Synthesis of (*E*)-2-chlorovinylribose to examine activity and mechanism of 6-chlorohomovinyladenosine

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Nucleosides function as important agents in fundamental human metabolism and provide a broad range of activity in resulting modification of these nucleosides as functional prodrugs. Various modified nucleosides exhibit inhibitory activity towards enzymes and carry the possibility of containing anti-viral and anti-cancer properties. These properties are often exhibited by modifying the nucleobase moiety or the sugar moiety as synthesized novel nucleosides. In understanding my project aim, the sugar moiety of 6-chlorohomovinyl adenosine will be synthesized as the novel nucleoside (*E*)-2-chlorovinylribose to examine the nucleoside as the active component of 6-chlorohomovinyl adenosine. 6-chlorohomovinyl adenosine **1** demonstrates an active component that works specifically against *Trypanosoma Brucei,* a parasite associated with African trypanosomiasis, which is a widespread disease within East and South Africa. This compound has also demonstrated positive results within animal testing and is in the second phase of drug testing. As the sugar analog of **1**, (*E*)-2-chlorovinylribose **4** will be examined to understand the mechanistic properties and active sites of **1**. The proposed synthesis for the target compound begins with oxidative cleavage at C5 and C6 of **2** which is commercially available and is the primary source needed to make the desired product in addition to the necessary reactive agents. Followed by benzyl substitution, **2** is converted into **3** by the means of periodic acid and ethyl acetate and formed into the 5'OH-ribose by the means of sodium borohydride reduction. Furthermore, Moffatt oxidation followed by Wittig homologation with the tosylated ylide ($PPh_3CH=Ts$), Bu_3SnH with AIBN is expressed on the compound to propagate a new bond on the 6' Carbon for conversion into the desired chloro group on 6'C. Then, deprotection of the isopropyl group and the benzyl group are formed to the target **4**. This synthesis of compound **4** would provide as the evidence as to how **1** function within the cell environment.