulator

Risk assessment

Preeclampsia risk

Date: 17-11-2017
Gestational age: 13^{+1} weeks (Measu

Maternal factors

Maternal characteristics

Date of birth: 1987-11-18
Height: 170 cm
Weight: 65 kg
Racial origin: White
Method of conception: Spontaneo
Smoking during pregnancy: No
Family history of PE: No

Biophysical measurements

Date of measurement	Weight	MAP	Mean UTPI
17-11-2017	65 kg	110 mmHg (1.28 MoM)	1.9 (1.21 MoM)

Biochemical measurements

Date of measurement	Weight	PLGF	PAPP-A
17-11-2017	65 kg	0.5 MoM	0.5 MoM

Preeclampsia risk from history only

< 32 weeks: 1 in 3333
< 37 weeks: 1 in 263
≥ 37 weeks: 2.3 %

Preeclampsia risk from history plus MAP, UTPI, PLGF, PAPP-A

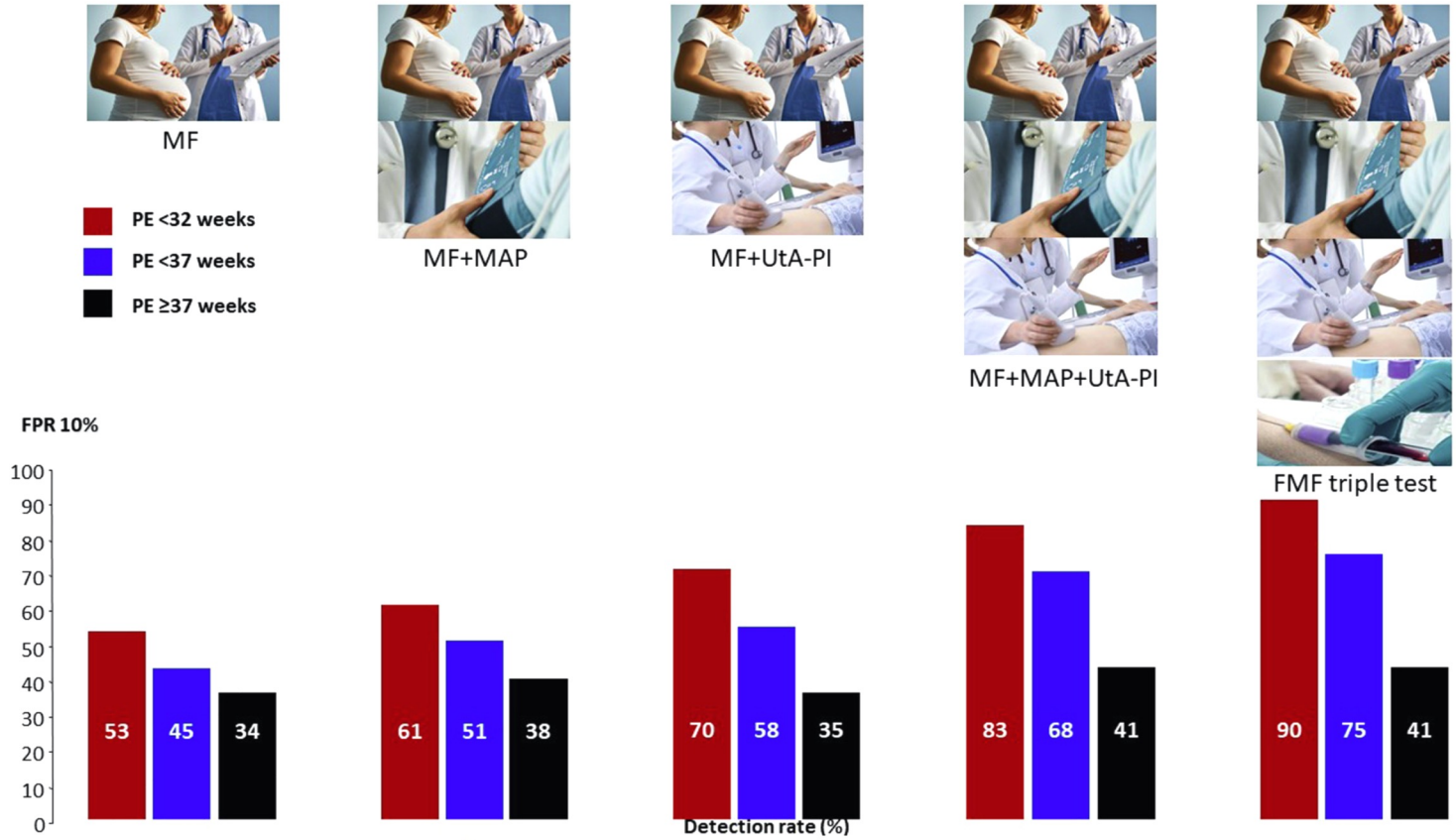
< 32 weeks: 1 %
< 37 weeks: 6.8 %
≥ 37 weeks: 13 %

