Elecsys PAPP-A

04854098 119

100

English

System information

For cobas e 411 analyzer: test number 290
For MODULAR ANALYTICS E170, cobas e 601 and cobas e 602 analyzers: Application Code Number 211

Please note

The measured PAPP-A value of a patient’s sample can vary depending on the testing procedure used. The laboratory finding must therefore always contain a statement on the PAPP-A assay method used. PAPP-A values determined on patient samples by different testing procedures cannot be directly compared with one another and could be the cause of erroneous medical interpretations. If there is a change in the PAPP-A assay procedure used while monitoring therapy, then the PAPP-A values obtained upon changing over to the new procedure must be confirmed by parallel measurements with both methods.

Intended use


This assay is intended for the use as one component in combination with other parameters to evaluate the risk of trisomy 21 (Down syndrome) during the first trimester of pregnancy. Further testing is required for diagnosis of chromosomal aberrations.

The electrochemiluminescence immunoassay “ECLIA” is intended for use on Elecsys and cobas e immunoassay analyzers.

Note: Please note that the catalogue number appearing on the package insert retains only the first 8 digits of the licensed 11-digit Catalogue Number: 04854098200 for the Elecsys PAPP-A assay. The last 3 digits -200 have been replaced by -119 for logistic purposes.

Summary

Human pregnancy-associated plasma protein A (PAPP-A) is a large glycoprotein composed by two subunits with a total molecular weight of 200 kDa. PAPP-A belongs to the metzin superfamily of zinc peptidases and was first isolated from the serum of pregnant women, where its concentration increases steadily until term. PAPP-A is produced by the trophoblast and secreted into the maternal serum, where it mainly circulates as a heterotetrameric 2:2 complex, together with two subunits of the proform of eosinophil major basic protein (proMBP).

PAPP-A, in combination with free βHCG and the sonographic determination of nuchal translucency (NT), identifies women at increased risk of carrying a fetus affected with Down syndrome during the first trimester (week 8-14) of pregnancy. Using this marker combination, detection rates of up to 70 % (serum markers only) and 90 % (combined with NT) have been described at a false positive rate of 5 %. When the sonographic examination also includes the presence of the nasal bone, the detection rate was found to reach 97 %. Based on the maternal age, the risk for having a Down syndrome pregnancy can be calculated using a specific algorithm.

Precautions and warnings

For in vitro diagnostic use. Exercise the normal precautions required for handling all laboratory reagents. Disposal of all waste material should be in accordance with local guidelines. Avoid foam formation in all reagents and sample types (specimens, calibrators and controls).

Reagent handling

The reagents in the kit have been assembled into a ready-for-use unit that cannot be separated. All information required for correct operation is read in from the respective reagent barcodes.

Storage and stability

Store at 2-8 °C. Do not freeze.

Stability:

unopened at 2-8 °C up to the stated expiration date

after opening at 2-8 °C 4 weeks

on the analyzers 3 weeks

Specimen collection and preparation

Only the specimens listed below were tested and found acceptable.

Serum collected using standard sampling tubes or tubes containing separating gel.

Stable for 24 hours at 15-25 °C, 8 days at 2-8 °C, 12 months at -20 °C (± 5 °C). The samples may be frozen 3 times.

The sample types listed were tested with a selection of sample collection tubes that were commercially available at the time of testing, i.e. not all available tubes of all manufacturers were tested. Sample collection systems from various manufacturers may contain differing materials which could affect the test results in some cases. When processing samples in primary
Elecys PAPP-A

tubes (sample collection systems), follow the instructions of the tube manufacturer. Do not use heat-inactivated samples. Do not use samples that have been stabilized with azide. Ensure the samples, calibrators and controls are at 20-25 °C prior to measurement. Due to possible evaporation effects, samples, calibrators and controls on the analyzers should be analyzed/measured within 2 hours.

Materials provided
See “Reagents – working solutions” section for reagents.

