# TRANSAMINASE ACTIVITY OF THE WHITE AND GRAY MATTER OF THE SPINAL CORD

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Besides aspartate-aminotransferase (AST) activity, alanine-aminotransferase (ALT) activity also was found in the white and gray matter of the lumbar enlargement of the cat spinal cord, where it was bound with subcellular structures. The distribution of activity of these enzymes was studied in these structures and AST activity was found to be much higher than ALT activity.

The activity of alanine-aminotransferase (E.C. 2.6.1.2) and aspartate-aminotransferase (E.C. 2.6.1.1) in the spinal cord has not been investigated.

The activity of these enzymes in a homogenate and in the subcellular fractions of the white and gray matter of the lumbar enlargement of the cat spinal cord was determined.

## EXPERIMENTAL METHOD

Sexually mature cats were used. After decapitation of the animal the lumbar enlargement of the spinal cord was quickly removed and placed on ice. All subsequent procedures were carried out in a cold room at 1-3° C. The meninges were removed and the spinal cord divided into gray and white matter [6]. A 5% homogenate was prepared in a glass homogenizer with Teflon pestle in 0.32 M sucrose, pH 5.0, and separated into the soluble fraction and fraction of subcellular structures [7, 8]. Enzyme preparations were obtained by diluting the homogenate and its fractions by 100 times for alanine-aminotransferase (ALT) and 700 times for aspartate-aminotransferase (AST) with 0.67 M phosphate buffer, pH 7.5. Activity of the transaminases [4] was expressed in $\mu$g pyruvic acid/mg fresh tissue and in $\mu$g/mg protein. Protein was determined by method [13].

## EXPERIMENTAL RESULTS AND DISCUSSION

The results (Table 1) show that the total activity and activity of soluble ALT, expressed per milligram fresh tissue, were the same for the white and gray matter of the spinal cord, but if expressed per milligram protein the values for the white matter were almost 1.5 times higher than for the gray matter. Activity of the enzyme in the fraction of subcellular structures, calculated for fresh tissue, was 3 times higher in the gray matter than in the white. The results agree with data pointing to the existence of a mitochondrial isoenzyme of ALT in various tissues including nerve tissue [5, 9-12].

AST activity in the structures of the lumbar enlargement studied showed a rather different character of distribution. Higher AST activity, expressed per weight of fresh tissue, was found in all the fractions of gray matter studied than in the white matter. If expressed relative to protein the total AST activity was higher in the white matter whereas activity of the enzyme bound with the subcellular structures was higher in the gray matter.

Morphologically and functionally more complex structures (gray matter) thus have higher transaminase activity than the white matter. This is in agreement with the view that a biochemical topography exists in

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TABLE 1. Activity of Transaminases in Gray and White Matter of Lumbar Enlargement of Cat Spinal Cord (in μg pyruvic acid after i incubation for 20 min at 25° C; M±m)

| Enzyme | Matter | Total enzyme activity (in homogenate) per mg | | Activity of sol. enzyme (in supernatant fraction) per mg | | Activity of enzyme bound with subcellular structures per mg | |
|---|---|---|---|---|---|---|---|
| | | tissue | protein | tissue | protein | tissue | protein |
| ALT | White | 1,76±0,05 | 21,6±0,5 | 1,17±0,08 | 61,6±4,3 | 0,25±0,02 | 4,09±0,3 |
| | Gray | 1,9±0,08 | 14,1±0,5 | 0,96±0,09 | 41,5±2,3 | 0,77±0,07 | 5,74±0,5 |
| AST | White | 28,4±0,67 | 351,9±8,3 | 25,6±0,4 | 1339,4±22,9 | 3,37±0,2 | 54,4±2,9 |
| | Gray | 38,4±1,4 | 276,7±9,8 | 32,4±0,99 | 1378,5±42,6 | 8,1±0,2 | 72,5±5,3 |

functionally and morphologically different structures of the CNS [1, 2] and also with observations on the intensity of protein renewal in the white and gray matter of the brain [3]. The present results showing higher AST activity than ALT activity agree with determinations of ALT and AST in the brain [5].

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