

Case reports

*MUDr. Ing. Magdaléna Fořtová, Ph.D.
MagdalenaFortova@seznam.cz*

*Department of Medical Chemistry and Clinical
Biochemistry, Charles University,
2nd Faculty of Medicine and University Hospital Motol*

Patient 1

Middle-aged man

- The patient was found at the sidewalk in the snow **at about 6 am**, he was very confused, he didn't know what had happened.
- He was slightly supercooled (35.5 °C), SpO₂ 94 %, pulse: 96/min, blood pressure: 150/88.
- He was transported using fast rescue service to University Hospital Motol.

- **blood collection time: 6:48 SAMPLE 1**

| | | | | Ref. meze |
|--|-------|------|--------|-------------|
| Hb | 144,0 | [*] | g/l | 132,0-173,0 |
| <small>Vodivost/Fotometrie Nova SP CCX</small> | | | | |
| Hct | 45 | [*] | % | 39-49 |
| <small>Konduktometrie Nova SP CCX</small> | | | | |
| 81135 Sodný kation | 142 | [*] | mmol/l | 137-146 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81145 Draselný kation | 2,9 | *[] | mmol/l | 3,8-5,0 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81157 Chloridy | 109 | []* | mmol/l | 97-108 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81141 Ca++ - norm. | 1,17 | [*] | mmol/l | 1,13-1,32 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81155 Glukóza | 11,13 | []* | mmol/l | 3,30-5,80 |
| <small>Amperometrie Nova SP CCX</small> | | | | |
| 81137 Močovina | 3,9 | [*] | mmol/l | 2,8-8,0 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| FIO2 | 20,90 | | % | |

- **blood collection time: 7:26 SAMPLE 2**

| | | | | Ref. meze |
|--|------|------|--------------|-----------|
| Chylózní vzorek | | + | | |
| 81111 ALT | 3,24 | []* | ukat/l | 0,17-0,78 |
| <small>Modifikovaná IFCC metoda při 37°C</small> | | | | |
| 81153 GGT (GMT) | 0,84 | [*] | ukat/l | 0,14-0,84 |
| <small>IFCC metoda při 37°C</small> | | | | |
| 81121 Bilirubin celkový | 3,7 | [*] | umol/l | 2,0-17,0 |
| <small>Vanadátová metoda</small> | | | | |
| S-KREA | | | | |
| 81169 Kreatinin | 116 | []* | umol/l | 55-96 |
| <small>Enzymová kolorimetrická metoda</small> | | | | |
| eGFR-krea-(CKD-EPI) | 1,17 | | ml/s/1,73 m2 | |
| 81125 Celková bílkovina | 67,0 | [*] | g/l | 65,0-85,0 |
| <small>Biuretová metoda</small> | | | | |
| 91153 CRP-HS | 1,3 | [*] | mg/l | 0,0-5,0 |
| <small>Imunoturbidimetrie</small> | | | | |
| 97111 Separace séra | 1x | | | |

Blood
collection
time:

10:00

SAMPLE 3

| | | | | Ref. meze |
|-------|---|-----------------------|--------------|---|
| 81135 | Sodný kation ISE - s ředěním | 136 | *[] mmol/l | 137-146 |
| 81145 | Draselný kation ISE - s ředěním | 3,5 | *[] mmol/l | 3,8-5,0 |
| 81157 | Chloridy ISE - s ředěním | 114 | []* mmol/l | 97-108 |
| 81141 | Ca++ - norm. ISE | 1,09 | *[] mmol/l | 1,13-1,32 |
| 81465 | Hořčík Kolorimetrická metoda s xylidilovou modří | 0,85 | [*] mmol/l | 0,66-0,91 |
| 81563 | Osmolalita Kryoskopie | 336 | []* mmol/kg | opakovaně 285-295 |
| | Osmolalita-počítaná počítaná: 2*(Na)+p-Glu+Urea | 283 | *[] mmol/kg | 285-295 |
| 81155 | Glukóza v plazmě Metoda s HK | 7,0 | []* mmol/l | 3,3-5,8 |
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 2,89 | []* ukat/l | 0,17-0,78 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 1,00 | []* ukat/l | 0,14-0,84 |
| 81165 | Kreatinkináza Metoda při 37°C (NAC) | 28,00 | []* ukat/l | ředěno 0,41-3,24 |
| 81117 | Amyláza IFCC metoda při 37°C | 1,36 | [*] ukat/l | 0,30-2,28 |
| 81121 | Bilirubin celkový Vanadátová metoda | 5,9 | [*] umol/l | 2,0-17,0 |
| 81123 | Bilirubin přímý Vanadátová metoda | 1,9 | [*] umol/l | 0,0-5,1 |
| 81137 | Močovina Enzymová metoda s ureázou a GDH | 3,9 | [*] mmol/l | 2,8-8,0 |
| | S-KREA | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 77 | [*] umol/l | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,86 | ml/s/1,73 m2 | |
| | hs Tnl + delta | | | |
| 81237 | hs Troponin I CMIA Architect | <2,0 | ng/l | cut-off AIM: M: 342; Ž: 156 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | nelze spočítat | | |
| | Relativní delta hs Tnl počítaná hodnota | nelze spočítat | | |
| 93135 | Myoglobin Imunoturbidimetrie | 1596,0 | []* ug/l | ředěno 23,0-72,0 |
| 81125 | Celková bílkovina Biuretová metoda | 55,6 | *[] g/l | 65,0-85,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 1,2 | [*] mg/l | 0,0-5,0 |
| 91481 | Prokalcitonin ECLIA Cobas 6000 (e601) | 0,12 | [*] ug/l | 0,00-0,50 |
| 97111 | Separace séra | 1x | | |

Questions A

- What findings from "Sampling 3" could be related to a life-threatening condition?
- Try a differential diagnostic analysis of the causes of these findings.

Blood
collection
time:

10:00

SAMPLE 3

| | | | | | Ref. meze |
|-------|--|--------|----------------|--------------|---|
| 81135 | Sodný kation ISE - s ředěním | 136 | *[] | mmol/l | 137-146 |
| 81145 | Draselný kation ISE - s ředěním | 3,5 | *[] | mmol/l | 3,8-5,0 |
| 81157 | Chloridy ISE - s ředěním | 114 | []* | mmol/l | 97-108 |
| 81141 | Ca ⁺⁺ - norm. ISE | 1,09 | *[] | mmol/l | 1,13-1,32 |
| 81465 | Hořčík Kolorimetrická metoda s xylidilovou medí | 0,85 | [*] | mmol/l | 0,66-0,91 |
| 81563 | Osmolalita Kryoskopie | 336 | []* | mmol/kg | opakovaně 285-295 |
| | Osmolalita-počítaná počítána 2*(Na)+Gluc+Urea | 283 | *[] | mmol/kg | 285-295 |
| 81155 | Glukóza v plazmě Metoda s HK | 7,0 | []* | mmol/l | 3,3-5,8 |
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 2,89 | []* | ukat/l | 0,17-0,78 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 1,00 | []* | ukat/l | 0,14-0,84 |
| 81165 | Kreatinkináza Metoda při 37°C (NAC) | 28,00 | []* | ukat/l | ředěno 0,41-3,24 |
| 81117 | Amyláza IFCC metoda při 37°C | 1,36 | [*] | ukat/l | 0,30-2,28 |
| 81121 | Bilirubin celkový Vanadátová metoda | 5,9 | [*] | umol/l | 2,0-17,0 |
| 81123 | Bilirubin přímý Vanadátová metoda | 1,9 | [*] | umol/l | 0,0-5,1 |
| 81137 | Močovina Enzymová metoda s ureázou a GDH | 3,9 | [*] | mmol/l | 2,8-8,0 |
| | S-KREA | | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 77 | [*] | umol/l | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,86 | | ml/s/1,73 m2 | |
| | hs Tnl + delta | | | | |
| 81237 | hs Troponin I CMIA Architect | <2,0 | | ng/l | cut-off AIM: M: 342; Ž: 156 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | | nelze spočítat | | |
| | Relativní delta hs Tnl počítaná hodnota | | nelze spočítat | | |
| 93135 | Myoglobin Imunoturbidimetrie | 1596,0 | []* | ug/l | ředěno 23,0-72,0 |
| 81125 | Celková bílkovina Biuretová metoda | 55,6 | *[] | g/l | 65,0-85,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 1,2 | [*] | mg/l | 0,0-5,0 |
| 91481 | Prokalcitonin ECLIA Cobas 6000 (e601) | 0,12 | [*] | ug/l | 0,00-0,50 |
| 97111 | Separace séra | 1x | | | |

Substances that increase osmolality above 3 mmol/kg water at a potentially lethal dose

| Substance | Potentially lethal concentration (mg/l) | Osmolal gap (mmol/kg vody) |
|--------------|---|----------------------------|
| etanol | 3500 | 81 |
| etyléter | 1800 | 70 |
| izopropanol | 3400 | 60 |
| metanol | 800 | 27 |
| aceton | 550 | 10 |
| trichloretan | 1000 | 4 |
| paraldehyd | 500 | 4 |
| etylenglykol | 210 | 3,4 |
| chloroform | 390 | 3,4 |

(Weiss, 1988)

Osmolal gap in the case of our patient: **53 mmol/kg**, osmolality is most increased by ethanol, which is also the most common cause of this condition.

In addition, ethanol could be smelled from our patient's breath.