Recommendation

On the basis of this assessment the patient has been classified as being at increased risk for developing PE before 37 weeks. The ASPRE trial has shown that in such women use of low dose aspirin (150mg/night) from now until 36 weeks reduces the incidence of PE before 34 weeks by >80% and PE before 37 weeks by >60%. For more information click here.

PE-Screening: FMF-Algorithmus

FIGURE 4
Screening performance of the first trimester FMF prediction model for preeclampsia according to the different combinations at FPR of 10%



Screening performance derived from Tan et al.[61]

FMF, Fetal Medicine Foundation; *FPR*, false-positive rate; *MAP*, mean arterial pressure; *MF*, maternal factors; *PE*, preeclampsia; *UtA-PI*, uterine artery pulsatility index.

Chaemsaithong. First trimester preeclampsia screening and prediction. Am J Obstet Gynecol 2022.

Best Practice & Research Clinical Obstetrics & Gynaecology
Available online 31 March 2022
In Press, Corrected Proof

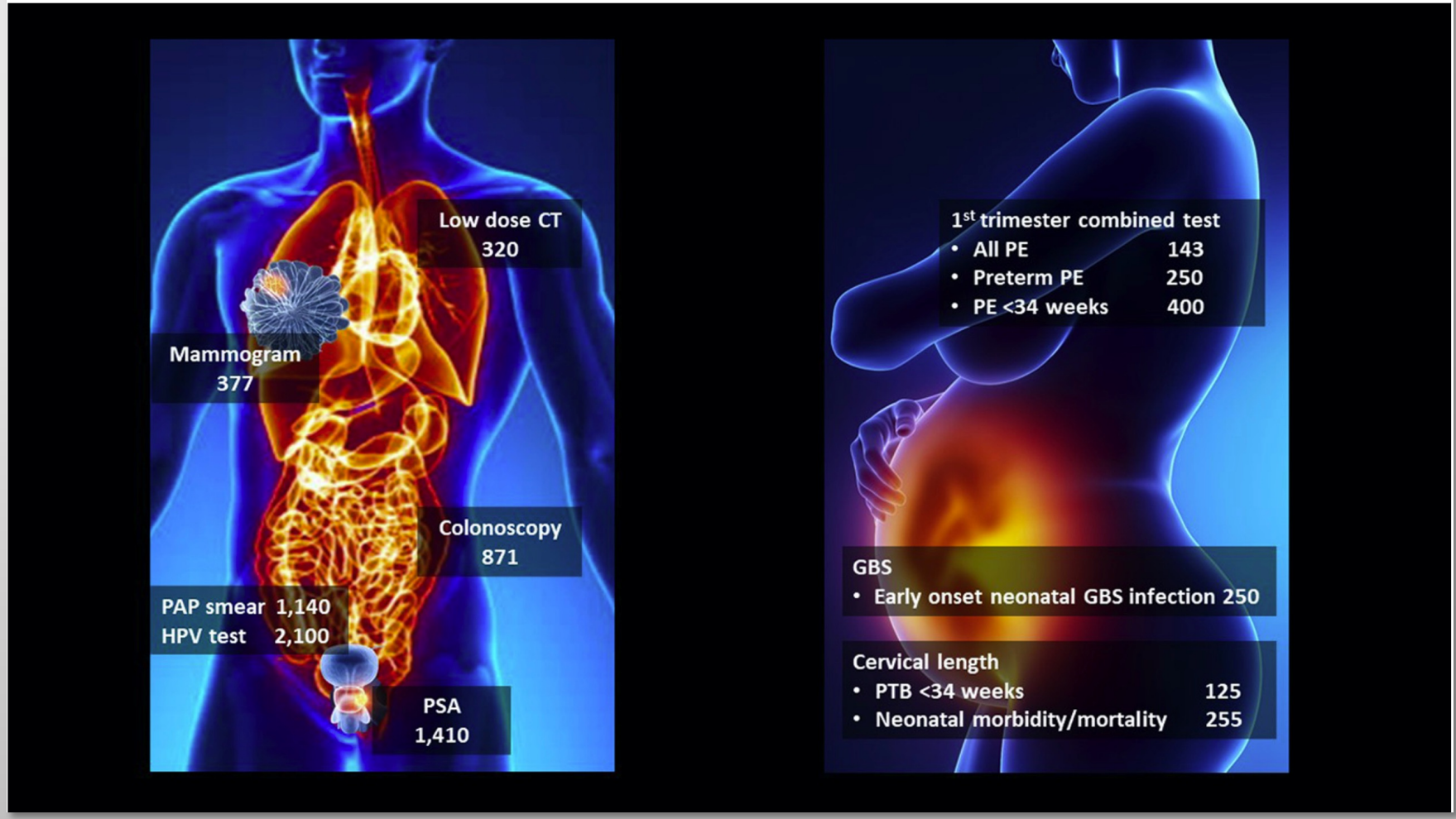
Screening for preeclampsia in twin pregnancies

Carla Francisco [a], Mariana Gamito [a], Maya Reddy [b], Daniel L. Rolnik [b]

- Multiple pregnancies are at a significantly higher risk of preeclampsia.
- The risk of preeclampsia in twins is underestimated because preterm birth is more likely.
- Preeclampsia tends to occur earlier and is more severe in twin pregnancies.
- Prediction tools are improving but still underperform compared to prediction in singletons.
- The benefit of aspirin for the prevention of preeclampsia in twin pregnancies is unclear.

Number needed to screen (NNS)

