How Peptides are Manufactured (Part 6)

Published on **28 August, 2013**, by **Richard Blanchard+**

Problems With Moving From Peptides to Proteins

As you learn more about organic molecules, you are bound to find yourself fascinated by the similarities and differences between peptides and proteins. While both are composed of amino acids and may carry out similar tasks, it is often far more difficult to study proteins.

In fact, researchers cannot even produce a functional protein if it is over 200 – 300 amino acids in length. Unfortunately, when it comes to truly understanding biological fundamentals of any given organism, or even a cell, being able to produce functional proteins of any size is extremely important. You should have a good understanding of problems in this arena, as well as always remain aware of how lack of knowledge can easily skew data, and even cause you to reach all the wrong conclusions.

Peptides vs. Proteins

To begin, it is very important to realize that peptides are usually less than 50 amino acids in length. Since they are very short, their structure tends to be linear or made up of very few folds. Therefore, manufacturing synthetic peptides becomes a fairly simple matter of lining up the amino acids and then storing the finished product until it is needed.

Proteins are noted for their flexion and tendency to change shape based on temperature changes. Even if you synthesize a functional protein in the lab, a change in temperature, pH, or other environmental condition can render it useless before you have a chance to work with it.

There is no question that some researchers may not even be aware of these problems because they are relying on cell based protein production methods. That said, if you have ever cooked meat or other foods in order to “denature” various harmful proteins, then you can easily see how these issues can wreak havoc in a lab.

How are Proteins Folded

If you give it some thought, you are bound to be fascinated by the idea that microscopic organelles can create proteins with hundreds of molecules in a matter of hours, or even minutes. Aside from simply matching up amino acids to a template, ribosomes also ensure that proteins fold correctly.

Did you know that the loops of any given protein molecule can form lock structures that exactly fit the “key” provided by another protein? Aside from being the basis for hormones and other triggering mechanisms, proteins can also act as transport mechanisms that bind some molecules at one site while repelling them from other regions.

Problems with Creating Functional Proteins

Have you ever tried to walk a mile versus ride a bike or drive in a car? If you are able to use the exact same path, the outcome will differ mainly in the amount of time required to achieve your goal. When it comes to creating functional proteins in laboratory conditions, it is possible to force cells to create proteins they would not normally produce.

While mimicking the nature of viruses can work to a point, it cannot answer some of the most fundamental questions about protein manufacture. In particular, researchers have found it difficult, if not impossible to duplicate the exact folds found in any given protein. Aside from that, even when all of the folds are successfully duplicated, the protein molecule may unexpectedly fall apart or denature in situations where it should remain stable.

Why Creating Functional Synthetic Proteins is Vital to Our Future

Even if you do not follow the news, there are many signs that our world is suffering from incomplete information about how biological organisms work. This includes an inability to find out why bees and fish are dying off in excessive numbers, as well as an inability to curb skyrocketing cancer rates.

When it comes to finding answers, many researchers now turn to “genetics” and molecular biology for answers. As long as we are unable to synthesize proteins as effectively and consistently as peptides, it is fair to say that researchers will have a difficult time getting consistent results and answers to various questions.

Under these circumstances, harnessing everything from immune responses to hormones and neurotransmitters will remain a matter of trial and error. From there, one must ask if we, as a species truly have time for making more of the kinds of mistakes may soon rob us of bees and other vital organisms. From genetically modified organisms (GMOs) to biological warfare, counteracting human ignorance as well as finding truly useful answers may well hinge on being able to create synthetic proteins reliably and in sufficient quantity.

During the process of learning more about how living organisms function, you are sure to encounter a good bit of information about peptides. In some cases, you may find this information very complicated, and perhaps even spend years studying just a handful of molecules. This can easily lead to a situation where you will lose your ability to see the larger picture of living organisms and a complex dance that extends far beyond peptides.

In fact, even if you extend your scope to proteins, it may become very difficult to see past genes and recognize that other, non-amino acid based molecules are also very important.

That said, if you view peptides as useful tools, you will be able to use them effectively as well as keep them in their proper context. No matter whether you use synthetic peptides to analyze proteins or create new chemicals, you should always remember that cells and complex organisms seek optimal balances. Coming back to that perspective will make it easier to devise useful experiments as well as reduce the risk of producing the kinds of misleading results that prevent science and humanity from reaching its highest potential.

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