Osmolal gap

Osmolal gap: 53 mmol / kg

1g of ethanol in 1L of plasma (i.e. 1 promile)
increases osmolality by about 23 mmol / kg

$$P(\text{Ethanol}) = \text{OsmGap} \times 0.0429 \text{ (g/L, promile)}$$

$$53 \times 0.0429 = \mathbf{2.2737 \text{ ‰}}$$

*4 hours after
finding the patient*

$$P(\text{Ethanol}) = \text{OsmGap} \times 0.9457 \text{ (mmol/L)}$$

$$53 \times 0.9457 = \mathbf{50.1221 \text{ mmol/L}}$$

- **6:48**

- The patient (35 years old) is better oriented, says that he was drinking hard alcohol all night (whiskey - 1-2 bottles) + he was smoking marijuana.
- He then quarreled with his girlfriend.
- With the cry "I am the Devil" he jumped out of the window (3rd floor).

- Sample 2 with the uncovered ethanol test result (in 7:26)

| | | | | Ref. meze |
|-------|---|-------|--------------|--------------|
| | Chylózní vzorek | | | |
| 81723 | Ethanol Enzymatická metoda s ADH | 64,46 | mmol/l | 2,9 ‰ |
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 3,24 | []* ukat/l | 0,17-0,78 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 0,84 | [*] ukat/l | 0,14-0,84 |
| 81121 | Bilirubin celkový Vanadátová metoda | 3,7 | [*] umol/l | 2,0-17,0 |
| | S-KREA | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 116 | []* umol/l | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,17 | ml/s/1,73 m2 | |
| 81125 | Celková bílkovina Biuretová metoda | 67,0 | [*] g/l | 65,0-85,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 1,3 | [*] mg/l | 0,0-5,0 |
| 97111 | Separace séra | 1x | | |

→ 1.5 h after finding the patient: 2.9 ‰ ethanol

Questions B

- In "Sample 1", try to explain the cause of **hypokalemia and hyperglycemia.**
- In „Sample 2", try to explain the cause of **increased creatinine and ALT.**

- **blood collection time: 6:48 SAMPLE 1**

| | | | | Ref. meze |
|--|-------|------|--------|-------------|
| Hb | 144,0 | [*] | g/l | 132,0-173,0 |
| <small>Vodivost/Fotometrie Nova SP CCX</small> | | | | |
| Hct | 45 | [*] | % | 39-49 |
| <small>Konduktometrie Nova SP CCX</small> | | | | |
| 81135 Sodný kation | 142 | [*] | mmol/l | 137-146 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81145 Draselný kation | 2,9 | *[] | mmol/l | 3,8-5,0 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81157 Chloridy | 109 | []* | mmol/l | 97-108 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81141 Ca++ - norm. | 1,17 | [*] | mmol/l | 1,13-1,32 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| 81155 Glukóza | 11,13 | []* | mmol/l | 3,30-5,80 |
| <small>Amperometrie Nova SP CCX</small> | | | | |
| 81137 Močovina | 3,9 | [*] | mmol/l | 2,8-8,0 |
| <small>Potenciometrie Nova SP CCX</small> | | | | |
| FIO2 | 20,90 | | % | |

- **blood collection time: 7:26 SAMPLE 2**

| | | | | Ref. meze |
|--|------|------|--------------|-----------|
| Chylózní vzorek | | + | | |
| 81111 ALT | 3,24 | []* | ukat/l | 0,17-0,78 |
| <small>Modifikovaná IFCC metoda při 37°C</small> | | | | |
| 81153 GGT (GMT) | 0,84 | [*] | ukat/l | 0,14-0,84 |
| <small>IFCC metoda při 37°C</small> | | | | |
| 81121 Bilirubin celkový | 3,7 | [*] | umol/l | 2,0-17,0 |
| <small>Vanadátová metoda</small> | | | | |
| S-KREA | | | | |
| 81169 Kreatinin | 116 | []* | umol/l | 55-96 |
| <small>Enzymová kolorimetrická metoda</small> | | | | |
| eGFR-krea-(CKD-EPI) | 1,17 | | ml/s/1,73 m2 | |
| 81125 Celková bílkovina | 67,0 | [*] | g/l | 65,0-85,0 |
| <small>Biuretová metoda</small> | | | | |
| 91153 CRP-HS | 1,3 | [*] | mg/l | 0,0-5,0 |
| <small>Imunoturbidimetrie</small> | | | | |
| 97111 Separace séra | 1x | | | |

- urine collection time: 7:29

Poznámka k materiálu:

Masivní nález ery - sediment nelze hodnotiti!

| | | | Ref. meze |
|------------------------|--------------------|----------------|----------------|
| Moč chemicky | | | |
| 81325 | Spec. hmotnost | 1,027 | kg/l |
| | pH | 5,0 | |
| | Leukocyty | 4 | |
| | Nitrity | 1 | |
| | Bílkovina | 3 | |
| | Glukóza | 1 | |
| | Ketolátky | 1 | |
| | Urobilinogen | 1 | |
| | Bilirubin | - | |
| | Kyselina askorbová | - | |
| | Barva | červená | |
| | Zákal | lehce zakalená | |
| | Krev | 3 | |
| Elementy v moči | | | |
| | Erytrocyty | 20702 | []* částic/ul |
| | | | 0-10 |

Questions C

- Try to interpret the patient's urinary finding.
- Try to explain the finding that a patient with the same medical history would have almost all the results physiological (including a urinary erythrocyte test) and **the only pathological result would be a positive blood test (and possibly a slightly elevated protein).**

- 8:00

- **CT scan was performed:**

- Aortic rupture / dissection at the aboral end of the aortic arch with slight leakage of contrast medium
- Contusion changes of pulmonary parenchyma right basal
- Fracture of the right hip bone without dislocation
- Shattering fracture of pubic bone, including both arms

- Interventional radiologists have indicated **urgent introduction of stent graft**
- Performance was without complications

- **From the traumatological point of view, fractures were not indicated for surgical treatment, gradual rehabilitation was recommended**

Next steps:

- Repeated psychiatric and psychological examinations
- Intensive rehabilitation, crutches verticalization in about 3 weeks
- A month after the event, transport to the Psychiatric Hospital Bohnice

Patient 2

4.5-year-old boy

- Current disease: from the morning he breathed more, coughed a little, in the afternoon the mother noticed accelerated breathing (respiratory rate 38 /min), BT 36.8 °C
- Medical history: up to 4 years of age he was almost healthy (only 6th childhood disease and 1x tonsillitis), then increased morbidity - 2x obstructive bronchitis, 1x tonsillitis, 1x laryngitis, viral pneumonia 2 months ago
- Due to the anamnesis, the boy was examined in the evening at the emergency of the Motol University Hospital
- Pulse 162/min, BP 110/60, RR 40/min, Sat.O₂ 93–94 %

4.5-year-old boy

Blood collection time: 23:30

| | | | Ref. meze |
|--------|---------------------------------|-----------------|-------------|
| 8158 5 | pH | 7,424 [*] | 7,360-7,440 |
| | Potenolometrie Nova SP CCX | | |
| | pCO2 | 3,91 *[] kPa | 4,80-6,14 |
| | Potenolometrie Nova SP CCX | | |
| | pO2 | 8,37 *[] kPa | 9,50-14,00 |
| | Amperometrie Nova SP CCX | | |
| | akt. HCO3 | 19,8 *[] mmol/l | 21,0-26,0 |
| | BE | -4,7 *[] mmol/l | -2,3-2,3 |
| | BB | 43,1 [*] mmol/l | 42,1-53,9 |
| | Satur. HbO2 | 92,6 [*] % | 92,0-98,0 |
| | Fotometrie Nova SP CCX | | |
| | Hb | 117,0 [*] g/l | 110,0-150,0 |
| | Vodivost/Fotometrie Nova SP CCX | | |
| | Hct | 35 [*] % | 33-41 |
| | Konduktometrie Nova SP CCX | | |
| 8113 5 | Sodný kation | 141 [*] mmol/l | 137-146 |
| | Potenolometrie Nova SP CCX | | |
| 8114 5 | Draselný kation | 3,9 [*] mmol/l | 3,6-5,9 |
| | Potenolometrie Nova SP CCX | | |
| 8115 7 | Chloridy | 109 [*] mmol/l | 95-110 |
| | Potenolometrie Nova SP CCX | | |
| 8114 1 | Ca++ - norm. | 1,31 [*] mmol/l | 1,20-1,38 |
| | Potenolometrie Nova SP CCX | | |
| 8115 5 | Glukóza | 6,46 [*] mmol/l | 3,30-5,80 |
| | Amperometrie Nova SP CCX | | |
| 8117 1 | Laktát | 1,80 [*] mmol/l | 0,56-2,25 |
| | Amperometrie Nova SP CCX | | |
| | TempP | 37,5 °C | |
| | FIO2 | 20,90 % | |

