## **Summary**

## Our thesis consisted of four main chapters, can be summarized as follow:

## In Chapter one we wrote a brief review about carbohydrate and glycosylation reaction. Also, we discussed the classification of glycoprotein and different methodologies developed to access *N*-glycopeptide. Finally, in the last section we tried to summarize people efforts in the synthesis of Heparan Sulfates Proteoglycans (HSPGs).

## In the second and third chapter, we want to explore the utility of N-glycans as a biomarker for early cancer detection via synthesizing multiple isotopically labeled N-glycans to facilitate the quantification of glycans isolated from human cancer patients.

## We tried to synthesize our target molecule 1 using chemical ligation through coupling between the free amino group in oligosaccharide **49** and free carboxylic group in peptide **72** (**Scheme i**).



## **Scheme i**

## Also, we used chemoenzymatic approach to access the glycopeptide. In which, oligosaccharide oxazoline donor **110** is coupled with glycopeptide **122** with regioselectivity and stereoselectivity using enzyme to afford the desired glycopeptide **127** (**Scheme ii**).



**Scheme ii**

## In the fourth chapter, we report the synthesis of isotopically labelled amyloid *β* A*β* (1-15) glycopeptides **21’** which can be used as a new biomarker of early detection of Alzheimer’s disease (AD). Where it was found that its level in AD patient was found higher than normal people (**Figure i**).

## **Figure i**