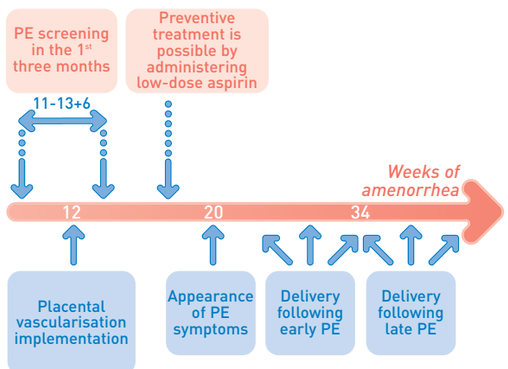
Clinical significance

The clinical significance of early screening for pre-eclampsia lies in the possibility to:

- initiate close obstetrical monitoring,
- start low-dose aspirin treatment early on in the pregnancy.

Although there is no international consensus, a recent study shows that aspirin reduces the risks of pre-eclampsia, premature birth, and IUGR by more than 50% if the treatment is initiated in the first 16 weeks of pregnancy (Bujold et al. 2010).
Furthermore, according to a meta-analysis in 2012, 89% of cases of early PE could have been avoided or delayed (a less severe form) if treatment with aspirin is initiated before 16 weeks of pregnancy i.e. 18 WA (Roberge et al. 2012).
These results highlight the clinical significance of early screening for PE.
In France, recommendations from the Collège National des Gynécologues et Obstétriciens [French National College of Gynaecologists and Obstetricians](2009) are to start aspirin treatment with (75-160 mg/day) in patients considered high-risk for PE, before the 20th WA.



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In practice

Test request

- Estimation of the risk of pre-eclampsia in the first trimester of pregnancy. The risk can only be calculated during a single-foetus pregnancy.

Sample

- Between 11 WA and 0 days and 13 WA and 6 days
- Serum: In a separate plain tube collect a sample for pre-eclampsia. After removing the coagulated mass, quickly centrifuge the sample to separate the serum.

Storage and transport

- Refrigerated (+2°C à +8°C)

Document(s) to be enclosed with the test request

- Specific request form for pre-eclampsia, which can be downloaded at www.biomnis.com › Test menu › Test guide (group code: PECLA).

  The scan date for the 1st trimester with the crown-rump length measurement (CRL) are essential for the pre-eclampsia risk assessment.

  The other clinical details, if supplied, enable the risk assessment to be improved.

Arterial blood pressure measurement

Ideally, simultaneously measure the blood pressure on both arms. If this is not possible, the calculation can be made using the arterial blood pressure from one arm (don't measure the blood pressure on one arm and then the other).

The period between the ultrasound scan, the taking of blood pressure and sample collection must not exceed 10 days.

Price

PAPP-A quantification is routine in the T21 risk calculation for the 1st trimester and the pre-eclampsia risk calculations. The PPAP-A assay must be performed alongside a PIGF assay and the reagents used must be adapted to the PE risk calculation software.

Please contact the Biomnis International Division for further information.

To find out more about this subject

Find all the necessary details at:

www.biomnis.com › Test Menu › Test guide or use the Biomnis mobile application

Biomnis group code: PECLA.

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Focus on...

Pre-eclampsia prediction screening during the first trimester

biomnis
SPECIALISED MEDICAL PATHOLOGY

Pre-eclampsia

Pre-eclampsia (PE) is a complication that can occur during pregnancy. It is a major, worldwide cause of maternal and foetal morbidity and mortality. In France, the incidence is estimated at 1-3% of nulliparous pregnancies and 0.5 - 1.5% of multiparous pregnancies.

Définition

PE is defined by:

- gestational arterial hypertension (systolic blood pressure ≥ 140 mm Hg, diastolic blood pressure ≥ 90 mm Hg),
- associated with proteinuria > 0.3 g/24 hrs and/or an oedematous syndrome.
- Hyperuricemia > 300 µmol/l,
- raised AST levels,
- thrombocytopenia > 150 x 10^9/L,
- intrauterine growth retardation (IUGR)

PE is considered severe when:

- the systolic blood pressure is ≥ 160 mm Hg and the diastolic blood pressure is ≥ 110 mm Hg,
- and/or the presence of severe proteinuria > 3.5 g/24 hrs
- combined with or without clinical symptoms (bar-like abdominal pain, nausea, vomiting, headaches etc.),
- or with changes in laboratory results (creatininemia > 100 µmol/l, AST > 3 times the normal level, thrombopenia < 100 x 10^9 /L).
- level, thrombopenia < 100 x 10^9 /L).

The diagnosis of HELLP syndrome (Haemolysis, Elevated Liver enzymes and Low Platelets) is made when confronted with haemolysis, combined with hepatic cytolysis and thrombocytopenia < 100 x 10^9 /L/L.

Pre-eclampsia pathophysiology

The origin of PE is attributed to a default in placentation, and then maternal endothelial dysfunction. In a 'normal' pregnancy, the maternal spiral uterine arteries dilate following a trophoblast invasion of the uterine walls. In PE, this restructuring does not happen correctly. Placental hypoxia is the first cause of PE. The maternal organism compensates for this abnormal placental vascularisation by arterial hypertension and a reduction in the perfusion of the organs, which leads to a risk of failure.

