

## TRANSAMINASE DISTRIBUTION IN THE BRAIN OF NEWBORNS

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It has been established in numerous investigations that the discharge of transaminase into the blood is caused by cytological processes arising from necrotic pathology of the tissues [1-9,15,17,20,21,25].

In an experiment, it was shown that the serum transaminase activity increases in proportion to the drop in transaminase concentration within the necrotized tissue [3]. In connection with this, it became necessary to study the distribution of the activity of these enzymes in the different tissues. As early as 1940-1941 it was established that the activity of glutamino-oxaloacetic and glutamino-pyruvic transaminase is very high in the liver, brain, myocardium, and kidneys [14,16]. At the same time, there are no data in the literature characterizing the activity of the tissue enzymes during the growth period.

In this report, we present data of the distribution of transaminase within the divisions of the brain of newborns.

## EXPERIMENTAL METHOD

Enzyme activity was determined according to the accepted method [24]. For the unit of activity of both transaminases, we used a unit equivalent to 1 microgram of generated pyruvic acid. The activity of the enzymes was

Transaminase Activity in the Tissues of Dog Fetuses and Newborn Puppies (in units/gram)

| Investigation subject | GOT |    |   | GPT |    |   | Coef-<br>ficient<br>of GOT<br>/GPT |
|-----------------------|-----|----|---|-----|----|---|------------------------------------|
|                       | M   | +m | t | M   | +m | t |                                    |

## Dog fetuses (47th to 48th day of pregnancy)

|                           |         |        |      |        |        |      |     |
|---------------------------|---------|--------|------|--------|--------|------|-----|
| Cerebral cortex           | 55 714  | ±5 749 | 9,6  | 12 000 | ±2 549 | 4,4  | 4,6 |
| Head of the caudate body. | 50 628  | ±3 317 | 15,2 | 12 044 | ±1 429 | 8,4  | 4,2 |
| Optic tubercles           | 69 052  | ±3 892 | 17,7 | 14 148 | ±2 654 | 5,3  | 4,6 |
| Hippocampus               | 61 440  | ±6 281 | 9,7  | 15 360 | ±3 048 | 5,0  | 4,0 |
| Spinal cord               | 112 941 | ±1 352 | 8,3  | 26 891 | ±1 270 | 21,2 | 4,2 |
| Liver                     | 23 899  | ±430   | 55,5 | 17 427 | ±1 966 | 9    | 1,3 |
| Serum                     | 50      | ±7,7   | 6,5  | 13     | ±1,8   | 7,2  | 3,9 |

## Puppies, first day of life

|                           |        |        |      |        |        |     |      |
|---------------------------|--------|--------|------|--------|--------|-----|------|
| Cerebral cortex           | 51 986 | ±2 716 | 19,1 | 5 486  | ±946   | 5,8 | 9,5  |
| Head of the caudate body. | 49 595 | ±3 513 | 14,1 | 6 442  | ±1 386 | 4,6 | 7,7  |
| Optic tubercles           | 66 664 | ±4 286 | 15,5 | 4 818  | ±971   | 5   | 13,9 |
| Hippocampus.              | 58 909 | ±3 336 | 17,6 | 7 136  | ±1 097 | 6,5 | 8,4  |
| Spinal cord               | 82 350 | ±3 606 | 22,8 | 16 340 | ±3 782 | 4,3 | 5,1  |
| Liver                     | 56 302 | ±6 231 | 9,0  | 74 370 | ±4 683 | 16  | 0,75 |
| Serum                     | 79     | ±6,7   | 12,0 | 24     | ±1,98  | 12  | 3,3  |

calculated on the basis of 1 g of dry tissue. We investigated the tissue of dog fetuses in the last quarter of pregnancy (47-49th day), and of newborn puppies (1st day of life). The animals were sacrificed by decapitation, the brain quickly removed under refrigerated conditions, freed of its blood vessels, and divided into portions. For the investigation, we used the cerebral cortex, the head of the caudate body, the optic tubercles, the hippocampus, and the spinal cord. We also studied the liver and serum. In this work, we present data obtained from investigating the tissues of 5 fetuses and 11 newborn puppies.

#### EXPERIMENTAL RESULTS

The table shows that in all the brain divisions of the dog fetuses that were studied, the activity of glutamino-pyruvic transaminase (GPT) was less than a quarter of the activity of glutamino-oxaloacetic transaminase (GOT). In the fetuses, high GPT levels were observed in the spine, and low figures in the cerebral cortex and the head of the caudate body; somewhat higher values were demonstrated in the optic tubercles and the hippocampus. A high activity in the spinal cord was also encountered for GOT; in the optic tubercles and hippocampus it was almost half; its lowest indices were observed in the head of the caudate body and the cerebral cortex.

The character of transaminase distribution in the brain formations of the newborn puppies did not differ from that seen in the fetuses, but in this case, the GPT indices in all areas of the brain were lower, while the GOT activity was markedly decreased only in the spinal cord.

Special attention is merited the coefficient of the ratio GOT/GPT. While in the brain formations of the dog fetuses this index was equal to 4 - 4.2 - 4.6, in the 1 day old puppies this coefficient was equal to 5.1 only in the spinal cord; in the brain divisions it was higher, ranging from 7.7 - 13.9.

Study of transaminase activity in the liver, performed for comparison purposes, demonstrated that it is lower in the liver tissue of the fetuses than in the postnatal period. The different course of the changes in transaminase activity in the liver, as compared with the brain, leads to the GOT activity in the liver of the dog fetuses being higher and the GPT activity, while in the newborn puppies, the GOT activity is lower than the GPT; in fact, the GPT activity of the liver on the 1st day of life of the animals is 4 times greater than its activity in the liver of the dog fetuses. In line with this, the GOT/GPT coefficient also changes: in the fetal liver it is 1.3, while in the newborn puppies, it falls to 0.75.

With development of the organism, the serum transaminase activity in the fetuses (GOT-50 units and GPT-13 units) increased (GOT-79 units and GPT-24 units), but the GOT/GPT coefficient, on the other hand, fell, with growth of the animal, from 3.9 in the fetuses to 3.3 in the animals on the 1st day of life (see the table).

On the basis of the data obtained, it may be concluded that in the brain divisions of both fetuses and newborn animals the processes that are catalyzed by GOT occur with almost identical intensity.

The elevation in transaminase activity within the liver of the newborn puppies can apparently be regarded as a result of intensified functional maturation of the liver cells, all the elements of which (nuclei, mitochondria, microsomes and cytoplasm) contain these enzymes [27,28].

The results obtained can be of importance in explaining the elevated serum transaminase activity in aborted human fetuses with intracranial injuries, observed by a number of authors [10,12,16,26].

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.