CRP statim 7.0 mg/l 0.0-8.0

- **What is the problem with an acid base balance (taking into account laboratory and clinical findings)?**

| | | | Ref. meze |
|---------|---------------------------------|-----------------|-------------|
| 81158 5 | pH | 7,424 [*] | 7,360-7,440 |
| | Potenciometrie Nova SP CCX | | |
| | pCO2 | 3,91 [*] kPa | 4,80-6,14 |
| | Potenciometrie Nova SP CCX | | |
| | pO2 | 8,37 [*] kPa | 9,50-14,00 |
| | Amperometrie Nova SP CCX | | |
| | akt. HCO3 | 19,8 [*] mmol/l | 21,0-26,0 |
| | BE | -4,7 [*] mmol/l | -2,3-2,3 |
| | BB | 43,1 [*] mmol/l | 42,1-53,9 |
| | Satur. HbO2 | 92,6 [*] % | 92,0-98,0 |
| | Fotometrie Nova SP CCX | | |
| | Hb | 117,0 [*] g/l | 110,0-150,0 |
| | Vodivost/Fotometrie Nova SP CCX | | |
| | Hct | 35 [*] % | 33-41 |
| | Konduktometrie Nova SP CCX | | |
| 81113 5 | Sodný kation | 141 [*] mmol/l | 137-146 |
| | Potenciometrie Nova SP CCX | | |
| 81114 5 | Draselný kation | 3,9 [*] mmol/l | 3,6-5,9 |
| | Potenciometrie Nova SP CCX | | |
| 81115 7 | Chloridy | 109 [*] mmol/l | 95-110 |
| | Potenciometrie Nova SP CCX | | |
| 81114 1 | Ca++ - norm. | 1,31 [*] mmol/l | 1,20-1,38 |
| | Potenciometrie Nova SP CCX | | |
| 81115 5 | Glukóza | 6,46 [*] mmol/l | 3,30-5,80 |
| | Amperometrie Nova SP CCX | | |
| 81117 1 | Laktát | 1,80 [*] mmol/l | 0,56-2,25 |
| | Amperometrie Nova SP CCX | | |
| | TempP | 37,5 °C | |
| | FIO2 | 20,90 % | |

Patient 3

71-year-old woman

- Patient with long-term nicotine abuse (25-40 cig./day) examined on urgent admission for progressive dyspnea
- She was examined in a pulmonary clinic a few years ago, then she did not go there
- The general practitioner sometimes prescribes beta-mimetics to temporarily improve her breathing
- Objectively: oriented, cooperating, plethoric appearance, obesity
- BP 170/90, pulse 100/min, Sat.O₂ 74 %, mild tachypnoea, BT 36,8 °C
- Emphysematous position of the chest, bilaterally with wheezing and basally crepitation, regular heart rate, slightly accelerated
- Abdomen above the level, anasarca, suspected ascites, lower limbs with diffuse solid swelling

71-year-old woman

Blood collection time: 10:00

| | | | Ref. meze |
|-------|---------------------------------|-----------------|-------------|
| 81585 | pH | 7,303 *[] | 7,360-7,440 |
| | Potenciometrie Nova SP CCX | | |
| | pCO2 | 7,31 []* kPa | 4,40-5,73 |
| | Potenciometrie Nova SP CCX | | |
| | pO2 | 6,61 *[] kPa | 9,50-14,00 |
| | Amperometrie Nova SP CCX | | |
| | akt. HCO3 | 27,4 []* mmol/l | 18,4-26,0 |
| | BE | 0,9 [*] mmol/l | -2,3-2,3 |
| | BB | 48,7 [*] mmol/l | 44,0-53,0 |
| | Satur. HbO2 | 79,4 *[] % | 92,0-98,0 |
| | Fotometrie Nova SP CCX | | |
| | Hb | 177,0 []* g/l | 117,0-155,0 |
| | Vodivost/Fotometrie Nova SP CCX | | |
| | Hct | 54 []* % | 35-45 |
| | Konduktometrie Nova SP CCX | | |
| 81135 | Sodný kation | 134 *[] mmol/l | 137-144 |
| | Potenciometrie Nova SP CCX | | |
| 81145 | Draselný kation | 5,2 [*] mmol/l | 3,9-5,3 |
| | Potenciometrie Nova SP CCX | | |
| 81157 | Chloridy | 106 [*] mmol/l | 98-107 |
| | Potenciometrie Nova SP CCX | | |
| 81141 | Ca++ - norm. | 1,16 [*] mmol/l | 1,16-1,29 |
| | Potenciometrie Nova SP CCX | | |
| 81155 | Glukóza | 6,70 []* mmol/l | 4,60-6,40 |
| | Amperometrie Nova SP CCX | | |
| 81171 | Laktát | 2,00 [*] mmol/l | 0,50-2,00 |
| | Amperometrie Nova SP CCX | | |
| 81137 | Močovina | 4,2 [*] mmol/l | 2,9-8,2 |
| | Potenciometrie Nova SP CCX | | |
| | FIO2 | 20,90 % | |

Further examination

Transthoracic echo: **significant dilatation of hypertrophic right ventricle and its syst. dysfunction**, mild left ventricular hypertrophy

Chest X ray: Lungs airy, without foci and infiltrations, with accentuated vascular drawing. **Heart magnified**. The lung base on the right is obscured by a **small amount of fluid**.

| | | | | Ref. meze |
|-------|---|--------|--------------------------|------------|
| | Hemolýza | ++ | | |
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 0,18 | [*] ukat/l | 0,10-0,63 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 0,47 | [*] ukat/l | 0,15-0,92 |
| 81121 | Bilirubin celkový Vanadátová metoda | 18,3 | [*] umol/l | 3,0-19,0 |
| | S-KREA | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 61 | [*] umol/l | 42-80 |
| | eGFR-krea-(CKD-EPI) | 1,46 | ml/s/1,73 m ² | |
| 81731 | NT - proBNP ECLIA Cobas 6000 (e601) | 6133,0 | []* ng/l | 20,0-125,0 |
| 81125 | Celková bílkovina Biluretová metoda | 65,3 | [*] g/l | 62,0-77,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 3,5 | mg/l | 0,0-5,0 |
| 97111 | Separace séra | 1x | | |

- **What is the problem with an acid base balance (taking into account laboratory and clinical findings)?**
- **Explain other pathological findings.**

| | | | Ref. meze |
|---------|---|-----------------|-------------|
| 81158 5 | pH Potenciometrie Nova SP CCX | 7,303 *[] | 7,360-7,440 |
| | pCO2 Potenciometrie Nova SP CCX | 7,31 []* kPa | 4,40-5,73 |
| | pO2 Amperometrie Nova SP CCX | 6,61 *[] kPa | 9,50-14,00 |
| | akt. HCO3 | 27,4 []* mmol/l | 18,4-26,0 |
| | BE | 0,9 [*] mmol/l | -2,3-2,3 |
| | BB | 48,7 [*] mmol/l | 44,0-53,0 |
| | Satur. HbO2 Fotometrie Nova SP CCX | 79,4 *[] % | 92,0-98,0 |
| | Hb Vodivost/Fotometrie Nova SP CCX | 177,0 []* g/l | 117,0-155,0 |
| | Hct Konduktometrie Nova SP CCX | 54 []* % | 35-45 |
| 81113 5 | Sodný kation Potenciometrie Nova SP CCX | 134 *[] mmol/l | 137-144 |
| 81114 5 | Draselný kation Potenciometrie Nova SP CCX | 5,2 [*] mmol/l | 3,9-5,3 |
| 81115 7 | Chloridy Potenciometrie Nova SP CCX | 106 [*] mmol/l | 98-107 |
| 81114 1 | Ca++ - norm. Potenciometrie Nova SP CCX | 1,16 [*] mmol/l | 1,16-1,29 |
| 81115 5 | Glukóza Amperometrie Nova SP CCX | 6,70 []* mmol/l | 4,60-6,40 |
| 81117 1 | Laktát Amperometrie Nova SP CCX | 2,00 [*] mmol/l | 0,50-2,00 |
| 81113 7 | Močovina Potenciometrie Nova SP CCX | 4,2 [*] mmol/l | 2,9-8,2 |
| | FIO2 | 20,90 % | |

Patient 4

65-year-old man

- Examination at 13:45 at the urgent admission of the Motol University Hospital
- The patient woke up without difficulty in the morning of the day of admission.
- During the morning, he developed paresthesias of his fingertips on his left upper limb, gradually unable to fully lift the limb, scratching his face. He continued to function normally, tripping about his left lower limb about twice, so that he almost fell. At the casino, his friends told him he had a left corner of his mouth below.
- The patient negates the headache, visus is in the norm. The patient reports occasional stinging to the heart, which has been going on for a long time.
- The armor of the left hand has been repeated in the past 3 months, always disappearing.

65-year-old man

Medical history

- Social history: he never worked, he lives with his 15-year-old son, he smokes 40 cigarettes a day and does not drink alcohol
- Past medical history: condition after coronary stent insertion 4 years ago, arterial hypertension
- He is taking antihypertensives, he doesn't know what, he was taking about 5 other drugs he received after the stent was inserted, he said: he hadn't taken them for at least a year - he stopped.