Materials required (but not provided)
- 04854101200, PAPP-A CalSet, for 4 x 1.0 mL
- 04899881200, PreciControl Maternal Care, for 6 x 2.0 mL
- 03005712190, ProbeWash M, 12 x 70 mL cleaning solution for run finalization and rinsing during reagent change
- 11732277122, Diluent Universal, 2 x 16 mL sample diluent
- 03183971122, Diluent Universal, 2 x 36 mL sample diluent
- General laboratory equipment
- MODULAR ANALYTICS E170 or cobas e analyzer

Accessories for cobas e 411 analyzer:
- 11662988122, ProCell, 6 x 380 mL system buffer
- 11662970122, CleanCell, 6 x 380 mL measuring cell cleaning solution
- 11930346122, Elecsys SysWash, 1 x 500 mL washer additive
- 11933159001, Adapter for SysClean
- 1170682001, AssayCup, 60 x 60 reaction cups
- 11706799001, AssayTip, 30 x 120 pipette tips
- 11800507001, Clean‑Liner

For risk calculation of trisomy 21:
- 04854071200, Elecsys free βhCG, 100 tests
- 04854080200, free βhCG CalSet, for 4 x 1.0 mL

A suitable software
Accessories for MODULAR ANALYTICS E170, cobas e 601 and cobas e 602 analyzers:
- 04880340190, ProCell M, 2 x 2 L system buffer
- 04880293190, CleanCell M, 2 x 2 L measuring cell cleaning solution
- 03023141001, PC/CC‑Cups, 12 cups to prewarm ProCell M and CleanCell M before use
- 03023150001, WasteLiner, waste bags

A suitable software
Accessories for MODULAR ANALYTICS E170, cobas e 601 and cobas e 602 analyzers:
- 04880340190, ProCell M, 2 x 2 L system buffer
- 04880293190, CleanCell M, 2 x 2 L measuring cell cleaning solution
- 03023141001, PC/CC‑Cups, 12 cups to prewarm ProCell M and CleanCell M before use
- 03023150001, WasteLiner, waste bags

Assay
For optimum performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator’s manual for analyzer-specific assay instructions. Resuspension of the microparticles takes place automatically prior to use. Read in the test-specific parameters via the reagent barcode. If in exceptional cases the barcode cannot be read, enter the 15-digit sequence of numbers (except for the cobas e 602 analyzer).

Bring the cooled reagents to approximately 20 °C and place on the reagent disk (20 °C) of the analyzer. Avoid foam formation. The system automatically regulates the temperature of the reagents and the opening/closing of the bottles.

Calibration
Traceability: This method has been standardized against a commercially available PAPP-A test, which in turn was standardized against the WHO standard preparation IRP 78/610.

Every Elecsys reagent set has a barcoded label containing specific information for calibration of the particular reagent lot. The predefined master curve is adapted to the analyzer using the relevant CalSet.

Calibration frequency: Calibration must be performed once per reagent lot using fresh reagent (i.e. not more than 24 hours since the reagent kit was registered on the analyzer). Calibration interval may be extended based on acceptable verification of calibration by the laboratory.

Renewed calibration is recommended as follows:
- after 12 weeks when using the same reagent lot
- after 7 days when using the same reagent kit on the analyzer
- as required: e.g. quality control findings outside the defined limits

Quality control
For quality control, use PreciControl Maternal Care. In addition, other suitable control material can be used. Controls for the various concentration ranges should be run individually at least once every 24 hours when the test is in use, once per reagent kit, and following each calibration.

The control intervals and limits should be adapted to each laboratory’s individual requirements. Values obtained should fall within the defined limits. Each laboratory should establish corrective measures to be taken if values fall outside the defined limits. If necessary, repeat the measurement of the samples concerned.

Follow the applicable government regulations and local guidelines for quality control.

Calculation
The analyzer automatically calculates the analyte concentration of each sample (either in mIU/L, IU/L or mIU/mL).

