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MULTISTEP SYNTHESIS OF ASYMMETRIC ORGANOPHOSPHORUS ANALOGS OF ACETYLCHOLINE

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Acetylcholinesterase is an enzyme which catalyzes the hydrolysis of acetylcholine, causing the relaxation of smooth, cardiac, and skeletal muscle contractions in the human body. One class of compounds that inhibit acetylcholinesterase is the organophosphates. While the mechanism of inhibition is fairly well understood, much less is known about the stereochemical aspects of inhibition. Our research involves the multi-step synthesis of organophosphorous analogs of acetylcholine which have similar size and functionality of that of acetylcholine, but that also contain two chiral centers. Once prepared, these analogs could then be used to learn more about the active site of acetylcholinesterase and also to learn about the stereochemistry involved in the phosphorylation of acetylcholinesterase. We are currently working on separating pairs of diasteroemers, which will eventually lead to the production of the desired analogs.