65-year-old man

| | | | Ref. meze |
|-------|---|-----------------|-------------|
| 81585 | pH Potenciometrie Nova SP CCX | 7,265 [*] | 7,360-7,440 |
| | pCO2 Potenciometrie Nova SP CCX | 8,57 [*] kPa | 4,90-6,70 |
| | pO2 Amperometrie Nova SP CCX | 5,68 [*] kPa | 4,80-5,90 |
| | akt. HCO3 | 29,5 [*] mmol/l | 20,1-26,0 |
| | BE | 2,3 [*] mmol/l | -2,3-2,3 |
| | BB | 50,1 [*] mmol/l | 44,0-53,0 |
| | Satur. HbO2 Fotometrie Nova SP CCX | 68,2 [*] % | 70,0-80,0 |
| | Hb Vodivost/Fotometrie Nova SP CCX | 167,0 [*] g/l | 132,0-173,0 |
| | Hct Konduktometrie Nova SP CCX | 51 [*] % | 39-49 |
| 81135 | Sodný kation Potenciometrie Nova SP CCX | 141 [*] mmol/l | 137-144 |
| 81145 | Draselný kation Potenciometrie Nova SP CCX | 4,7 [*] mmol/l | 3,9-5,3 |
| 81157 | Chloridy Potenciometrie Nova SP CCX | 106 [*] mmol/l | 98-107 |
| 81141 | Ca++ - norm. Potenciometrie Nova SP CCX | 1,23 [*] mmol/l | 1,16-1,29 |
| 81155 | Glukóza Amperometrie Nova SP CCX | 6,53 [*] mmol/l | 4,60-6,40 |
| 81171 | Laktát Amperometrie Nova SP CCX | 4,30 [*] mmol/l | 0,50-2,00 |
| 81137 | Močovina Potenciometrie Nova SP CCX | 8,2 [*] mmol/l | 2,9-8,2 |
| | FIO2 | 20,90 % | |

Further examination

AngioCT of the brain: postischemic and postmalatic changes l.dx., without acute bleeding or expansion

ECG monitoring: accidentally detected **paroxysmal arrhythmia – bigeminy**

Chest X ray: Lungs airy, increased lung transparency, without foci and infiltrations. Heart unmagnified. **Conclusion: pulmonary emphysema**

Further examination

| | | | | Ref. meze |
|-----------------------|---|-----------------------|--------------|---|
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 0,39 | [*] ukat/l | 0,10-0,63 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 0,37 | [*] ukat/l | 0,15-0,92 |
| 81121 | Bilirubin celkový Vanadátová metoda | 8,0 | [*] umol/l | 3,0-19,0 |
| S-KREA | | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 109 | [*] umol/l | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,01 | ml/s/1,73 m2 | |
| hs Tnl + delta | | | | |
| 81237 | hs Troponin I CMIA Architect | 7,2 | [*] ng/l | cut-off AIM: M: 342; Ž: 156 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | nelze spočítat | | |
| | Relativní delta hs Tnl počítaná hodnota | nelze spočítat | | |
| 81125 | Celková bílkovina Biuretová metoda | 73,2 | [*] g/l | 62,0-77,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 15,8 | [*] mg/l | 0,0-5,0 |
| 97111 | Separace séra | 1x | | |
| 81611 | Triacylglyceroly GPO-PAP | 2,21 | [*] mmol/l | 0,40-1,98 |
| 81471 | Cholesterol CHOD-PAP | 4,6 | [*] mmol/l | 3,4-5,0 |
| HDL-CHOL | | | | |
| 81473 | HDL cholesterol Prima metoda | 0,71 | *[] mmol/l | 0,72-2,53 |
| | non-HDL cholesterol Vypočítaná hodnota | 3,89 | [*] mmol/l | <3,80 |
| 81527 | LDL cholesterol Prima metoda | 3,49 | [*] mmol/l | 1,50-3,00 |
| 93135 | Myoglobin Imunoturbidimetrie | 80,8 | ug/l | 12,0-92,0 |
| 81731 | NT - proBNP ECLIA Cobas 6000 (#601) | 456,5 | [*] ng/l | 20,0-125,0 |

- **What is the problem with an acid base balance (taking into account laboratory and clinical findings)?**
- **Explain other pathological findings.**

| | | | Ref. meze | |
|-------|---|---|-----------------|-------------|
| 81158 | 5 | pH Potenciometrie Nova SP CCX | 7,265 [*] | 7,360-7,440 |
| | | pCO2 Potenciometrie Nova SP CCX | 8,57 [*] kPa | 4,90-6,70 |
| | | pO2 Amperometrie Nova SP CCX | 5,68 [*] kPa | 4,80-5,90 |
| | | akt. HCO3 | 29,5 [*] mmol/l | 20,1-26,0 |
| | | BE | 2,3 [*] mmol/l | -2,3-2,3 |
| | | BB | 50,1 [*] mmol/l | 44,0-53,0 |
| | | Satur. HbO2 Fotometrie Nova SP CCX | 68,2 [*] % | 70,0-80,0 |
| | | Hb Vodnost/Fotometrie Nova SP CCX | 167,0 [*] g/l | 132,0-173,0 |
| | | Hct Konduktometrie Nova SP CCX | 51 [*] % | 39-49 |
| 81135 | 5 | Sodný kation Potenciometrie Nova SP CCX | 141 [*] mmol/l | 137-144 |
| 81145 | 5 | Draselný kation Potenciometrie Nova SP CCX | 4,7 [*] mmol/l | 3,9-5,3 |
| 81157 | 7 | Chloridy Potenciometrie Nova SP CCX | 106 [*] mmol/l | 98-107 |
| 81141 | 1 | Ca++ - norm. Potenciometrie Nova SP CCX | 1,23 [*] mmol/l | 1,16-1,29 |
| 81155 | 5 | Glukóza Amperometrie Nova SP CCX | 6,53 [*] mmol/l | 4,60-6,40 |
| 81171 | 1 | Laktát Amperometrie Nova SP CCX | 4,30 [*] mmol/l | 0,50-2,00 |
| 81137 | 7 | Močovina Potenciometrie Nova SP CCX | 8,2 [*] mmol/l | 2,9-8,2 |
| | | FIO2 | 20,90 % | |

Patient 5

71-year-old patient

- **Chief complaint:** patient at cardiovascular risk (st.p. PCI RIA, st.p. AMI) admitted for elective coronary angiography for recurrence of exertional angina pectoris.
- **Medical history:** hypertension on therapy (Betaloc, Prestarium), dyslipidemia (statin), bladder cancer (2015), extirpation cystoscopically + intravesically chemotherapy, recurrence 2017
- Echocardiogram: good systolic function of the left ventricle, without significant valve defect, borderline size of the left atrium

71-year-old patient

Subjectively:

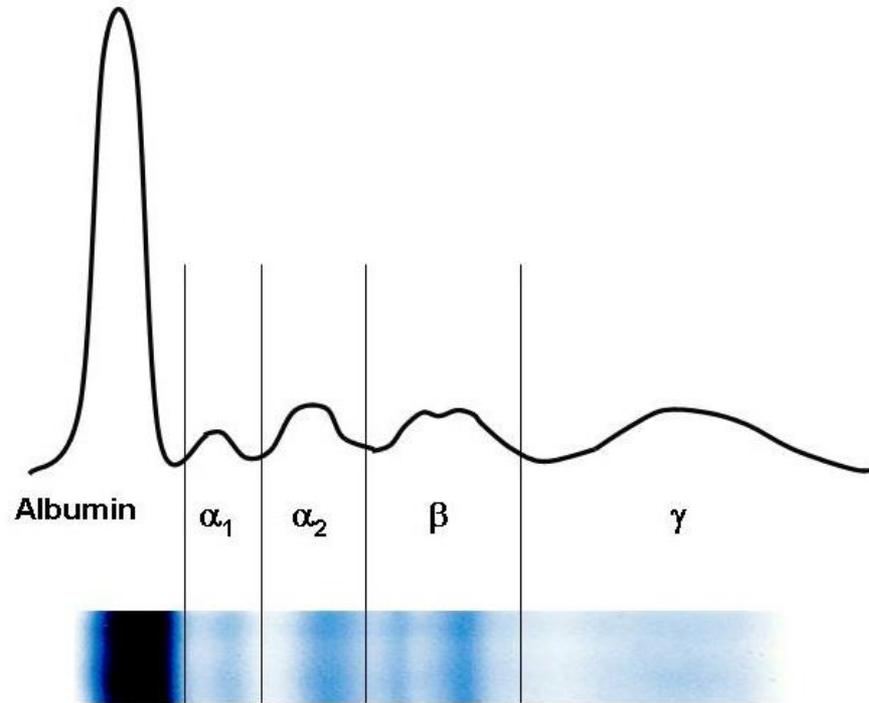
- For the last month, the patient reports exertional chest pain. The pain behind the sternum does not radiate, once or twice the patient's fingers tingled.
- At the same time, the patient reports exertional dyspnea and negates it at rest. He must slow down / stop and the pain will subside within a few minutes.
- Syncopes, palpitations and claudications are negated by the patient.

| | | | Ref. meze |
|---------------|---|--|------------------|
| 81593 | Sodný kation ISE - s ředěním | 133 [*] mmol/l delta check: nevýznamný | 137-144 |
| 81393 | Draselný kation ISE - s ředěním | 4,5 [*] mmol/l delta check: nevýznamný | 3,9-5,3 |
| 81469 | Chloridy ISE - s ředěním | 105 [*] mmol/l delta check: nevýznamný | 98-107 |
| 81337 | ALT Modifikovaná IFCC metoda při 37°C | 0,46 [*] ukat/l delta check: nevýznamný | 0,10-0,63 |
| 81435 | GGT (GMT) IFCC metoda při 37°C | 0,36 [*] ukat/l delta check: nevýznamný | 0,15-0,92 |
| 81621 | Močovina Enzymová metoda s ureázou a GDH | 7,3 [*] mmol/l delta check: nevýznamný | 2,9-8,2 |
| S-KREA | | | |
| 81499 | Kreatinin Enzymová kolorimetrická metoda | 81 [*] umol/l delta check: nevýznamný | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,39 ml/s/1,73 m2 | |
| 81365 | Celková bílkovina Bijuretová metoda | 114,5 [*] g/l | ředěno 62,0-77,0 |
| 91153 | CRP-HS Imunoturbidimetrie | <0,5 mg/l | 0,0-5,0 |
| 97111 | Separace séra | 1x | |