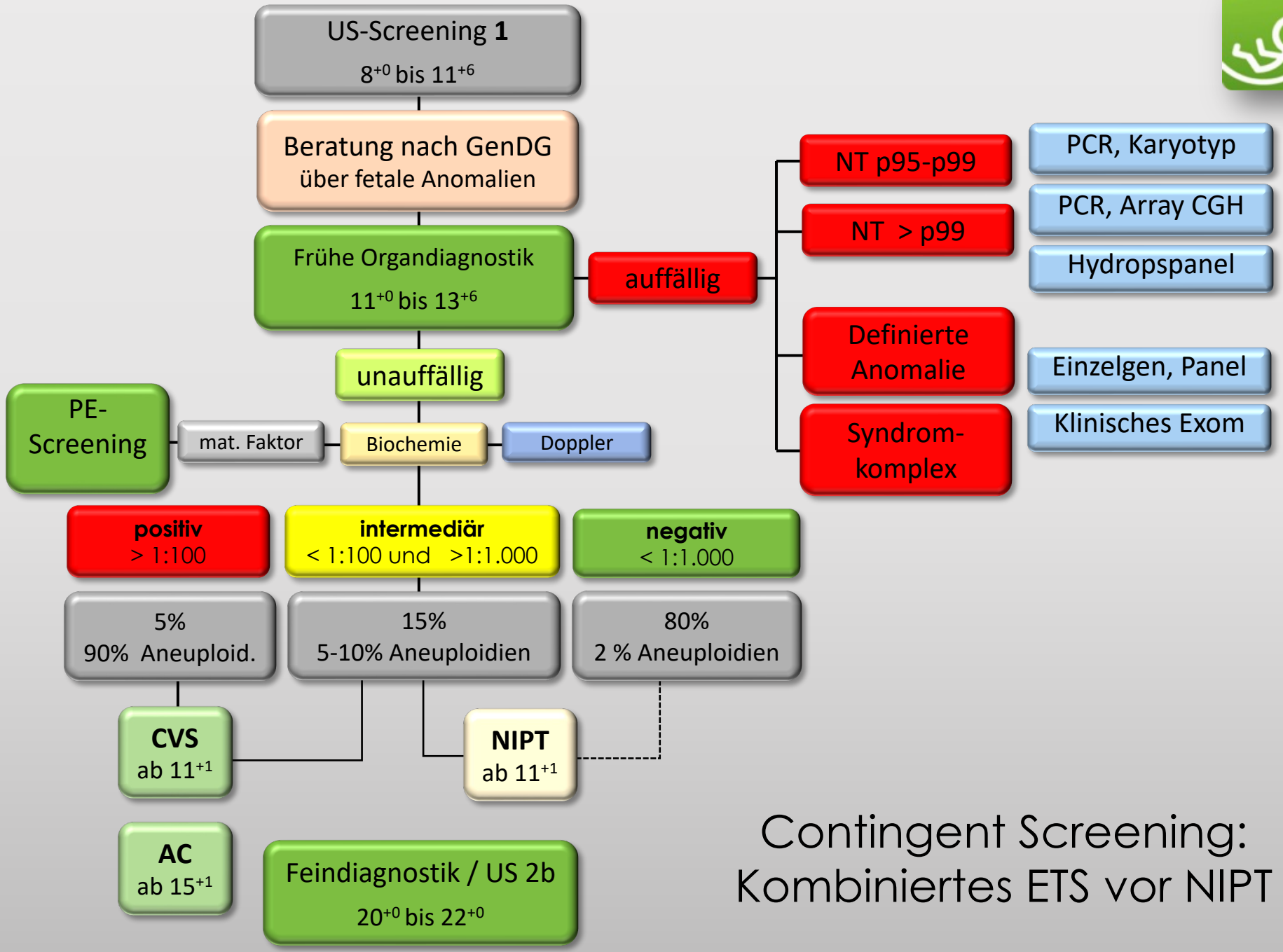
FIGURE 10
NNS in clinical oncology (left) and obstetrics (right)



