**Table 1. Characteristics of the patient groups**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Insulinoma (n = 87)** | **No insulinoma (n = 33)** | **P value (U-test\*)** |
| Women, N (%) | 67 (77) | 25 (76) | 0.885, chi square test |
| Age, years | 48 [38; 59], (19; 85) | 43 [35; 52], (23; 71) | 0.071 |
| Insulinoma differentiation grade, N (%)\*\*: | | | |
| G1 | 29 (60.4) |  |  |
| G2 | 17 (35.4) |  |  |
| G3 | 2 (4.2) |  |  |
| Insulinoma size, mm | 15 [12; 19], (6; 40) | – | – |
| Duration of fasting during the test, hours | 12 [5; 20], (1; 64) | 72 [72; 72], (10; 72) | < 0.001 |
| Duration of fasting before blood sampling, hours | 3 [3; 6], (2; 8) | 8 [8; 9], (8; 12) | < 0.001 |
| CgA, nmol/L (RI ≤ 2 nmol/L) | 0.9 [0.6; 1.4], (0.1; 8.5)\*\*\* | 0.7 [0.5; 1.1], (0.1; 2.0) | 0.045 |

CgA, chromogranin A; G, tumor differentiation grade; RI, reference interval

The values are given as absolute patient numbers and their proportions in the group, or as medians and quartiles, minimums and maximums (Ме [Q1; Q3], (min; max))

\* Р0 = 0.01 (with Bonferroni adjustment)

\*\* n = 48: the immunohistochemistry study results were not available in some patients

\*\*\* Before surgery (baseline)

**Table 2. Characteristics of the patients with insulinoma and increased chromogranin А levels (n = 10)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient ID** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| Age, years | 50 | 29 | 60 | 42 | 60 | 65 | 49 | 38 | 44 | 63 |
| Gender | F | М | M | F | F | F | F | F | F | F |
| CgA level before surgery, nmol/L | 8.5 | 2.4 | 2.5 | 6.8 | 4.1 | 2.3 | 2.3 | 2.3 | 3.2 | 2.5 |
| Insulinoma location within the pancreas | Tail | Body | Tail | Head | Head | Head | Head | Tail | Head | Tail |
| Maximal size of the insulinoma, mm | 12 | 10 | 13 | 20 | 40 | 18 | 10 | 10 | 11 | 16 |
| Tumor differentiation grade, G | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CgA levels after surgery, nmol/L | 1.3 | 1.9 | 0.7 | 1.7 | 0.5 | 1 | 1.4 | 1.6 | 1.7 | 0.9 |
| MEN1 syndrome (clinically or genetically confirmed) | – | – | – | MEN1 (PHPT with resulting hypoparathyroidism after surgery) | – | – | – | – | MEN1 (PHPT with resulting hypoparathyroidism after surgery) | – |

CgA, chromogranin A; F, female gender; G, tumor differentiation grade; M, male gender; MEN1, multiple endocrine neoplasia type 1; PHPT, primary hyperparathyroidism

**Table 3. Analysis of the correlation between chromogranin A concentration and clinical and laboratory characteristics of the insulinoma patients (n = 87)**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Descriptive statistics** | **r\*\*, p\*\*\*** |
| Insulin level at the end of the fasting test, mcU/mL | 17.8 [10.2; 30.6], (3.1; 387.3) | r = 0.138  р = 0.202 |
| Proinsulin level at the end of the fasting test, pmol/L\* | 12.3 [6.9; 45.3], (5.0; 291.0) | r = 0.044  р = 0.773 |
| C-peptide level at the end of the fasting test, ng/mL | 3.0 [2.1; 5.0], (0.6; 15.6) | r = 0.167  р = 0.122 |
| Duration of the fasting test, hours | 12.0 [4.5; 20.0], (0.8; 64.0) | r = -0.053  р = 0.633 |
| Duration of the fasting before blood sampling, hours | 8 [3; 8], (2; 8) | r = -0.047  p = 0.670 |
| Insulinoma size, mm | 15 [12; 19], (6; 40) | r = 0.112  р = 0.319 |
| Age, years | 48 [38; 59], (19; 85) | r = 0.108  р = 0.065 |

The values are given as medians and quartiles, minimums and maximums (Ме [Q1; Q3], (min; max))

\* n = 50: data was obtained not for all patients

\*\* Spearmen’s correlation coefficient

\*\* Р0 = 0.007 (with Bonferroni adjustment)

**Table 4. Factors presumably associated with increased chromogranin A level (> 2 nmol/L) in insulinoma**

|  |  |  |  |
| --- | --- | --- | --- |
| **Insulinoma characteristics** | **CgA > 2 nmol/L** | **CgА ≤ 2 nmol/L** | **P value\*\* (Freeman-Halton test)** |
| Pancreatic location (n = 87): | | | |
| head | 5 | 24 | 0.446 |
| body | 1 | 19 |
| tail | 4 | 34 |
| Differentiation grade (n = 48\*): | | | |
| G1 | 3 | 26 | 0.695 |
| G2 | 1 | 16 |
| G3 | 0 | 2 |

N, number of patients

\* The results of immunohistochemistry were available not for all patients

\*\* Р0 = 0.025 (with Bonferroni adjustment)

**Table 5. Cross tabulation of the final diagnosis and chromogranin A test with a cut-off value of 2 nmol/L**

|  |  |  |  |
| --- | --- | --- | --- |
| **CgA concentration** | **Final diagnosis, n** | | **Total, n** |
| **Insulinoma** | **No insulinoma** |
| Increased (> 2 nmol/L) | 10 | 0 | 10 |
| Not increased (≤ 2 nmol/L) | 77 | 33 | 110 |
| Total, n | 87 | 33 | 120 |

CgA, chromogranin A; N, number of patients