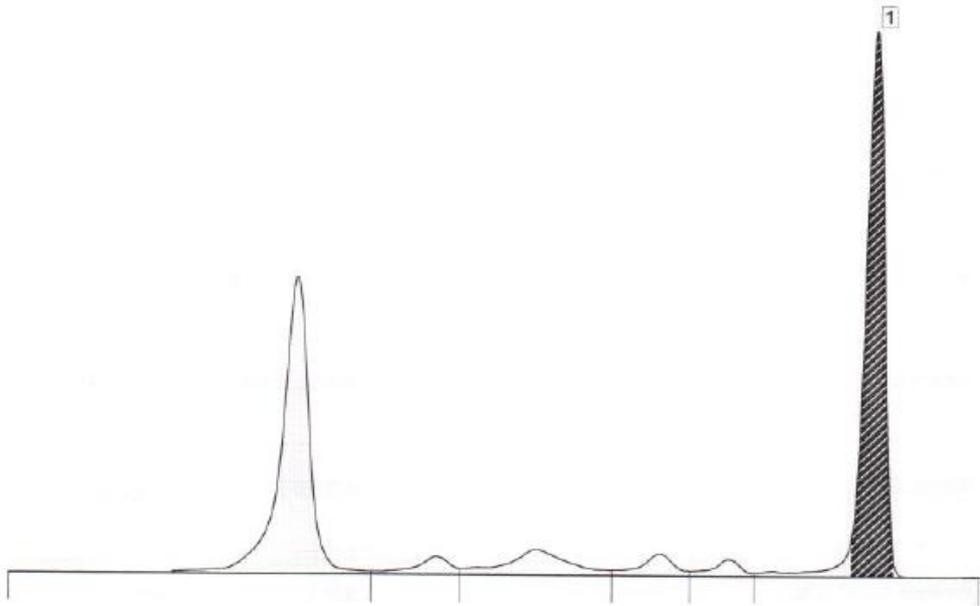
| | | | | | | | | | | |
|-------|---|---|---|---|---|---|---|---|---------------------------|-------------|
| WBC | . | . | . | . | . | . | . | * | 3.5 x10 ⁹ /l | 4.0-10.0 |
| RBC | . | . | . | . | . | . | . | * | 2.18 x10 ¹² /l | 4.00-5.80 |
| HGB | . | . | . | . | . | . | . | * | 77 g/l | 135-175 |
| HCT | . | . | . | . | . | . | . | * | 0.225 l/l | 0.400-0.500 |
| MCV | . | . | . | . | . | . | . | * | 103.2 fl | 82.0-98.0 |
| MCH | . | . | . | . | . | . | . | * | 35.3 pg | 28.0-34.0 |
| MCHC | . | . | . | . | . | . | . | | 342.2 g/l | 320.0-360.0 |
| RDW | . | . | . | . | . | . | . | * | 15.5 % | 10.0-15.2 |
| PLT | . | . | . | . | . | . | . | | 226 x10 ⁹ /l | 150-400 |
| MPV | . | . | . | . | . | . | . | | 10.4 fl | 7.8-11.0 |
| PCT | . | . | . | . | . | . | . | | 0.230 % | 0.120-0.350 |
| PDW | . | . | . | . | . | . | . | | 11.2 fl | 9.0-17.0 |
| NRBC | . | . | . | . | . | . | . | * | 0.3 % | 0.0-0.0 |
| NRBC# | . | . | . | . | . | . | . | * | 0.010 x10 ⁹ /l | 0.000-0.000 |
| P-LCR | . | . | . | . | . | . | . | | 26.9 % | 15.0-35.0 |

- Significant hyperproteinemia and leukopenia and severe anemia were accidentally detected in a cardiac patient in a laboratory finding.
- What diagnosis is likely, what else would you examine?

Serum protein electrophoresis



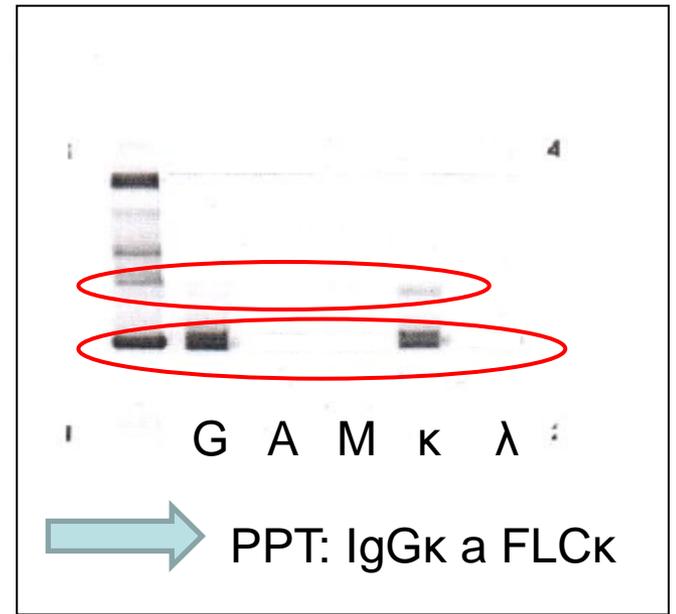
Serum protein electrophoresis



| Fractions | % | Ref. % | Conc. | Ref. Conc. |
|------------|------|---------------|-------|-------------|
| 5941-Album | 36,8 | < 55,8 - 66,1 | 44,0 | 40,2 - 47,6 |
| 5942-Alp 1 | 2,8 | < 2,9 - 4,9 | 3,3 | 2,1 - 3,5 |
| 5943-Alp 2 | 7,2 | 7,1 - 11,8 | 8,6 | 5,1 - 8,5 |
| 5944-Beta1 | 3,3 | < 4,7 - 7,2 | 3,9 | 3,4 - 5,2 |
| 5945-Beta2 | 2,2 | < 3,2 - 6,5 | 2,6 | 2,3 - 4,7 |
| 5946-Gamma | 47,7 | > 11,1 - 18,8 | 57,0 | 8,0 - 13,5 |

| Peaks | % | g/l |
|-------|------|------|
| 1 | 45,1 | 53,9 |

PPT v gamma



➡ PPT: IgGκ a FLCκ

| | | | | |
|--------------------------|--|-----------------------|--|-------------|
| 81593 | Sodný kation ISE - s ředěním | 133 | [*] mmol/l delta check: nevýznamný | 137-144 |
| 81393 | Draselný kation ISE - s ředěním | 4,4 | [*] mmol/l delta check: nevýznamný | 3,9-5,3 |
| 81469 | Chloridy ISE - s ředěním | 111 | [*] mmol/l delta check: změna +6t od 15.01.2020 (105) | 98-107 |
| 81625 | Ca celkový Fotometrie s arsenazo III | 2,14 | [*] mmol/l | 2,05-2,40 |
| 81421 | Alkalická fosfatáza IFCC metoda při 37°C (AMP) | 1,08 | [*] ukat/l | 0,88-2,35 |
| 81357 | AST Modifikovaná IFCC metoda při 37°C | 0,50 | [*] ukat/l | 0,16-0,63 |
| 81337 | ALT Modifikovaná IFCC metoda při 37°C | 0,46 | [*] ukat/l delta check: nevýznamný | 0,10-0,63 |
| 81435 | GGT (GMT) IFCC metoda při 37°C | 0,35 | [*] ukat/l delta check: nevýznamný | 0,15-0,92 |
| 81345 | Amyláza IFCC metoda při 37°C | 0,90 | [*] ukat/l | 0,40-2,51 |
| 81481 | Amyláza pankreat. Kolorimetrická metoda | 0,50 | [*] ukat/l | 0,22-0,88 |
| 81361 | Bilirubin celkový Vanadátová metoda | 5,1 | [*] umol/l delta check: nevýznamný | 3,0-19,0 |
| 81363 | Bilirubin přímý Vanadátová metoda | 1,7 | [*] umol/l | 0,0-2,0 |
| 81523 | Kyselina močová Enzymová metoda s urikázou | 366 | [*] umol/l | 250-476 |
| 81621 | Močovina Enzymová metoda s ureázou a GDH | 7,6 | [*] mmol/l delta check: nevýznamný | 2,9-8,2 |
| S-KREA | | | | |
| 81499 | Kreatinin Enzymová kolorimetrická metoda | 85 | [*] umol/l delta check: nevýznamný | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,31 | ml/s/1,73 m2 | |
| 81365 | Celková bílkovina Bijurová metoda | 119,6 | [*] g/l ředěno delta check: nevýznamný | 62,0-77,0 |
| CZE-ELFO bílkovin | | | | |
| 81397 | CZE-Albumin | 0,368 | [*] rel.j. | 0,558-0,661 |
| | CZE-Alfa 1 | 0,028 | [*] rel.j. | 0,029-0,049 |
| | CZE-Alfa 2 | 0,072 | [*] rel.j. | 0,071-0,118 |
| | CZE-Beta 1 | 0,033 | [*] rel.j. | 0,047-0,072 |
| | CZE-Beta 2 | 0,022 | [*] rel.j. | 0,032-0,065 |
| | CZE-Gamma | 0,477 | [*] rel.j. | 0,110-0,188 |
| | CZE-Mezifrakce 1 | 0,451 | rel.j. | |
| 91397 | Paraprotein Elektroforéza proteinů s následnou imunofacií | viz komentář, účtovat | | |
| 91167 | Free Kappa Imunoturbidimetrie | 2172,1 | [*] mg/l | 3,3-19,4 |
| 91169 | Free Lambda Imunoturbidimetrie | 3,4 | [*] mg/l | 5,7-26,3 |
| | Kappa/Lambda | 638,85 | [*] | 0,26-1,65 |
| 93195 | TSH CMIA Centaur | 0,661 | [*] mIU/l | 0,350-4,800 |
| 93189 | FT4 CMIA Centaur | 12,18 | [*] pmol/l | 11,50-22,70 |
| 97111 | Separace séra | 1x | | |

Komentář:

IF: prokázán PPT typu IgG kappa 53.9 g/l a FLC kappa.