Praeeklampsie

early onset PE	**late onset PE**
0,5 %	1,5 %
Entbindung < 34 SSW	> 33 SSW

Häufigste Schwangerschaftskomplikation
25% der maternofetalen Mortalität

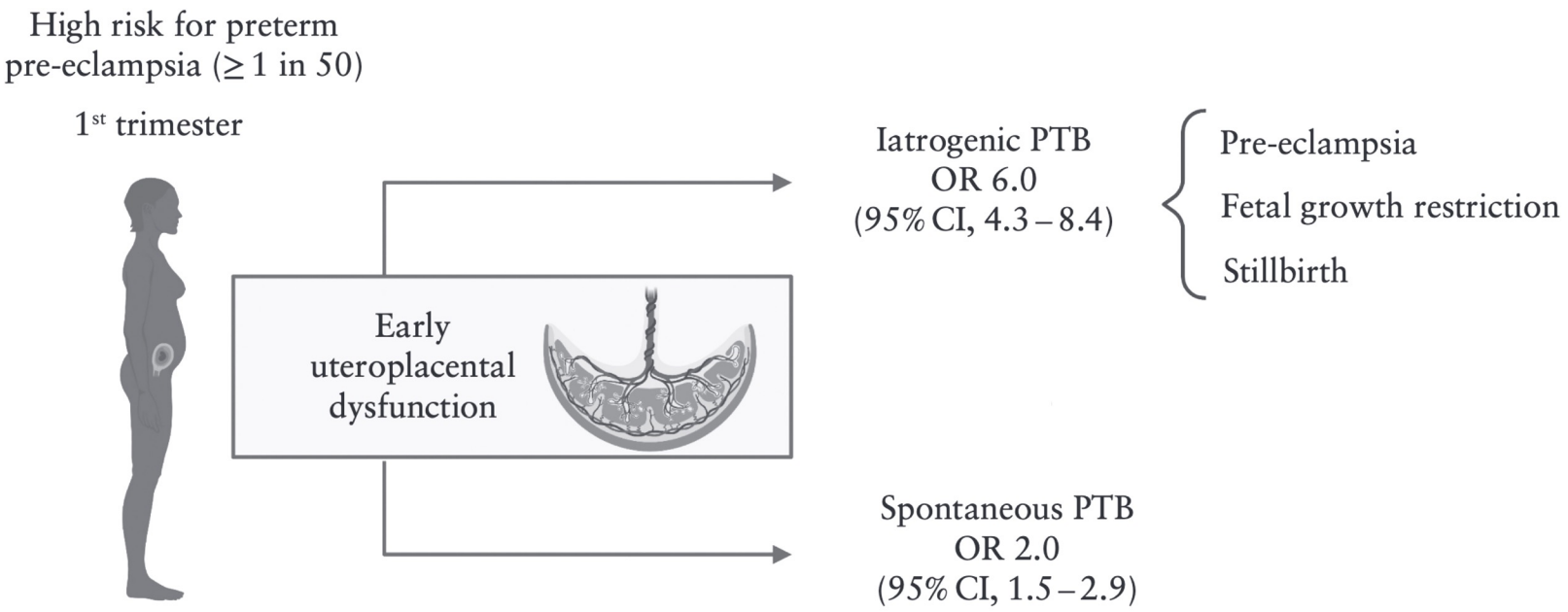


Contingent Screening: Kombiniertes ETS vor NIPT

Routine first-trimester pre-eclampsia screening and risk of preterm birth

V. GIORGIONE[1,2], O. QUINTERO MENDEZ[1], A. PINAS[1], W. ANSLEY[2] and B. THILAGANATHAN[1,2]

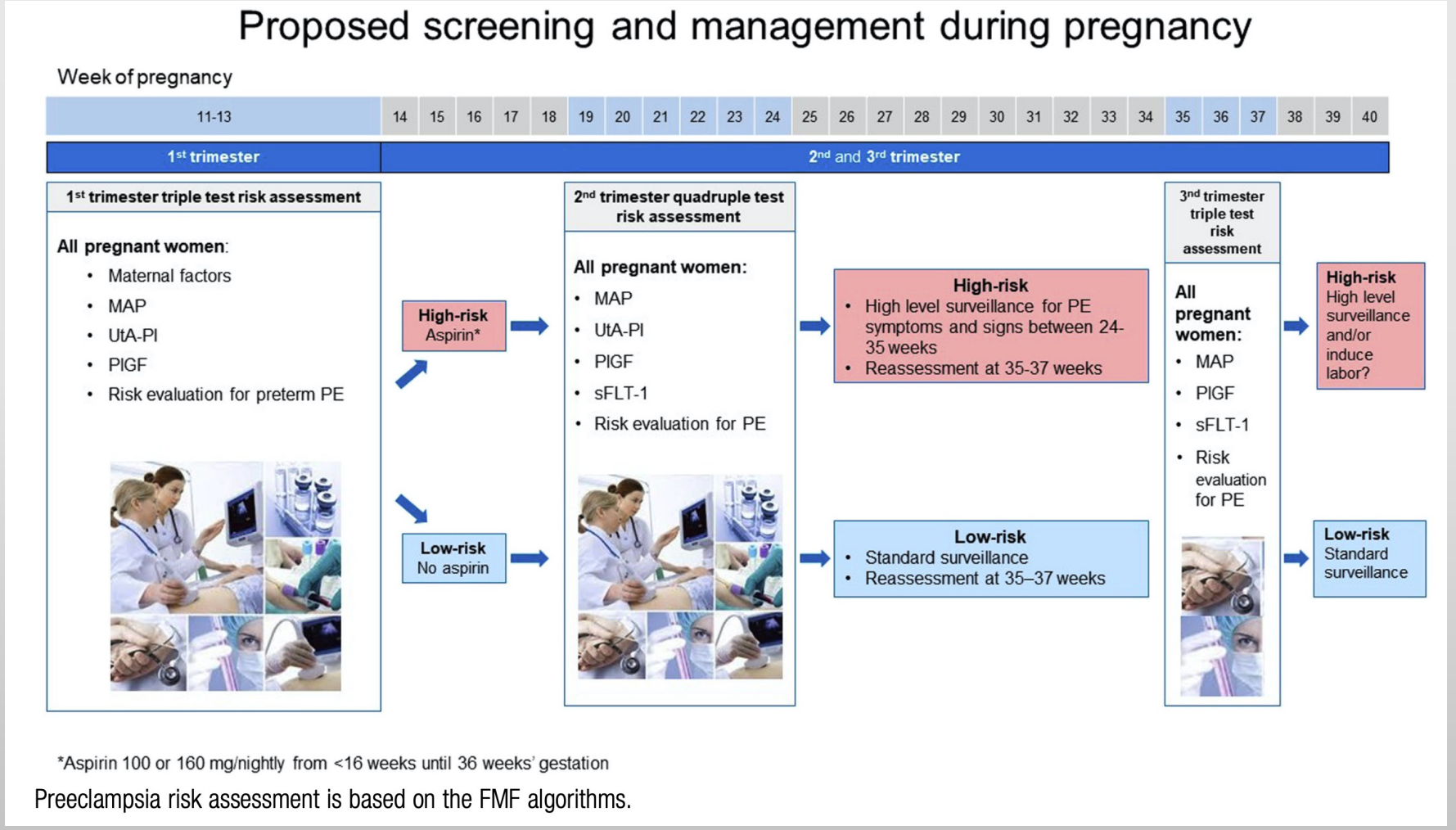
[1]*Fetal Medicine Unit, St George's University Hospitals NHS Foundation Trust, London, UK;* [2]*Vascular Biology Research Centre, Molecular and Clinical Sciences Research Institute, St George's University of London, London, UK*



Early uteroplacental dysfunction in pathogenesis of iatrogenic and spontaneous preterm birth (PTB). OR, odds ratio.

Giorgione 2022 UOG

FMF-Algorithmus: PE



Preeclampsia risk assessment is based on the FMF algorithms.