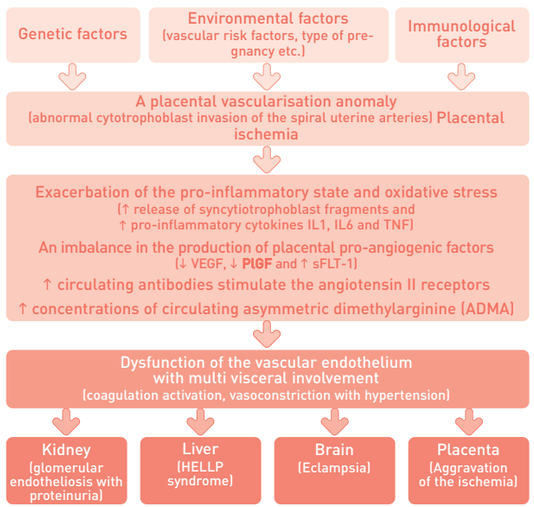
Pre-eclampsia develops at the beginning of the 1st trimester of pregnancy

The symptoms occur in the 3rd trimester of pregnancy:

- before 34 weeks of amenorrhoea: Early pre-eclampsia,
- after 34 weeks of amenorrhoea: Late pre-eclampsia.

Cases of early PE are more problematic because they require premature induction to delivery.

The pathogenesis of pre-eclampsia



By H Boulanger and M Flamant (2007).

Pre-eclampsia risk factors*

- Nulliparity
- Previous history of pre-eclampsia
- Pre-existing arterial hypertension
- Maternal age: < 20 years or > 35 years
- Obesity: BMI greater than 30 kg/m^2
- Multiple pregnancy
- Auto immune diseases: diabetes, SLE, RP, etc.
- Kidney failure
- Family history of pre-eclampsia.

** This list is non-exhaustive*

Short-term complications

- Premature delivery
- Intrauterine growth retardation (IUGR)
- Neonatal morbidity and mortality
- Maternal mortality: 2nd cause in France

Long-term complications

Women who suffer from pre-eclampsia that leads to premature delivery are 8 times more likely to die from a cardiovascular disease than women who did not suffer from pre-eclampsia and who deliver at full term.

The calculation of the risk of pre-eclampsia in the first trimester of pregnancy is performed using:

Definition

The calculation of the risk of pre-eclampsia in the first trimester of pregnancy is performed using:

Quantification assays of the following serum markers:

- PlGF (*Placental Growth Factor*), which is produced by the placenta, is an angiogenic factor that belongs to the vascular endothelial growth factor family (VEGF). It is a marker of endothelial function. The circulating concentration of PlGF decreases before the onset of clinical symptoms of PE.
- La PAPP-A (*Pregnancy-Associated Plasma Protein-A*) is a vascular marker and is quantified routinely as a serum marker for Down's syndrome screening during the first trimester of pregnancy. The risk of PE, notably severe PE, rises as the PAPP-A concentration decreases.

PlGF and PAPP-A values are expressed in multiples of the median (MoM) relative to the gestational age at the date of sampling.

Biophysical measurements:

- Arterial blood pressure
- Doppler scan of uterine arteries

Clinical information:

- **The patient:** BMI, geographical origin, smoker, etc.
- **The patient's background:** parity, previous history of PE, previous history of arterial hypertension

The calculation software Predictor® (Perkin Elmer) used by Biomnis uses a calculation method developed by Professor Cuckle (University of Leeds) with data provided by Professor Nicolaides (King's College Hospital).

The risk calculation is given using a decisional threshold of 1/20.

Risk calculation performance

During the first trimester of pregnancy (11-13.6 weeks of amenorrhoea), the combination of the PAPP-A and PlGF results along with the clinical history and the uterine Doppler scan detect up to 93% of cases of early pre-eclampsia (with approximately 5% of false positives).

The PE detection rate relative to the combination of biological and biophysical markers used in the risk calculation (according to Akolekar, 2012).

Parameters	PE with delivery < 34 weeks		PE with delivery < 37 weeks		PE with delivery > 37 weeks	
	FP 5%	FP 10%	FP 5%	FP 10%	FP 5%	FP 10%
Patient information with	35.5%	50.5%	32.7%	43.3%	29.4%	40.3%
PlGF	59.3%	72.4%	40.8%	54.4%	29.1%	40.1%
PAPP-A	43.6%	54.7%	37.3%	48.2%	31.5%	42.1%
PlGF & PAPP-A	60.3%	74.3%	42.8%	55.8%	30.4%	40.8%
PlGF, DUA & MAP	87.4%	95.8%	60.6%	77.3%	37.6%	52.9%
PAPP-A, DUA & MAP	81.8%	92.5%	52.5%	74.6%	36.0%	59.9%
PlGF, PAPP-A, DUA & MAP	93.4%	96.3%	61.1%	76.6%	37.8%	53.6%

MAP: Mean arterial pressure
DUA: Doppler scan of uterine arteries
PAPP-A: Pregnancy-Associated Plasma Protein-A
PlGF: Placental Growth Factor
FP: False positives