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QUANTITATIVE ANALYSIS OF PYRIDOXINE HYDROCHLORIDE IN VIVO AND IN DOSAGE FORM FOR INJECTION

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Abstract
Pyridoxine hydrochloride, known as vitamin B6, plays a key role in the human body by participating in amino acid metabolism, neurotransmitter synthesis, and maintaining the normal functioning of the central nervous system. Quantitative evaluation of pyridoxine in vivo is necessary to assess its level in the body, diagnose deficiency and monitor therapeutic use. The quantitative determination of pyridoxine hydrochloride in vivo is an important area of pharmacokinetic research, since vitamin B6 plays an important role in maintaining metabolism, neurotransmitter synthesis and the normal functioning of the nervous system. Various analytical methods such as high-performance liquid chromatography (HPLC) and mass spectrometry are used to assess its content in the body.

Keywords: vitamin B6, pyridoxine hydrochloride, nervous system, quantitative assessment, depression.

Introduction

HPLC makes it possible to effectively isolate and quantify pyridoxine and its metabolites in plasma, urine and other biological fluids. In order to avoid contamination and achieve high sensitivity of the methods, it is necessary to properly prepare the sample, including extraction and purification.

Suppression of the activity of enzymes involved in pyridoxine metabolism can also affect its level in vivo, which requires consideration when interpreting the results. The conducted studies on the quantitative determination of pyridoxine hydrochloride will help to better understand its physiological functions and will become the basis for the development of recommendations for its use in clinical practice.

There are several methods for the quantitative determination of pyridoxine hydrochloride in vivo, each of which has its advantages and limitations.

Chromatographic Methods

High performance liquid chromatography (HPLC). This is one of the most common ways. This allows quantitative analysis of blood plasma, urine and other biological fluids. Fluorescence detectors are often used to increase sensitivity.

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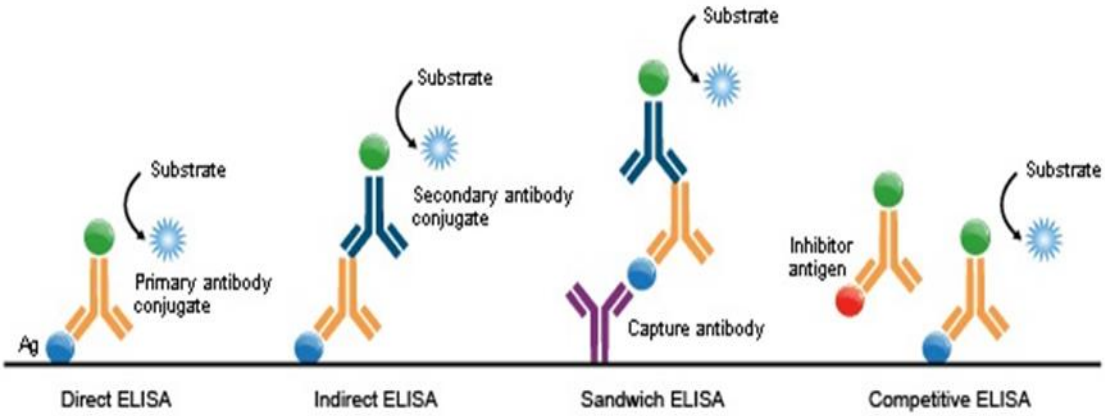
Gas chromatography (GC). This method is also used, but requires more complex sample preparation. It can be used to analyze pyridoxine in tissue samples.

Enzyme immunoassays:

It is used to determine the level of vitamin B6 in plasma based on a specific antigen-antibody reaction. This method can provide a quick and accurate assessment, but requires special reagents.



Spectrophotometry. This method is based on measuring the absorption of light at a specific wavelength. It can be simple and fast, but less sensitive than chromatographic methods.

The procedure for conducting the analysis. Samples of the patient's blood plasma or urine are taken for analysis. Samples should be collected under conditions that prevent the breakdown of pyridoxine (for example, at low temperature and in dark dishes).

Production of samples. The samples are processed, which may include extraction, protein precipitation, and concentration of the active ingredient.

Conducting an analysis. The selected analytical method (HPLC, GC or immunoassay) is used to measure the concentration of pyridoxine in prepared samples.

Interpretation of the results:

Normal plasma pyridoxine levels are usually in the range of 5-30 nmol/ml. Low levels may indicate vitamin deficiency, which can lead to various diseases. It is important to consider factors that may affect pyridoxine levels, such as age, gender, general health and the presence of concomitant diseases.

The study was conducted on a group of volunteers with vitamin B6 deficiency, who determined plasma levels of pyridoxine before and after the course of treatment.

At the initial stage, the content of vitamin B6 in plasma was 30 nmol / l, which is significantly lower than normal. After 8 weeks of treatment with a daily dose of 25 mg pyridoxine, the results showed an impressive increase in B6 levels to 85 nmol / l, which confirmed the effectiveness of therapy.

In addition, related metabolites such as pyridoxal-5'- phosphate were analyzed, which also increased by 150%. Notably, improved vitamin B6 levels were associated with significant improvements in cognitive function and reduced symptoms of depression in the participants. These results highlight the importance of vitamin B6 for maintaining health and its potential role in the treatment of various diseases.

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Quantitative analysis of pyridoxine hydrochloride in the form of an injection drug

It was conducted according to the article pharmacopoeia.

1) Preparation of the test solution: the pure volume of the drug containing 50 mg of pyridoxine hydrochloride is placed in a 100 ml volumetric flask and brought to the level of 0.1 m hydrochloric acid. 2.0 ml is taken from the prepared solution and placed in a 100 ml measuring flask and brought to the mark with the same solvent.

2) Preparation of a standard solution of pyridoxine hydrochloride: 50 mg is weighed in a pure amount from a weighted standard sample of pyridoxine hydrochloride and placed in a 50 ml measuring flask. Then 30 ml is dissolved in 0.1 m hydrochloric acid solution and brought to the mark with the same solvent. 1.0 ml is taken from the prepared solution and placed in a 100 ml measuring flask and brought to the mark with the same solvent.

3) solution for comparison: 0.1 m hydrochloric acid

The test solution and a sample of the standard solution are measured with a spectrophotometer at a wavelength of 291 Nm, the optical density is measured in a cuvette 1 cm thick.

The amount of C8H11NO3 * HCl as a percentage is determined by the formula:

$$X = \frac{A_1 \cdot a_0 \cdot P \cdot 100 \cdot 1 \cdot 100}{A_0 \cdot V_1 \cdot L \cdot 2 \cdot 50 \cdot 100} = \frac{A_1 \cdot a_0 \cdot P}{A_0 \cdot V_1 \cdot L}$$

Where: A1 is the optical density of the test solution;

A0 is the standard optical density of the solution sample;

a0-standard solution sample box;

V1 is the volume of the preparation obtained for the preparation of the test solution, ml;

P is the amount of C8H11NO3·HCl in the sample of the standard solution as a percentage;

L is the amount of C8H11NO3·HCl in the test solution mg/ml

It has been established that the analyzed dosage forms meet the requirements imposed on them in quantitative terms.

Conclusion

Quantitative evaluation of pyridoxine hydrochloride in vivo is an important tool in clinical practice. The correct determination of vitamin B6 levels allows timely detection of deficiency and improvement of the patient's well-being. The choice of the analysis method should be based on the availability of equipment and the necessary sensitivity to obtain reliable results.

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