Sternal puncture

Proven infiltration by tumor plasma cells.
After consultation with a hematologist, the condition was classified as **multiple myeloma**.
The plan is to start chemotherapy.

- Which (not very specific) tumor markers are used to monitor patients with hematological disease?

Selective coronarography

Conclusion: gross calcified wall changes on coronary arteries, **stent in RIA without restenosis. A conservative approach** was recommended.

Transthoracic echo

Conclusion: **left ventricular systolic dysfunction** with an ejection fraction of 40 % with akinesis of the apex and adjacent half of the anterosept, thrombus in the apex of the left ventricle 12 x 13 mm. Diastolic dysfunction grade 1.

Ref. meze

Moč chemicky

| | | | |
|-------|----------------|-----------|------|
| 81325 | Spec. hmotnost | 1,010 | kg/l |
| | pH | 7,0 | |
| | Leukocyty | - | |
| | Nitrity | - | |
| | Bílkovina | 1 | |
| | Glukóza | - | |
| | Ketolátky | - | |
| | Urobilinogen | Normal | |
| | Bilirubin | - | |
| | Barva | žlutá | |
| | Zákal | průhledná | |
| | Krev | 2 | |

Elementy v moči

| | | | | |
|--|------------------|-----|---------------|------|
| | Erytrocyty | 842 | [*] částic/ul | 0-10 |
| | Leukocyty | 6 | [*] částic/ul | 0-15 |
| | Dlaždicové epit. | 0 | [*] částic/ul | 0-10 |

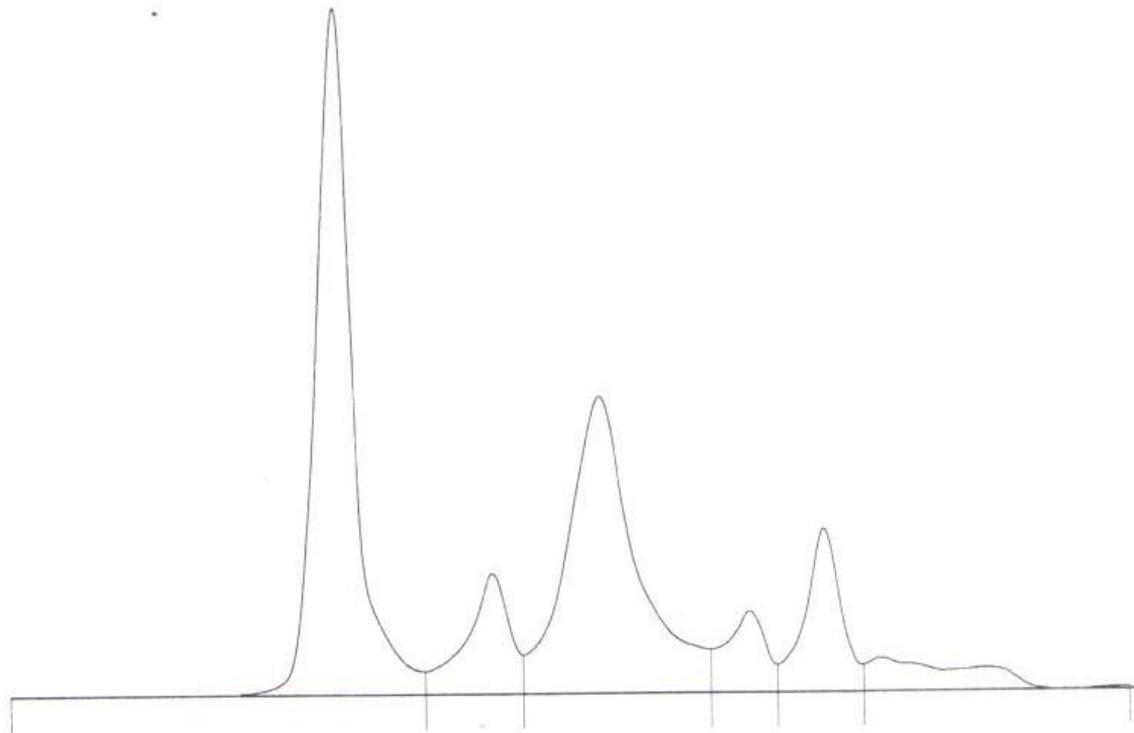
Patient 6

51-year-old man

- The patient came up with acute difficulties.
- He was examined in detail, including serum protein electrophoresis.

- Interpret the electrophoreogram of serum proteins in the following image.
- Which clinical symptoms could correspond to this finding?

Serum protein electrophoresis



| Fractions | % | | Ref. % | Conc. | Ref. Conc. |
|------------|------|---|-------------|-------|---------------|
| 5941-Album | 39.7 | < | 55.8 - 66.1 | 13.86 | 40.20 - 47.60 |
| 5942-Alp 1 | 8.2 | > | 2.9 - 4.9 | 2.86 | 2.10 - 3.50 |
| 5943-Alp 2 | 32.4 | > | 7.1 - 11.8 | 11.31 | 5.10 - 8.50 |
| 5944-Beta1 | 5.1 | | 4.7 - 7.2 | 1.78 | 3.40 - 5.20 |
| 5945-Beta2 | 9.3 | > | 3.2 - 6.5 | 3.25 | 2.30 - 4.70 |
| 5946-Gamma | 5.3 | < | 11.1 - 18.8 | 1.85 | 8.00 - 13.50 |

Other laboratory findings:

| | | | | Ref. meze |
|--------------------------|---|------------------------------|--------------------------|--------------------|
| 81593 | Sodný kation ISE - s ředěním | 140 | [*] mmol/l | 137-146 |
| 81393 | Draselný kation ISE - s ředěním | 4,7 | [*] mmol/l | 3,8-5,0 |
| 81421 | Alkalická fosfatáza IFCC metoda při 37°C (AMP) | 1,83 | [*] ukat/l | 0,66-2,20 |
| 81357 | AST Modifikovaná IFCC metoda při 37°C | 0,74 | [*] ukat/l | 0,16-0,72 |
| 81337 | ALT Modifikovaná IFCC metoda při 37°C | 0,76 | [*] ukat/l | 0,17-0,78 |
| 81435 | GGT (GMT) IFCC metoda při 37°C | 0,94 | [*] ukat/l | 0,14-0,84 |
| 81361 | Bilirubin celkový Vanadátová metoda | 6,9 | [*] umol/l | 2,0-17,0 |
| 81523 | Kyselina močová Enzymová metoda s urikázou | 347 | [*] umol/l | 200-420 |
| 81621 | Močovina Enzymová metoda s ureázou a GDH | 3,1 | [*] mmol/l | 2,8-8,0 |
| S-KREA | | | | |
| 81499 | Kreatinin Enzymová kolorimetrická metoda | 79 | [*] umol/l | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,65 | ml/s/1,73 m ² | |
| 81611 | Trilacylglyceroly GPO-PAP | 2,71 | [*] mmol/l | 0,70-1,70 |
| 81471 | Cholesterol CHOD-PAP | 9,6 | [*] mmol/l | 3,4-5,0 |
| 81365 | Celková bílkovina Biuretová metoda | 45,2 | *[] g/l | 65,0-85,0 |
| CZE-ELFO bílkovin | | | | |
| 81397 | CZE-Albumin | 0,561 | [*] rel.j. | 0,558-0,661 |
| | CZE-Alfa 1 | 0,055 | [*] rel.j. | 0,029-0,049 |
| | CZE-Alfa 2 | 0,236 | [*] rel.j. | 0,071-0,118 |
| | CZE-Beta 1 | 0,054 | [*] rel.j. | 0,047-0,072 |
| | CZE-Beta 2 | 0,058 | [*] rel.j. | 0,032-0,065 |
| | CZE-Gamma | 0,036 | *[] rel.j. | 0,110-0,188 |
| 91397 | Paraprotein | viz komentář, účtovat | | |
| | Elektroforéza proteinů s následnou imunofixací | | | |
| 91167 | Free Kappa Imunonefelometrie | 7,7 | [*] mg/l | 3,3-19,4 |
| 91169 | Free Lambda Imunonefelometrie | 417,5 | [*] mg/l | ředěno 5,7-26,3 |
| | Kappa/Lambda | 0,02 | *[] | 0,26-1,65 |
| 91153 | CRP-HS Imunoturbidimetrie | 0,6 | [*] mg/l | 0,0-5,0 |
| 91139 | Sérový amyloid A Imunonefelometrie | 1,73 | [*] mg/l | <10,00 |
| 91147 | Alfa-2-Makroglobulin Imunoturbidimetrie | 3,58 | [*] g/l | 1,31-2,93 |
| 97111 | Separace séra | 1x | | |

Komentář:

IF: prokázány pouze FLC Lambda.

