

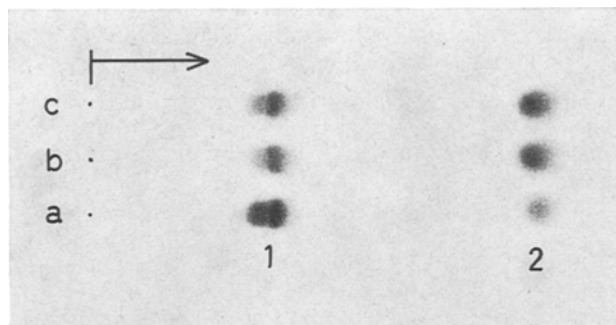
Gamma-Aminobutyric Acid (GABA) in Fish Erythrocytes

Considerable attention has been paid to GABA in nervous tissues¹, which is the only vertebrate tissue so far where this substance has been found². It has been suggested that GABA plays an important physiological role as an inhibitory transmitter in the vertebrate central nervous system, and at the crustacean neuromuscular junction¹. Other physiological functions have also been suggested³.

In the present investigation it has been found that GABA, together with taurin, are the major constituents of the intracellular extractable amino acid pool in erythrocytes from flounder (*Pleuronectes flesus*), plaice (*P. platessa*), and dab (*P. limanda*) (Figure).

Protein-free alcohol extracts (80% ethyl alcohol) were prepared from hemolyzed cells which were collected from heparinized blood, and washed in isotonic saline. Thin-layer chromatography was carried out^{4,5} using either iso-propanol/formic acid/water (40/2/10, v/v), or n-propanol/ammonia 0.2N (3/1, v/v) as solvent for the development in one-dimensional chromatography. For two-dimensional chromatography, the first solvent mentioned was used for the first dimension and phenol/water (75/25, w/w, gas-phase equilibrated with 3% NH₄OH), or n-butanol/acetone/diethylamine/water (70/70/14/35, v/v) for the second dimension.

In every chromatogram tested, one and the same ninhydrin-positive spot behaved in an identical manner to a standard containing GABA. The other dominating ninhydrin-positive substance was taurin (Figure) which, together with GABA, makes up most of the intracellular pool of extractable amino acid-like substances (about 45 mM/l cells, measured as taurin equivalents⁶). However, traces of β -alanine, alanine, glutamic acid, aspartic acid, glycine and 3–4 unidentified spots could also be detected.



Thin-layer chromatogram (solvent for the development: iso-propanol/formic acid/water, 40/2/10) of alcohol extracts from flounder (a), plaice (b), and dab (c) erythrocytes. The ninhydrin-positive spots 1 represents taurin, the spots 2 represents γ -aminobutyric acid.

Ion-exchange chromatography (Bio-Cal Instruments, sulphosalicylic acid protein-free extracts) showed that the intracellular GABA pool was only half the size of the taurin pool in flounder erythrocytes.

The total pool of extractable amino acid-like substances in erythrocytes from flounder⁷, plaice and dab⁸ has been shown to vary in concentration concomitant with a variation in plasma osmolality, initiated by a change in the salinity of the surrounding water. In vitro experiments on isolated flounder blood samples have shown that when the erythrocytes were exposed to a diluted plasma, an osmotic swelling of the cells occurred; but this stage was followed by cell volume adjustment back to the original volume. During this process the cellular content of protein-free ninhydrin-positive substances decreased concomitant with an increase in plasma content of similar substances. The phenomenon could not be explained as a temporary lysis of the cells⁶.

It has now been shown that both GABA and taurin leave the flounder erythrocytes under similar experimental conditions, and the same substances are in vivo reduced in concentration in flounder, plaice and dab erythrocytes under conditions which lead to a decrease in plasma osmolality. From the above findings it seems that GABA as well as taurin in the 3 fish species erythrocytes play a role as osmotically active solutes in the cell volume regulation under conditions which lead to an alteration in plasma osmolality.

Zusammenfassung. Nachweis, dass γ -Aminobuttersäure und Taurin bei den 3 verwandten Plattfischarten Flunder, Scholle und Kliesche die wichtigsten intraerythrozytären freien Aminosäuren sind.

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Cardiac Muscle and Liver Ribosomes of the Rat: the Influence of Laparotomy and Laparotomy Combined with Adrenalectomy

Surgical trauma (laparotomy) induces in rats, in the immediate post-operative period, an increase in the incorporation ability of ribosomal preparations from both cardiac muscle and liver in an in vitro system (KÖLBEL¹, KÖLBEL et al.²). The increase is due to a temporary increase in the formation of polysomes. As the glucocorticoids are known to be one of the possible regulatory factors in the

metabolism of RNA (GARREN et al.³), we became interested in the reaction of cardiac muscle and liver ribosomes to surgical trauma in adrenalectomized animals.

Material and methods. In 15 male rats (Wistar strain, body weight 200–210 g), bilateral adrenalectomy was performed per laparotomy under ether anaesthesia. The animals were decapitated on the 5th post-operative day.