**Synthesis of MS-Labile Crosslinker to Determine Protein-Protein Interaction Networks in Various Biological Systems Using Crosslinking Mass Spectrometry**

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**Introduction:**
- Crosslinkers are used to serve many purposes such as:
  - Determining domains of protein interactions
  - 3-D structures of proteins
  - What are crosslinkers?
    - Molecules that have two or more reactive ends that are particularly reactive towards specific functional groups
  - bind to proteins via these functional groups

**Objective:**
- We want to synthesize a crosslinker that is MS-labile and that produces fragments under MS conditions that allows masses of the peptides determined by the name of LXR-SEB (Labile Crosslinker Reagent-Succinic Ethanolamine Biotin)
- This crosslinker will ultimately assist in the future of healthcare by allowing scientists to not only understand more about PPIs (protein-protein interactions) but also about what occurs inside a cell when it becomes diseased

**Methods:**
- Our hypothesis is that the crosslinker fragments, SEB and LXR-Amine, can be synthesized by using the chemical synthesis approach:
  - Synthesis of SEB
  - Synthesis of LXR-Amine

**Results:**
- Biotin and TBEA reacts in DMF solvent at room temperature to form TEB and side products
- Pure TEB is required for deprotection step
- FPLC (Fast Protein Liquid Chromatography) successfully separates TEB from the rest of the side products.
- TEB produces MS peak at 688 m/z

**Conclusion and Future Studies:**
- We designed a new synthetic strategy for the in-solution synthesis of LXR-SEB and the results show that the suggested route produces intermediate complexes
- Further experiments will include fine-tuning the amount of acid for deprotection
- This project will continue on to combine the eventual formation of SEB and the successfully produced LXR-Amine to form the complete crosslinker of LXR-SEB

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