Conversion factors:
\[
\text{mIU/mL} \times 1000 = \text{mIU/L} \\
\text{mIU/mL} \times 1 = \text{IU/L} \\
\text{IU/L} \times 1000 = \text{mIU/L}
\]

Limitations - interference
The assay is unaffected by icterus (bilirubin < 205 µmol/L or < 12 mg/dL), hemolysis (Hb < 0.621 mmol/L or < 1.0 g/dL), lipemia (Intralipid < 1500 mg/dL) and biotin (< 123 mmol/L or < 30 ng/mL).

Criterion: Recovery within ± 10 % of initial value.

Samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.

No interference was observed from rheumatoid factors up to a concentration of 1000 IU/mL.

There is no high-dose hook effect at PAPP-A concentrations up to 120000 mU/L.

In vitro tests were performed on 18 commonly used pharmaceuticals. No interference with the assay was found.

In rare cases, interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur. These effects are minimized by suitable test design.

In the event that the measured PAPP-A value is conspicuously low, e.g. < 0.2 MoM, it is recommended to either exclude PAPP-A from the 1st trimester risk calculation, or to perform a 2nd trimester trisomy screening.

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Limits and ranges
Measuring range
4-10000 mU/L (defined by the lower detection limit and the maximum of the master curve). Values below the lower detection limit are reported as

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Limits and ranges
Measuring range
4-10000 mU/L (defined by the lower detection limit and the maximum of the master curve). Values below the lower detection limit are reported as
Elecsys PAPP-A

< 4 mIU/L. Values above the measuring range are reported as > 10000 mIU/L (or up to 10000 mIU/L for 10-fold diluted samples).

Lower limits of measurement

**Lower detection limit of the test**
Lower detection limit: < 4 mIU/L

The lower detection limit represents the lowest measurable analyte level that can be distinguished from zero. It is calculated as the value lying two standard deviations above that of the lowest standard (master calibrator, standard 1 + 2 SD, repeatability study, n = 21).

Dilution

Samples with PAPP-A concentrations above the measuring range can be diluted with Diluent Universal. The recommended dilution is 1:10 (either automatically by the analyzers or manually). The concentration of the diluted sample must be > 500 mIU/L.

After manual dilution, multiply the result by the dilution factor.

After dilution by the analyzers, the software automatically takes the dilution into account when calculating the sample concentration.

Expected values and clinical performance

The following results were obtained with the Elecsys PAPP-A assay:

1. **Reference range study** using a panel of samples from 500 healthy non-pregnant donors (Roche study No. RMP026) with

   < 7.15 mIU/L (95th percentile).

2. **Performance evaluation study** of the Elecsys PAPP-A assay and the Elecsys free βhCG assay in first trimester trisomy 21 risk assessment (Roche study No. B05P020, status May 2011 and Roche study No. CIN 00950, status May 2011)16

Measurements with the Elecsys free βhCG assay and the Elecsys PAPP-A assay were conducted in 6 clinical centers in Belgium, Switzerland, Denmark, England and Germany. Median values (gestational weeks 8+0 to 14+0) were calculated from log-linear regression analysis of 4841 PAPP-A values for the middle of the respective week (week n+3). Gestational age was calculated from ultrasound crown-to-rump length (CRL) according to Robinson.19

<table>
<thead>
<tr>
<th>Gestational week</th>
<th>Number of samples</th>
<th>Value at the middle of the week (mIU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8+0 to 8+6</td>
<td>178</td>
<td>289</td>
</tr>
<tr>
<td>9+0 to 9+6</td>
<td>302</td>
<td>580</td>
</tr>
<tr>
<td>10+0 to 10+6</td>
<td>465</td>
<td>1144</td>
</tr>
<tr>
<td>11+0 to 11+6</td>
<td>805</td>
<td>1647</td>
</tr>
<tr>
<td>12+0 to 12+6</td>
<td>1557</td>
<td>2664</td>
</tr>
<tr>
<td>13+0 to 13+6</td>
<td>1438</td>
<td>4349</td>
</tr>
</tbody>
</table>

Each laboratory should investigate the transferability of the expected values to its own patient population and if necessary determine its own reference ranges.

