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Synthesis and pharmacological activity of small organosulfur molecules

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Garlic belongs to the Allium genus plants. It has a bewildering number of molecules, and organosulfur compounds are the most representatives. The most known and studied molecule and also the most abundant is allicin. This molecule is produced from alliin, by the action of the enzyme alliinase that together are released after crashing the garlic bulb. Allicin has many pharmacological activities and there are many papers available in literature about the studies of its properties. One of the main problems of this molecule is the considerable instability. Diallyl disulfide is the most important decomposition product of allicin. Many studies were carried out in the past years about this molecule, regarding biological activity and stability. We recently developed a green procedure to obtain saturated and unsaturated thioacetates starting from organic methanesulfonates. This procedure use water as solvent and avoid the use of a catalyst. Thioacetates are easily hydrolyzed to thiols and thiols are easily converted to symmetrical disulfides by an oxidation reaction. One of the most important properties of diallyl disulfide is the anticancer activity. Some researchers have recently proved in vitro, the antitumoral activity of this molecule against lung cancer cells with apoptosis and cell cycle arrest. There are many studies that prove that the allylic double bonds play an important role. We synthesized different symmetric disulfides for mimicking this molecule, with double bonds in different positions and with different substituents. We have obtained interesting result in vitro, using A549 lung cancer cells line that prove that allylic double bond is not the most important driving force, but other factors like substituents or the position of the unsaturation site can affect the activity. We have two new substrates that are quite similar but show higher activity than diallyl disulfide that can open new synthetic routes and studies in this direction.

Biography

Fabrizio Olivito is a PhD student in Life Sciences and Technologies attending the last year of PhD. He has obtained a Master's degree in Chemistry at the University of Calabria, Italy. He has some experience in organic synthesis with focus on the development of new environmentally friendly synthetic procedures and the synthesis of new bioactive organic compounds. He spent the second year of his PhD at the University of California, Davis at the Chemistry Department, where, along with other collaborators, he carried out a project about natural products mimicking, in particular the organosulfur compounds of Allium genus plants, with the assessment of some pharmacological functions. The main goal of his research group is to overcome the conventional procedures, avoiding the use of toxic solvent and toxic reagents, especially trying to use water as reaction medium, and open new routes through organic synthesis, going inside structure-activity relationship for drug discovery.

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