How Peptides are Manufactured (Part 5)

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Usefulness in Laboratories

In a cellular setting, peptides are used for all kinds of fascinating purposes. This includes transporting other molecules, ensuring that templates are cut to the proper size, and accelerating all kinds of chemical reactions. Under laboratory conditions, these capacities can be used in many kinds of research. For example, many times researchers want to know where a specific molecule will wind up in a cell. In order to achieve this goal, they can simply attach a peptide tag to the molecule and then use various stains to make the entire complex show up under a microscope.

Peptides are also ideal for cutting nucleic acids and probing the structure of proteins. No matter whether a biologist wants to work on gene sequencing or study the way certain proteins change in a malignant cell, peptides can be of immense use. You will also find that synthetic peptides are very useful for joining bits of genetic information together to form a new organism, or even splicing genes that will produce synthetic proteins.

Equipment Used to Study and Manufacture Synthetic Peptides

It is fair to say that a well equipped cellular biology lab should be able to produce a reasonable quantity of pure synthetic peptides. On the other hand, actually describing that process and how it works can fill several volumes. As with the processes that go on inside of a cell, you are best served by having a basic overview of the procedure as well as the main pieces of equipment involved. At the very least, if you find that some elements of the routine differ from one lab to another, you will still be able to see how it all fits together.

Fundamental Equipment

After a peptide has been isolated, researchers must determine which amino acids are used to create the complete molecule. Depending on the lab, the template used to create new amino acids can be obtained from stripping genetic material of its protective layer and isolating the required template. Today, many labs make use of a resin or other type of non-reactive matrix to align amino acids.

Centrifuges

Plant or animal based tissues are combined with water and various reagents that break cells apart while being spun in the centrifuge. As this process continues, lighter materials are increasingly separated from heavier ones. Typically, spinning at higher rates of speed or for longer periods of time will result in a larger number of bands within the centrifuge tube. These devices can be used to isolate peptides, nucleic acid templates, and just about any other material required at any given stage of a project.

Electrophoresis Gels

During the process of isolating peptides and developing synthetic molecules, it is very important to make sure that the finished product is pure and consistent. Electrophoresis gels are ideal because they create patterned color bands that easily reveal impurities as well as concentrations of any given molecule. Electrophoresis units can also be very useful when it

comes to seeing how variations of any given peptide compare in terms of molecular weight, or even in relation to a control solution.

Resin Matrices

It is very important to realize that modern researchers cannot duplicate the endoplasmic reticulum let alone a ribosome. As a result, making peptides isn't as simple as shaking up some nucleic acids in the presence of amino acids and hoping the molecules will sort themselves out. Instead, researchers must use various reagents and a support structure to mimic a natural environment. Modern researchers usually use resin matrices as well as other non-reactive structures that allow amino acids to assemble in the proper orientations.

Cleaving Reagents

Perhaps it is best to say that creating synthetic peptides is not so different from weaving a rug. In order to achieve this goal, yarn or some other material must be passed through a network that stabilizes the pattern. Eventually, if the rug is to be of any use, it must eventually be cut free of the network and equipment. When it comes to synthetic peptides, cleaving reagents are used to separate newly formed peptides from the resin matrix. From there, they can be suspended in an aqueous solution, or used in any number of other experiments.

Types of Ligation

Historically speaking, researchers have used a number of different "ligation" methods to create synthetic peptides. The three most common methods are native chemical ligation, expressed protein ligation, and Staudinger ligation. Even though expressed protein ligation tends to be more common, researchers are still looking for methods that will yield higher amounts of usable synthetic peptides. Since Staudinger ligation is a newer, more effective method, it may soon replace expressed protein ligation.

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