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КОМПЬЮТЕРНАЯ ГРАФИЧЕСКАЯ РЕКОНСТРУКЦИЯ ПЕЧЕНИ ЧЕЛОВЕКА

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Целью исследования было картирование печени с последующим компьютерным графическим восстановлением ее поверхности. В качестве системы координат была взята система, предложенная проф. М.П.Бурых. В ходе исследования были проведены: стандартизация тестовых сечений по распределению градиента печеночного объема, где объем наибольшего градиента отмечен во второй и третьем срезах печени; стереометрическая экстраполяция третьей секущей плоскости на позвоночный столб, что соответствует межпозвоночному пространству Th10-Th11. Таким образом, пересекающиеся плоскости образуют многомерную систему топографических координат печени человека, основанную на результирующем распределении градиентного объема. Предлагаемая система описывает топографические координаты, а координаты отражает каждый отрезок печени, проанализированный в декартовой системе координат, дает представление о положении тела в пространстве.

Ключевые слова: печень, топографические анатомические координаты, меридиан

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COMPUTER GRAPHIC RECONSTRUCTION OF THE HUMAN LIVER

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The aim of the study was to map the liver with subsequent computer graphic restoration of its surface. Used coordinate system was proposed by prof. M.P.Burykh. In the course of the study, the standardization of test sections for the distribution of the hepatic volume gradient was carried out, where the volume of the largest gradient was recorded in the second and third sections of the liver; the stereometric extrapolation of the third secant plane onto the vertebral column, which corresponds to the intervertebral space of Th10-Th11. Thus, intersecting planes form a multidimensional system of topographic coordinates of the human liver, based on the resulting distribution of the gradient volume. The proposed system describes the topographic coordinates, and the coordinates reflect each segment of the liver, analyzed in a Cartesian coordinate system, gives an idea of the position of the body in space.

Keywords: liver, topographic anatomical coordinates, meridian

Until now, mapping of internal organs is certainly an important issue. The solution to this problem is due to the complexity of the body measurement standardization and individualization stereometric standards [1].

The **aim** of our study was to map the liver with subsequent computer graphic reconstruction of its surface.

Materials and methods. Determination of the coordinates of the liver slices, and its mapping was carried out on 38 patients of computer tomograms in Kharkiv Regional Clinical Hospital. Mapping of the liver was carried out in accordance with the principles developed in collaboration with the Department of Cartography of the Karazin Kharkiv National University.

During the beginning of the local coordinate system we adopted the point, which is the geometric center of the Th10 body because vertebral body is present constantly as landmark on each CT scan. The initial starting point corresponded to the middle of the distance from the foramen vertebralis to the front edge of the vertebral body and the middle of the distance between its side surfaces. The Z-axis of the coordinate system correspond the longitudinal axis of the spine. X axis is along the spinous process Th10 through the middle foramen vertebralis and the reference point, perpendicular to the x-axis at the level of Th10-Th11 intervertebral space. The Y axis passes through the origin of the coordinate perpendicular to the X-axis of coordinates defining the cutoff points of the contour carried out using topometry (patent number 1421907 on 08/05/1988; M.P.Buryh, R.P.Proskurnyak [2,3]), combining the initial reference point coordinate system of private zero point of the scale. Computer graphic reconstruction of the surface of the liver (Fig. 1) was carried out by a specially developed mathematical program "Stereometric body spline analysis of irregular shape" at the Department of Applied Mathematics, Zhukovsky Kharkiv Aviation University.