For prenatal testing it is recommended that the median values be re-evaluated periodically.

Clinical performance data

In total, 2629 samples from clinical routine with known outcome were examined. 107 out of the 2629 samples were from pregnancies with confirmed Down syndrome. All samples were measured in parallel with FMF (Fetal Medicine Foundation) certified PAPP-A and free βhCG tests. Prenatal calculation was performed using a commercial software. This software makes use of an algorithm described by Palomaki et al.16 by means of the mathematical calculations for Gaussian multivariate distribution as already published.20 Risk analysis is based on maternal age, nuchal translucency as well as on the results of the biochemical parameters, corrected by different factors like e.g. maternal weight, smoking and ethnic background of the pregnant woman.

Individual risk calculation

The calculation of a woman's individual risk of carrying a single fetus affected by trisomy 21 was assessed without consideration of nuchal translucency (NT) data to demonstrate the performance of the biochemical methods. Maternal weight and smoking behavior were taken into account as correction factors. Concordance of risk analysis compared to a competitor method combination was examined using the cutoff value already established in the participating laboratory.22

It is the responsibility of the user to choose the cutoff which will apply for further procedures.

Concordance analysis data

A. Concordance analysis in unaffected pregnancies (n = 2522)

<table>
<thead>
<tr>
<th>Cutoff 5 % FPR*</th>
<th>Risk &lt; cutoff (Roche*)</th>
<th>Risk &lt; cutoff (Roche*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk &gt; cutoff</td>
<td>109 (4.32 %)</td>
<td>86 (80.4 %)</td>
</tr>
<tr>
<td>(competitor**)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk &lt; cutoff</td>
<td>17 (0.67 %)</td>
<td>3 (3.74 %)</td>
</tr>
<tr>
<td>(competitor**)</td>
<td></td>
<td>17 (15.9 %)</td>
</tr>
</tbody>
</table>

b) FPR = false positive rate

In 2522 unaffected samples the Roche methods correctly classified 2396 samples (specificity: 95.0 %) in comparison to 2395 (specificity: 95.0 %) correctly classified by the competitor methods.

B. Detection rate in confirmed trisomy 21 pregnancies (n = 107)

<table>
<thead>
<tr>
<th>Cutoff 5 % FPR*</th>
<th>Risk &lt; cutoff (Roche*)</th>
<th>Risk &lt; cutoff (Roche*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk &gt; cutoff</td>
<td>86 (80.4 %)</td>
<td>0</td>
</tr>
<tr>
<td>(competitor**)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk &lt; cutoff</td>
<td>4 (3.74 %)</td>
<td>17 (15.9 %)</td>
</tr>
<tr>
<td>(competitor**)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In 107 affected samples the Roche methods showed a detection rate of 84.1 % (90/107) in comparison to 80.4 % (86/107) obtained with the competitor methods.

* Combination of results from the Elecsys PAPP-A assay and the Elecsys free βhCG assay

** Combination of results from the competitors PAPP-A and free βhCG methods

Specific performance data

Representative performance data on the analyzers are given below.

Results obtained in individual laboratories may differ.

Precision

Precision was determined using Elecsys reagents, pooled human sera and controls in a modified protocol (EP5-A) of the CLSI (Clinical and Laboratory Standards Institute); 6 times daily for 10 days (n = 60). The following results were obtained:

