Lecture 7: Intracellular vesicle trafficking

We started to talk about protein glycosylation. When proteins are formed in the lumen of the ER there is glycosylation. Now the glycosylation, the oligiosaccharide complex is very specific. It is made of 14 sugars: 2 N-acetylglucosamine, 9 mannose and 3 glucose.You have a branching going one. The structure is called N-linked oligiosacharide because it is linked to the nitrogen in the R group of the asparagines amino acid. It is always an amino acid, followed by any amino acid followed by either serine or threionine. So when you have these three amino acids showing up that is where the oligiosaccharide binds to. Now where does it bind? Now before binding this oligiosaccharide is actually attached to the membrane through a membrane lipid called Dolichol. It is then joined to Dolicohol by a pyrophosphate (really high in energy) and as you have a growing peptide and you have this three arrangement of amino acids (asparagines, any amino acid, threonine or serine) you have get a transfer of the oligiosaccharide. This transfer is made possible by another protein by the name of Oligosaccharyl transferase. This is an easy transfer. Now this example is an example of a membrane protein, but what I want to tell you is that it is the same for a soluble protein. So if the protein is a soluble protein the oligiosaccharide will be linked and the point of linking is also when the protein is growing.

Another thing is a protein that is linked to a very important membrane lipid, phosphotydl inosotil. Now I mentioned that this protein is very important in producing secondary messengers for signal transduction. Now this protein is also important in linking completed proteins from the ER to the membrane. An example: You have inositol actually called glycosylphosphatidylinositol what it is that you have four extra sugars attached to it. So the first one is inositol and it is followed by glucosamine(suagar) flowed by 3 mannose. When a protein is formed here you have a protein that is partly inserted in the membrane and you have a part that is completed intracellularly. Obviously this particular protein will end up linking with glycosylphosphatidyl inositol at the COOH segement of the peptide. The glycosylphohatidyl inositol will cleave the protein and will join with the protein, which will be dangling in the lumen of the ER. This protein is called GPI anchored protein. This type of protein has significance.

What we are talking about now is the folding of the protein after the soluble protein is completed in the ER lumen. What happens to the protein? Well when you have a completed protein it will not remain as a linear polypeptide. You have all of these amino acids NH2 group, OH group, COOH group associated with all of the amino acids. So you have all of these possibilities of forming a hydrogen bond. One of the possibilities is that the protein can fold by itself to its most stable conformation. The second way is through an enzyme called IDS which is responsible for forming disulfide bonds. So it is able to promote the linking of two cystein