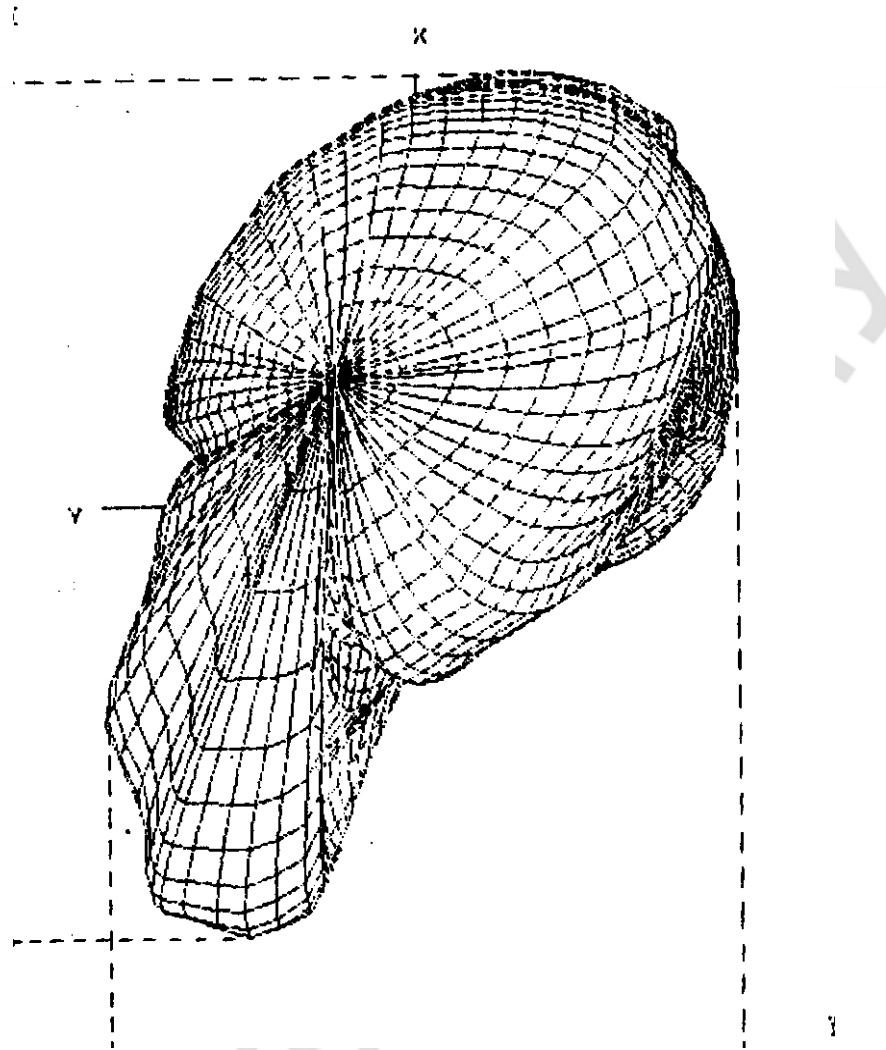


Fig.1. Computer reconstruction of the surface of the liver. Superior aspect.

Results. In the course of the research we have carried out: standardization of the test sections on the distribution gradienta liver volume, where the volume of the largest gradient had the second and third sections of the liver; stereometric extrapolation of the third cut plane on the spinal column, which corresponds to the intervertebral space of Th10-Th11. Thus, the intersecting planes form a multi-dimensional system of human liver topographic coordinates, based on the resulting distribution of gradient volume.

Conclusions: The proposed system describes the topographic coordinates and coordinate reflects each slice of liver analyzed in a Cartesian coordinate system, it gives an idea of body position in space.

Литература:

1. Митьков В.В. Клиническое руководство по ультразвуковой диагностике // Москва «Визар». – 1996 – Том 1. – с. 27-94.
2. Бурых М.П. Система топографических координат тела человека // Харьков. – 1991 – 36 с.
3. Бурых М.П., Зинченко В.Д., Михалин М.А., Горяинова Г.В. Геотопографический подход к изучению тела человека. Ультразвуковая морфометрия почек и печени // Материалы международной научной конференции, посвященной 80-летию со дня рождения проф.Т.В.Золотаревой. – Полтава. – 1994. – с. 37-38.

Репозиторий БГМУ