Other laboratory findings:

Doba sběru: 24:00 hod

Množství materiálu: 1300 ml

| | | | | | Ref. meze |
|--------------------------------------|---|--------------------------------|----------------------|--------|-------------|
| Sodný kation | | | | | |
| 81593 | U-Na ISE - s ředěním | 157 | mmol/l | | |
| | dU-Na | 204 | [*] mmol | | 120-220 |
| Draselný kation | | | | | |
| 81393 | U-K ISE - s ředěním | 47 | mmol/l | | |
| | dU-K | 61,1 | [*] mmol | | 35,0-80,0 |
| 81395 | ELFO proteinů Elektroforéza na SDS-agaróze | > povolená frekvence | | | |
| Močovina | | | | | |
| 81621 | U-UREA Enzymová metoda s ureázou a GDH | 207,5 | mmol/l | | |
| | dU-UREA | 269,8 | [*] mmol | | 167,0-583,0 |
| Kreatinin | | | | | |
| 81499 | U-KREA Enzymová kolorimetrická metoda | 14,8 | []* mmol/l | | 5,7-14,7 |
| | dU-KREA Enzymová kolorimetrická metoda | 19,24 | []* mmol | | 7,10-17,70 |
| Celková bílkovina sbíraná moč | | | | | |
| 81369 | U-CB Turbidimetrie - benzetonium chlorid | 12970 | mg/l | ředěno | |
| | dU-CB | 16861 | []* mg | | 20-150 |
| | dU-CB/m2 | 7900 | []* mg/m2 | | 0-96 |
| | U-CB/U-Krea | 876,35 | []* mg/mmol Krea | | 0,00-22,70 |

Patient 7

57-year-old man

- Chief complaint: a patient with a history of recurrent deep vein thrombosis and pulmonary embolism (HT, DLP) was recently hospitalized for recurrent pulmonary embolism, now on emergency admission due to chest pain
- At night he woke up with a burning sensation on his chest and shoulder pain, fell asleep, in the morning the burning continued, perhaps a slight relief while sitting and standing, fluctuating in intensity, without accompanying symptoms.
- He has reflux, he attributes the chest pain to this problem, but it has been going on for a long time, so he arrived for an examination (mainly due to a recent pulmonary embolism).
- The patient was given Controloc (pantoprazole), followed by virtually complete relief from the discomfort.

Examination 1, 10:22

| | | | | Ref. meze |
|-----------------------|---|--------|---------------------------------------|---|
| 81139 | Ca celkový Fotometrie s arsenazo III | 2,18 | [*] mmol/l | 2,05-2,54 |
| 81141 | Ca++ - norm. ISE | 1,28 | [*] mmol/l | 1,13-1,32 |
| 81465 | Hořčík Kolorimetrická metoda s xylidilovou modří | 0,83 | [*] mmol/l | 0,66-0,91 |
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 0,17 | [*] ukat/l delta check: nevýznamný | 0,17-0,78 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 0,26 | [*] ukat/l delta check: nevýznamný | 0,14-0,84 |
| 81121 | Bilirubin celkový Vanadátová metoda | 11,0 | [*] umol/l delta check: nevýznamný | 5,0-21,0 |
| 81137 | Močovina Enzymová metoda s ureázou a GDH | 3,7 | [*] mmol/l delta check: nevýznamný | 2,8-8,0 |
| S-KREA | | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 84 | [*] umol/l delta check: nevýznamný | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,48 | ml/s/1,73 m ² | |
| hs Tnl + delta | | | | |
| 81237 | hs Troponin I CMIA Architect | 88,2 | [*] ng/l | cut-off AIM: M: 342; Ž: 156 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | -13,3 | ng/l | |
| | Relativní delta hs Tnl počítaná hodnota | -13,10 | % | |
| 81125 | Celková bílkovina Biuretová metoda | 61,3 | *[] g/l delta check: nevýznamný | 65,0-85,0 |
| 97111 | Separace séra | 1x | | |

Evaluation of results according to the difference of two consecutive values of hs TnI concentrations with the recommended interval between examinations of 3 hours, the so-called "delta" principle

- **"Absolute delta"**: the difference between currently measured and previous value of hsTnI ≥ 20 ng /L \longrightarrow clinically significant result
- **"Relative delta"**: the difference between currently measured and previous value of hs TnI ≥ 50 % (for input hsTnI below 50 ng /L)
 ≥ 20 % (for input hsTnI over 50 ng/L)
 \longrightarrow clinically significant result

Three-hour interval: as recommended by the European Society of Cardiology in 2011

- If faster diagnostics are needed, the second collection can be performed as early as 1 to 2 hours after the initial examination.
- However, the delta principle in a shorter interval than three hours does not yet have the force of recommendation.

Lp (a): 1071 mg/L



Concentration **exceeding 300 mg/L** indicates high genetic risk for coronary heart disease!

Examination 2, 13:15

| | | | Ref. meze |
|-----------------------|--|------------------|---|
| hs Tnl + delta | | | |
| 81237 | hs Troponin I CMIA Architect | 1584,5 []* ng/l | cut-off AIM: M: 342; Ž: 156 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | 1496,3 ng/l | |
| | Relativní delta hs Tnl počítaná hodnota | 1696,49 % | |
| 97111 | Separace séra | 1x | |

On the ECG, a new negative T in the thoracic ducts (NSTEMI), after agreement, the patient is transferred to the coronary unit.

Examination 3, 17:57

| | | | Ref. meze |
|-----------------------|--|------------------|---|
| hs Tnl + delta | | | |
| 81237 | hs Troponin I CMIA Architect | 6886,9 []* ng/l | cut-off AIM: M: 342; Ž: 156 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | 5302,4 ng/l | |
| | Relativní delta hs Tnl počítaná hodnota | 334,64 % | |
| 97111 | Separace séra | 1x | |

Patient sent for coronary intervention:

Conclusion: tight 90-95 % RIA stenosis treated with PCI (percutaneous coronary intervention) + DES (drug-eluting stent) within NSTEMI.

Examination Day 2, 5:20

| | | | | Ref. meze |
|-----------------------|---|--------|---|-----------------------------|
| 8113 5 | Sodný kation ISE - s ředěním | 137 | [*] mmol/l delta check: změna -3% od 19.11.2019 () | 137-146 |
| 8114 5 | Draselný kation ISE - s ředěním | 4,2 | [*] mmol/l delta check: nevýznamný | 3,8-5,0 |
| 8115 7 | Chloridy ISE - s ředěním | 108 | [*] mmol/l delta check: nevýznamný | 97-108 |
| 8113 7 | Močovina Enzymová metoda s ureázou a GDH | 4,0 | [*] mmol/l delta check: nevýznamný | 2,8-8,0 |
| S-KREA | | | | |
| 8116 9 | Kreatinin Enzymová kolorimetrická metoda | 81 | [*] umol/l delta check: nevýznamný | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,54 | ml/s/1,73 m2 | |
| hs Tnl + delta | | | | |
| 8123 7 | hs Troponin I CMIA Architect | 6619,5 | []* ng/l | cut-off AIM: M: 342; Ž: 156 |
| | Absolutní delta hs Tnl počítaná hodnota | -267,4 | ng/l | |
| | Relativní delta hs Tnl počítaná hodnota | -3,88 | % | |
| 9115 3 | CRP-HS imunoturbidimetrie | 2,1 | mg/l delta check: nevýznamný | 0,0-5,0 |
| 9711 1 | Separace séra | 1x | | |

Day 3,
5:40

| | | | | | |
|-----------------------|---|---------|---------------------------------------|-----------------------------|----------------------|
| 81135 | Sodný kation ISE - s ředěním | 138 | [*] mmol/l delta check: nevyznamny | | Ref. meze 137-146 |
| 81145 | Draselný kation ISE - s ředěním | 4,1 | [*] mmol/l delta check: nevyznamny | | 3,8-5,0 |
| 81157 | Chloridy ISE - s ředěním | 110 | [*] mmol/l delta check: nevyznamny | | 97-108 |
| 81137 | Močovina Enzymová metoda s ureázou a GDH | 4,2 | [*] mmol/l delta check: nevyznamny | | 2,8-8,0 |
| S-KREA | | | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 89 | [*] umol/l delta check: nevyznamny | | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,38 | ml/s/1,73 m2 | | |
| hs Tnl + delta | | | | | |
| 81237 | hs Troponin I CMIA Architect | 3044,9 | [*] ng/l | cut-off AIM: M: 342; Ž: 156 | 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | -3574,6 | ng/l | | |
| | Relativní delta hs Tnl počítaná hodnota | -54,00 | % | | |
| 97111 | Separace séra | 1x | | | |

Day 4,
5:50

| | | | | | |
|-----------------------|---|---------|---|-----------------------------|----------------------|
| 81135 | Sodný kation ISE - s ředěním | 137 | [*] mmol/l delta check: nevyznamny | | Ref. meze 137-146 |
| 81145 | Draselný kation ISE - s ředěním | 3,9 | [*] mmol/l delta check: nevyznamny | | 3,8-5,0 |
| 81157 | Chloridy ISE - s ředěním | 108 | [*] mmol/l delta check: nevyznamny | | 97-108 |
| 81137 | Močovina Enzymová metoda s ureázou a GDH | 4,2 | [*] mmol/l delta check: nevyznamny | | 2,8-8,0 |
| S-KREA | | | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 81 | [*] umol/l delta check: nevyznamny | | 55-96 |
| | eGFR-krea-(CKD-EPI) | 1,54 | ml/s/1,73 m2 | | |
| hs Tnl + delta | | | | | |
| 81237 | hs Troponin I CMIA Architect | 1489,4 | [*] ng/l | cut-off AIM: M: 342; Ž: 156 | 0,0-34,2 |
| | Absolutní delta hs Tnl počítaná hodnota | -1555,5 | ng/l | | |
| | Relativní delta hs Tnl počítaná hodnota | -51,09 | % | | |
| 91153 | CRP-HS Imunoturbidimetrie | 5,9 | [*] mg/l delta check: změna +1814 od 02.12.2019 () | | 0,0-5,0 |
| 97111 | Separace séra | 1x | | | |

