

The Effect of Sodium Ion on the Gene Expression of Biochemical Messengers in the Central Nervous System

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Summary

The effect of sodium ion on the gene expression of biochemical messengers in the central nervous system was investigated by using the in situ hybridization and immunocytochemical methods.

Choice of targets and design of the probe for in situ hybridization:

Many functional and structural proteins in the cell have been shown to be categorized as subsets of a superfamily, indicating that these proteins would be originated from certain prototype proteins. This means that in these families the nucleotide sequence of the genes is composed of high homologous regions and low homologous regions. In the case of oxytocin and vasopressin genes, a central portion of precursor protein shows very high homology between them. In our experience, 30mer probes, in which 4 bases are different, specifically hybridized with each mRNA, showing that a well- designed probe could detect selected target sites of mRNA.

Labeling of the probe and analysis of the data:

Usual labeling of the oligonucleotide probe is undertaken by tailing of the 3' end with an isotope or an enzyme substrate. Once labeled, the specificity of the probe might decrease. Therefore one has to check the specificity once again by computer-assisted homology search after labeling. For the semi- quantitative study of measure of mRNAs in response to certain physiological and pharmacological manipulations, graphical and statistical analyses could guarantee the most reliable data processing of the hybridization signals overlying the cell.

Salt-loaded experiment :

2% salt was applied to rats and the effect of such high salt challenge on the immunoreactivity and mRNA of vasopressin and oxytocin in the hypothalamus was analyzed. In the hypothalamus and posterior pituitary the immunoreactivity of vasopressin of salt-loaded animals was significantly decreased. On the other hand such manipulation did cause the increase of mRNA of vasopressin in the supraoptic and paraventricular nuclei.

In conclusion, the dynamic of biochemical messengers should be analyzed from the points of immunological and hybridizational view, because these techniques detect different molecules in the cells.