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# Labelled Amino Acids

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[dx.doi.org/10.17504/protocols.io.n2bvj6pqwlk5/v1](https://doi.org/10.17504/protocols.io.n2bvj6pqwlk5/v1)

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Isotope-labeled amino acids refer to the replacement of single or multiple atoms of the amino acid with isotopes, which can be radioactive isotopes or stable isotopes. Basically, isotope-labeled amino acids have identical structures and properties as non-labeled amino acids. The trends of isotopes-labeled amino acids can be observed by analytical methods such as mass spectrometry and nuclear magnetic resonance. Therefore, isotope-labeled amino acids serve as safe, effective, and convenient tracer tools for scientific research in medicine, biology, pharmacy, chemistry, *etc.*

- In the field of **medicine**: Isotope-labeled amino acids can be used for the clinical diagnosis of various diseases. Labeled amino acids can be used as tracers to track the metabolic processes of amino acids and proteins in different physiological and pathological conditions, which allows the exploration of disease mechanism and effective ways to prevent and treat diseases.
- In the field of **biology**: Isotope-labeled amino acids are used as starting materials to study the biosynthetic pathways and mechanisms of natural products in animals, plants, and microorganisms by analyzing the abundance of labeled elements in products.
- In the field of **pharmacy**: Isotope-labeled amino acids are critical tools for the development of new drugs, and are used to determine the transfer, transformation, efficacy, mechanism of action, toxicity, and side effects of drugs *in vivo*.
- In the field of **chemistry**: Isotope-labeled amino acids can be used as tracers to explore chemical reaction mechanisms and as raw materials for the synthesis of other labeled products, such as labeled polypeptides.

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