OBSTETRICS

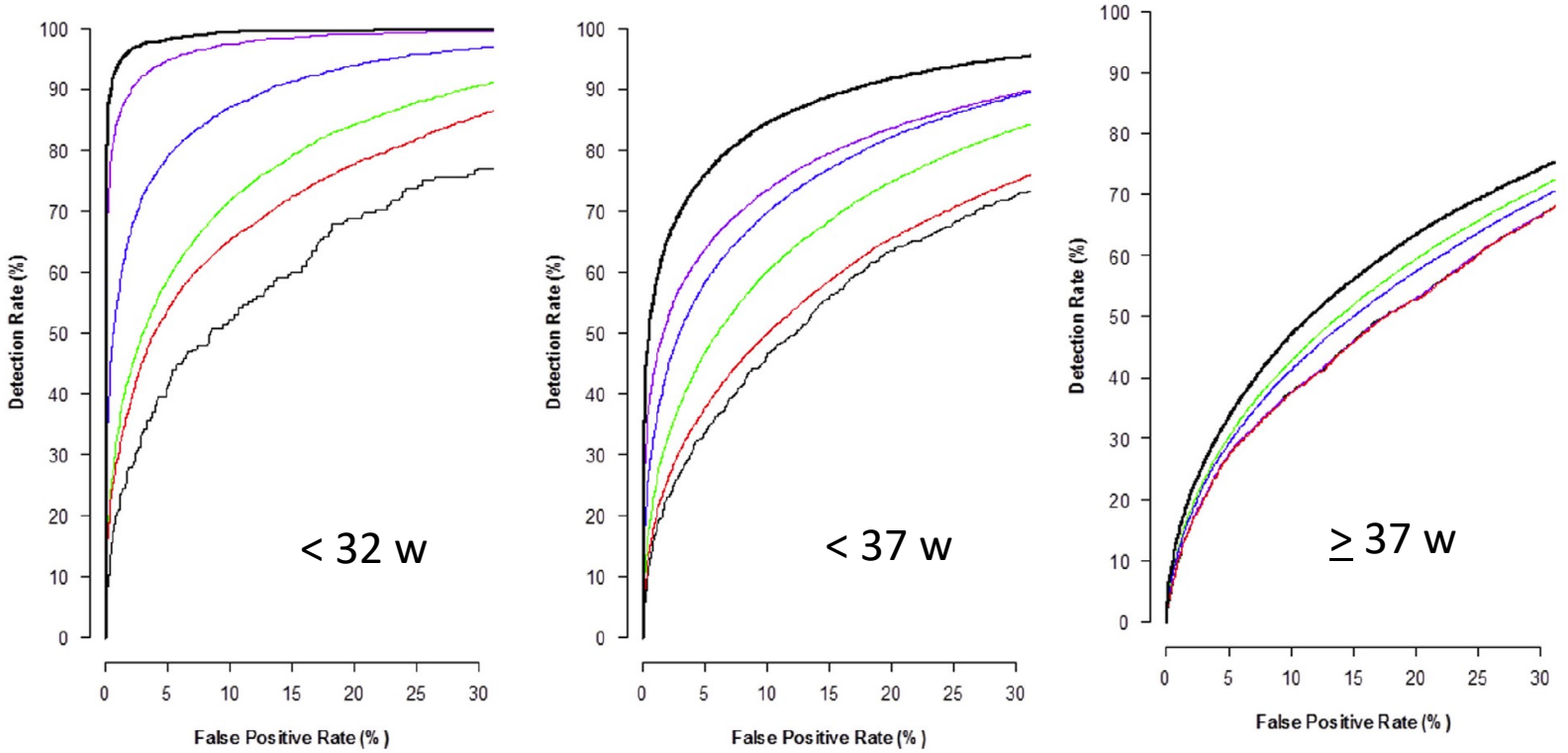
Competing risks model in screening for preeclampsia by maternal factors and biomarkers at 19–24 weeks' gestation

Dahiana M. Gallo, MD; David Wright, PhD; Cristina Casanova, MD; Mercedes Campanero, MD; Kypros H. Nicolaides, MD

Gallo 2016 AJOG

FIGURE 2

Receiver operating characteristic curves for prediction of preeclampsia



Results are shown at <32 (**left**), <37 (**middle**), and ≥37 weeks' gestation (**right**) by maternal factors (*black*) and combination of maternal factors with uterine artery pulsatility index (*blue*), mean arterial pressure (*green*), serum placental growth factor (*purple*), soluble fms-like tyrosine kinase-1 (*red*), and combination of maternal factors with uterine artery pulsatility index, mean arterial pressure, and serum placental growth factor (*bold black*).

Gallo et al. Second-trimester screening for preeclampsia. Am J Obstet Gynecol 2016.