Patient 8

84-year-old woman

- **Chief complaint:** About a month of progression of swelling of the lower limbs above the knees, the patient cannot sleep lying down, she feels short of breath during any load, she is not short of breath at rest, angina pectoris negates, a month ago she had an episode of palpitations.
- The patient negates the cough, temperature or other signs of a respiratory infection or difficulty urinating.
- **Medical history:** hypertension, dyslipoproteinemia, AMI 2005 2x, chronic atrial fibrillation
- **Medication:** Furon 40 mg 1-0-1, Omeprazol, Lusopress, Amprilan, Betaloc, Torvacard

- **Objectively:** BP 100/62 mmHg, pulse 114 / min, SpO₂ 95 %, temperature 37.2 °C
- **ECG: atrial fibrillation**, ventricles 122 / min, intermediate axis, QRS 108 ms, ST depression V5-6, Q and VL, V1-3

Samples
Day 1,
9:15

| | | | | Ref. meze |
|-----------------------|--|----------------|--------------|---|
| 81111 | ALT <small>Modifikovaná IFCC metoda při 37°C</small> | 0,33 | [*] ukat/l | 0,10-0,63 |
| 81153 | GGT (GMT) <small>IFCC metoda při 37°C</small> | 0,98 | [*] ukat/l | 0,15-0,92 |
| 81121 | Bilirubin celkový <small>Vanadátová metoda</small> | 26,0 | [*] umol/l | 3,0-19,0 |
| S-KREA | | | | |
| 81169 | Kreatinin <small>Enzymová kolorimetrická metoda</small> | 133 | [*] umol/l | 42-80 |
| | eGFR-krea-(CKD-EPI) | 0,52 | ml/s/1,73 m2 | |
| hs Tnl + delta | | | | |
| 81237 | hs Troponin I <small>CMIA Architect</small> | 72,9 | [*] ng/l | cut-off AIM: M: 342; Ž: 156 0,0-15,6 |
| | Absolutní delta hs Tnl <small>počítaná hodnota</small> | nelze spočítat | | |
| | Relativní delta hs Tnl <small>počítaná hodnota</small> | nelze spočítat | | |
| 81125 | Celková bílkovina <small>Biuretová metoda</small> | 61,6 | *[] g/l | 62,0-77,0 |
| 97111 | Separace séra | 1x | | |

9:25

| | | | | Ref. meze |
|-------|--|-------|------------|-------------|
| | Hb <small>Vodivost/Fotometrie Nova SP CCX</small> | 126,0 | [*] g/l | 117,0-155,0 |
| | Hct <small>Konduktometrie Nova SP CCX</small> | 39 | [*] % | 35-45 |
| 81135 | Sodný kation <small>Potenolometrie Nova SP CCX</small> | 136 | *[] mmol/l | 137-144 |
| 81145 | Draselný kation <small>Potenolometrie Nova SP CCX</small> | 3,6 | *[] mmol/l | 3,9-5,3 |
| 81157 | Chloridy <small>Potenolometrie Nova SP CCX</small> | 104 | [*] mmol/l | 98-107 |
| 81141 | Ca++ - norm. <small>Potenolometrie Nova SP CCX</small> | 1,23 | [*] mmol/l | 1,16-1,29 |
| 81155 | Glukóza <small>Amperometrie Nova SP CCX</small> | 5,90 | [*] mmol/l | 4,60-6,40 |
| 81137 | Močovina <small>Potenolometrie Nova SP CCX</small> | 5,6 | [*] mmol/l | 2,9-8,2 |
| | FIO2 | 20,90 | % | |

18:26

| | | | | Ref. meze |
|-----------------------|---|--------|----------|---|
| hs Tnl + delta | | | | |
| 81237 | hs Troponin I <small>CMIA Architect</small> | 149,5 | [*] ng/l | cut-off AIM: M: 342; Ž: 156 0,0-15,6 |
| | Absolutní delta hs Tnl <small>počítaná hodnota</small> | 76,6 | ng/l | |
| | Relativní delta hs Tnl <small>počítaná hodnota</small> | 105,08 | % | |
| 97111 | Separace séra | 1x | | |

Day 2
6:20

| | | | | |
|-------|---|---------|--------------|-----------------------------|
| | Ikerický vzorek | + | | |
| 81593 | Sodný kation ISE - s ředěním | 138 | [*] mmol/l | 137-144 |
| 81393 | Draselný kation ISE - s ředěním | 5,0 | [*] mmol/l | 3,9-5,3 |
| 81469 | Chloridy ISE - s ředěním | 97 | *[] mmol/l | 98-107 |
| 81641 | Železo Metoda s ferrozinem | 5,6 | umol/l | |
| 81421 | Alkalická fosfatáza IFCC metoda při 37°C (AMP) | 1,52 | [*] ukat/l | 0,88-2,35 |
| 81357 | AST Modifikovaná IFCC metoda při 37°C | 0,80 | []* ukat/l | 0,16-0,63 |
| 81337 | ALT Modifikovaná IFCC metoda při 37°C | 0,51 | [*] ukat/l | 0,10-0,63 |
| 81435 | GGT (GMT) IFCC metoda při 37°C | 1,13 | []* ukat/l | 0,15-0,92 |
| 81621 | Močovina Enzymová metoda s ureázou a GDH | 8,3 | []* mmol/l | 2,9-8,2 |
| | S-KREA | | | |
| 81499 | Kreatinin Enzymová kolorimetrická metoda | 151 | []* umol/l | 42-80 |
| | eGFR-krea-(CKD-EPI) | 0,45 | ml/s/1,73 m2 | |
| 81611 | Triacylglyceroly GPO-PAP | 1,01 | [*] mmol/l | 0,40-1,98 |
| 81471 | Cholesterol CHOD-PAP | 4,2 | [*] mmol/l | 3,8-7,0 |
| | HDL-CHOL | | | |
| 81473 | HDL cholesterol Přímá metoda | 1,01 | [*] mmol/l | 0,72-2,69 |
| | non-HDL cholesterol Vypočítaná hodnota | 3,19 | [*] mmol/l | 3,80 |
| 81527 | LDL cholesterol Přímá metoda | 2,58 | [*] mmol/l | 1,50-5,40 |
| | hs Tnl + delta | | | |
| 81237 | hs Troponin I CMIA Architect | 168,8 | []* ng/l | cut-off AIM: M: 342; Ž: 156 |
| | Absolutní delta hs Tnl počítaná hodnota | 19,3 | ng/l | |
| | Relativní delta hs Tnl počítaná hodnota | 12,91 | % | |
| 81731 | NT - proBNP ELISA Cobas 6000 (c001) | 19114,0 | []* ng/l | 20,0-450,0 |
| 81365 | Celková bílkovina Biluretová metoda | 63,0 | [*] g/l | 62,0-77,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 11,0 | []* mg/l | 0,0-5,0 |
| | Transferin | | | |
| 91137 | Transferin Imunoturbidimetrie | 3,76 | [*] g/l | 1,90-3,80 |
| | Saturace transferinu | 5,9 | *[] % | 20,0-40,0 |
| | Celk.vaz.kapacita pro železo | 94,9 | []* umol/l | 44,8-80,6 |
| 93195 | TSH CMIA Centaur | 3,348 | [*] mIU/l | 0,350-4,800 |

Examination after 14 days

| | | | | Ref. meze |
|-----------------------|---|--------|--------------|---|
| 81135 | Sodný kation ISE - s ředěním | 141 | [*] mmol/l | 137-144 |
| 81145 | Draselný kation ISE - s ředěním | 5,2 | [*] mmol/l | 3,9-5,3 |
| 81157 | Chloridy ISE - s ředěním | 104 | [*] mmol/l | 98-107 |
| 81563 | Osmolalita Kryoskopie | 305 | []* mmol/kg | 280-301 |
| 81111 | ALT Modifikovaná IFCC metoda při 37°C | 0,56 | [*] ukat/l | 0,10-0,63 |
| 81153 | GGT (GMT) IFCC metoda při 37°C | 1,40 | []* ukat/l | 0,15-0,92 |
| 81121 | Bilirubin celkový Vanadátová metoda | 23,7 | []* umol/l | 3,0-19,0 |
| 81137 | Močovina Enzymová metoda s ureázou a GDH | 11,2 | []* mmol/l | 2,9-8,2 |
| S-KREA | | | | |
| 81169 | Kreatinin Enzymová kolorimetrická metoda | 172 | []* umol/l | 42-80 |
| | eGFR-krea-(CKD-EPI) | 0,38 | ml/s/1,73 m2 | |
| hs Tnl + delta | | | | |
| 81237 | hs Troponin I CMIA Architect | 89,6 | []* ng/l | cut-off AIM: M: 342; Ž: 156 0,0-15,6 |
| | Absolutní delta hs Tnl počítaná hodnota | -79,2 | ng/l | |
| | Relativní delta hs Tnl počítaná hodnota | -46,92 | % | |
| 81125 | Celková bílkovina Biuretová metoda | 57,3 | *[] g/l | 62,0-77,0 |
| 91153 | CRP-HS Imunoturbidimetrie | 20,0 | []* mg/l | 0,0-5,0 |
| 91481 | Prokalcitonin ECLIA Cobas 6000 (e601) | 0,37 | [*] ug/l | 0,00-0,50 |
| 97111 | Separace séra | 1x | | |

Thank you for your attention