**cobas e 411 analyzer**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mean mIU/L</th>
<th>SD mIU/L</th>
<th>CV %</th>
<th>SD mIU/L</th>
<th>CV %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human serum 1</td>
<td>283</td>
<td>6.7</td>
<td>2.4</td>
<td>6.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Human serum 2</td>
<td>521</td>
<td>11.5</td>
<td>2.2</td>
<td>11.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Human serum 3</td>
<td>4181</td>
<td>87.1</td>
<td>2.1</td>
<td>94.7</td>
<td>2.3</td>
</tr>
<tr>
<td>PC Maternal Care 1</td>
<td>6630</td>
<td>111</td>
<td>1.7</td>
<td>133</td>
<td>2.0</td>
</tr>
<tr>
<td>PC Maternal Care 2</td>
<td>3361</td>
<td>55.0</td>
<td>1.6</td>
<td>58.7</td>
<td>1.8</td>
</tr>
<tr>
<td>PC Maternal Care 3</td>
<td>144</td>
<td>1.60</td>
<td>1.1</td>
<td>1.6</td>
<td>1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) PC = PreciControl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
</tr>
<tr>
<td>Human serum 1</td>
</tr>
<tr>
<td>Human serum 2</td>
</tr>
<tr>
<td>Human serum 3</td>
</tr>
<tr>
<td>PC Maternal Care 1</td>
</tr>
<tr>
<td>PC Maternal Care 2</td>
</tr>
<tr>
<td>PC Maternal Care 3</td>
</tr>
</tbody>
</table>

**cobas e 601 and cobas e 602 analyzers**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mean mIU/L</th>
<th>SD mIU/L</th>
<th>CV %</th>
<th>SD mIU/L</th>
<th>CV %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human serum 1</td>
<td>280</td>
<td>5.55</td>
<td>2.0</td>
<td>7.67</td>
<td>2.8</td>
</tr>
<tr>
<td>Human serum 2</td>
<td>506</td>
<td>8.33</td>
<td>1.7</td>
<td>9.83</td>
<td>1.9</td>
</tr>
<tr>
<td>Human serum 3</td>
<td>4001</td>
<td>75.5</td>
<td>1.9</td>
<td>92.2</td>
<td>2.3</td>
</tr>
<tr>
<td>PC Maternal Care 1</td>
<td>6335</td>
<td>107</td>
<td>1.7</td>
<td>114</td>
<td>1.8</td>
</tr>
<tr>
<td>PC Maternal Care 2</td>
<td>3229</td>
<td>36.8</td>
<td>1.1</td>
<td>45.3</td>
<td>1.4</td>
</tr>
<tr>
<td>PC Maternal Care 3</td>
<td>141</td>
<td>1.94</td>
<td>1.4</td>
<td>2.72</td>
<td>1.9</td>
</tr>
</tbody>
</table>
Elecsys PAPP-A

Method comparison
A comparison of the Elecsys PAPP-A assay (y) with a commercially available PAPP-A assay (x) using clinical samples gave the following correlations:

Number of samples measured: 3358

Passing/Bablok

\[ y = 0.942x + 74.8 \]
\[ y = 0.952x + 47.3 \]
\[ \tau = 0.923 \quad r = 0.985 \]

The sample concentrations were between approximately 30 and approximately 10000 mIU/L.

Analytical specificity
No cross reactivity against angiotensinogen and α2-macroglobulin detectable.

Functional sensitivity
< 20 mIU/L

The functional sensitivity is the lowest analyte concentration that can be reproducibly measured with an intermediate precision CV of 20 %.

References
5. Nicolaides KH. Screening for fetal aneuploidies at 11 to 13 weeks. The functional sensitivity is the lowest analyte concentration that can be reproducibly measured with an intermediate precision CV of 20 %.

For further information, please refer to the appropriate operator’s manual for the analyzer concerned, the respective application sheets, the product information and the Method Sheets of all necessary components (if available in your country).

A point (period/stop) is always used in this Method Sheet as the decimal separator to mark the border between the integral and the fractional parts of a decimal numeral. Separators for thousands are not used.

Symbols
Roche Diagnostics uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard (for USA: see https://usdiagnostics.roche.com for definition of symbols used):

- CONTENT
- SYSTEM
- REAGENT
- CALIBRATOR
- GTIN

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Additions, deletions or changes are indicated by a change bar in the margin.

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