Determination of eight metal elements in Enteral Nutritional Powder (Wei Wo) by Microwave Digestion Atomic Absorption Spectrometry

The enteral nutrition powder (Vivo) is mainly used for nutritional support in critically ill patients and postoperative patients, and its trace elements play an important role in the physiological function of patients. Nitric acid was used as digestion solution, enteral nutrition powder was treated by microwave drying equipment. The contents of K, Na, Ca, Mg, Fe, Mn, Cu and Zn were determined by atomic absorption spectrometry. The standard curve of the method had a good linear relationship (r=0.9992-0.9998). The recovery rate (n=6) was 97%-103%, and RSD value (n=6) was 0.46%-1.12%. It can be used for simultaneous determination of various metal elements in enteral nutrition powder. The method has the characteristics of low detection limit, high sensitivity, high speed and accuracy, and the results of the actual sample determination are satisfactory. To provide a guarantee for the quality control of such drugs, and provide data support for rational drug use in clinical practice.

IntroductionThe enteral nutrition powder (Vivo) is mainly used in clinical enteral nutrition support for patients with severe metabolic disorders and gastrointestinal dysfunction, such as postoperative patients, chronic kidney disease patients, cancer patients with radiation enteritis, low albumin patients, its main components are protein, fat, carbon and water. Compounds, vitamins and essential trace elements in human body. Clinical nutritional support is an important part of clinical treatment. Since 1990s, more and more attention has been paid to the application of enteral nutrition in clinical nutritional support. The trace elements contained in enteral nutrition powder are a kind of elements with little content but very important physiological functions. Mainly manifested in: the body's important components; maintain cell osmotic pressure and the body's acid-base balance; maintain nerve and muscle activity; participate in oxygen transport and tissue respiration, biological oxidation and so on. Trace elements are essential to maintain normal metabolism and growth and development of the body. When lacking or excessive, it will destroy the body's physiological balance. Especially for severe patients, moderate and appropriate supplement of trace elements plays a vital role in saving the lives of patients. Under different physiological and pathological conditions, how to scientifically and reasonably design nutritional support programs, ensure the coordination between drugs and nutrients, give full play to their clinical efficacy, reduce complications, is a problem of great concern to both doctors and patients, which requires us to accurately master enteral nutrition. At present, there is no report on the determination of trace elements in enteral nutrition powder. At the same time, with the improvement of people's living standards and the enhancement of drug safety awareness, it is necessary for relevant departments to establish perfect drug quality standards and accurately determine the content of effective components in drugs to ensure the safety and effectiveness of drug use.

The content of eight metal elements in enteral nutrition powder (Vivo) was determined by atomic absorption spectrometry in order to provide a scientific basis for the improvement of the quality standard.

After digestion, the digestion tank is removed from the microwave digestion apparatus, and the pressure is slowly released. The digestion liquid is heated to the residual nitric acid to 2 mL on the 120 C electric heating plate. After cooling, the digestion liquid is moved to 25 mL volumetric flask. The solution is diluted and volumetrized with ultrapure water as solution 1 (used for determination of Cu and Mn). METHODS Digestive solution was transferred to 50 mL volumetric flask and diluted with ultra-pure water as solution 2 (for the determination of Fe and Zn); 2 mL solution was precisely taken and placed in 100 mL volumetric flask, and then diluted with ultra-pure water as solution 3 (for the determination of K, Na, C). 2 mL solution 2, put in 100 mL volumetric flask, add lanthanum oxide solution (weighing 58.6 g lanthanum oxide, adding 150 mL hydrochloric acid to dissolve, adding water to 1000 mL, mixing) 2 mL, add ultra-pure water to dilute to the scale, shake well, as solution 4 (for use in). Determination of Mg). Do blank with the law. In the determination of magnesium, lanthanum oxide is added to the sample solution to eliminate the interference of coexisting ions.

Results and Discussion 3. The standard series of working fluids were determined according to the selected working conditions and the standard curves were drawn. The linear regression between absorbance A and concentration C was used to calculate the regression equation and correlation coefficient, and the minimum detection limit was determined.

Conclusion Enteral nutrition support is an important part of clinical treatment and its clinical application has been widely reported. According to recent data and statistics and foreign scholars'research, enteral nutrition has a significant impact on severe trauma, burns, tumor-induced malnutrition, gastrointestinal dysfunction and other severe patients. Clinical nutritional support can improve the clinical outcome, reduce complications and shorten hospital stay. Metal elements in enteral nutrition play an important role in saving patients'lives and maintaining their physiological functions. Based on the important role of metal elements in enteral nutrition powder in clinical practice, it is particularly important to establish a set of effective, scientific and rigorous detection methods.

Using nutrient powder drying equipment to digest samples has the advantages of fast digestion speed, complete sample digestion and so on.And because it is carried out in an airtight container, the pollution and volatilization of the sample are avoided, the reagent is saved in the digestion process, and the environmental pollution is reduced. It conforms to the concept of low carbon and environmental protection called for by the state. The digestion sample can satisfy the determination of many elements. Atomic Absorption Spectrometry (AAS) is one of the element analysis methods developed rapidly in recent years. It has been used more and more widely in mineral determination, environmental and pharmaceutical analysis, mainly because of its high sensitivity and accuracy, good selectivity and fast analysis speed. According to the composition of enteral nutrition powder and the properties of the elements to be measured, atomic absorption spectrometry (AAS) was used to determine the metal elements in the samples. Methodological experiments showed that the recovery rate was 97.1%-102.9%, RSD was 0.46%-1.12%, and the results were satisfactory. The method reported in this paper is simple, fast, sensitive, scientific and reliable. The method and results of this experiment provide a scientific basis for the establishment and improvement of the quality control standard of enteral nutrition powder by the national food and drug supervision department, and provide a reference for the quality control of similar products.