PE: Sekundäres Screening

Ultrasound Obstet Gynecol 2014; 44: 402–410
Published online 25 August 2014 in Wiley Online Library (wileyonlinelibrary.com). **DOI:** 10.1002/uog.13439

Longitudinal changes in maternal soluble endoglin and angiopoietin-2 in women at risk for pre-eclampsia

A. KHALIL*, N. MAIZ†, R. GARCIA-MANDUJANO‡, M. ELKHOULI‡ and K. H. NICOLAIDES‡

**Department of Fetal Medicine, St George's University of London, London, UK; †Fetal Medicine Unit, Obstetrics and Gynecology Service BioCruces Health Research Institute, Hospital Universitario Cruces, University of the Basque Country (UPV/EHU), Barakaldo, Spain; ‡Department of Fetal Medicine, King's College Hospital, London, UK*

Auffällige Befunde aus 1. Trimenon nach 18 w kontrolliert (n=122)
sEng ab 18 SSW

- early PE
- term PE
- Hypertonus

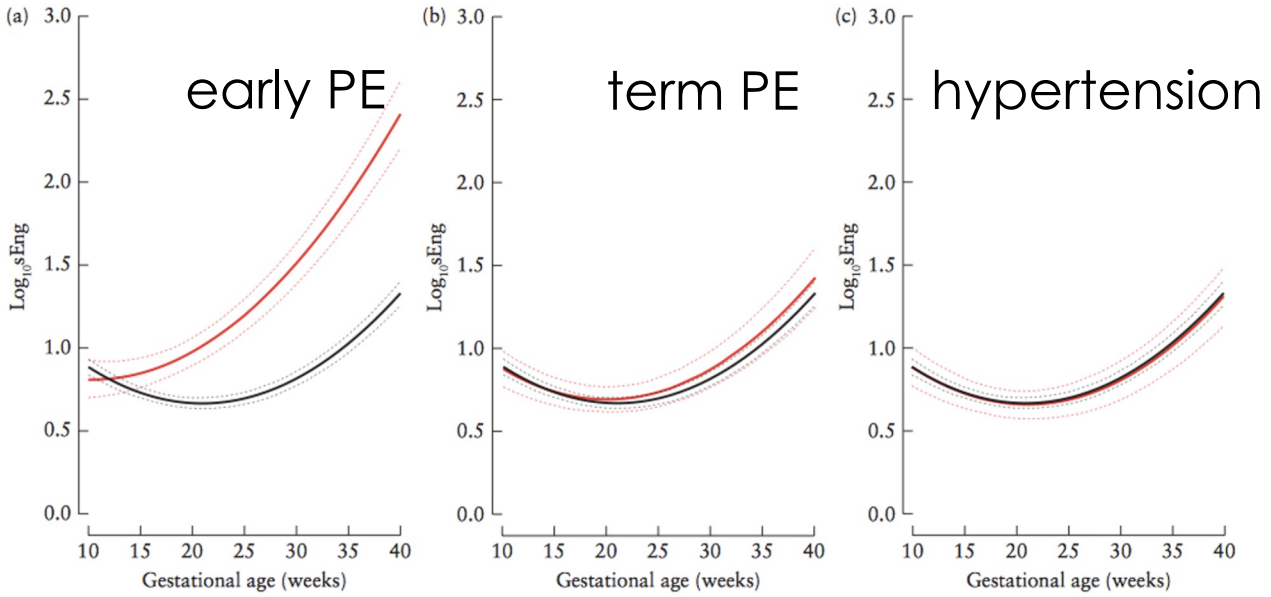


Figure 2 Mean predicted maternal plasma soluble endoglin (sEng) levels in pregnancies with normal outcome (——) and in those complicated (——) by preterm pre-eclampsia (PE) (a), term PE (b) and gestational hypertension (c), for a woman weighing 70 kg. Mean values with 95% CIs are shown.


DE GRUYTER
Holger Stepan,
Stefan Verlohren (Hrsg.)
PRÄEKLAMPSIE
DIAGNOSTIK UND KLINISCHES MANAGEMENT
DE
G