Evaluation of Antibiotic Properties of Diarylhydrazones, Diaryl Schiff-bases and Their Precursors

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Parallel with the advancements in medical techniques and treatments, the microorganisms that we are constantly battling against are also evolving. Bacterial evolution is leading to an increasing number of antibiotic resistant strains of bacteria. As the bacteria evolve, the antibiotics that are currently in use to combat bacterial diseases are becoming ineffective. FDA approval of new antibacterial agents decreased drastically over the past decade. Thus the design and synthesis of new classes of antibacterial agents, possibly with structures unrelated to the current antibiotics, as the next generation antibacterial agents is highly desirable.

In the current work the antimicrobial effect of an extended library of about 80 diarylhydrazones, related diaryl Schiff-bases and their precursor compounds, aryl-carbonyl compounds and phenylhydrazines have been evaluated against *Escherichia coli*, *Micrococcus luteus* and *Staphylococcus aureus* strains of bacteria. All compounds have been properly purified by recrystallization or column chromatography. The products were characterized by mass spectrometry and ^{1}H, ^{13}C and, when applicable, ^{19}F NMR spectroscopy.

While the diarylhydrazones and diaryl Schiff-bases were chosen due to their general biological activity, the carbonyl compounds and phenylhydrazines, that are their precursor compounds, were screened as possible metabolic products. Independent hydrolysis and mass spectrometric studies were also carried out under the generic assay conditions in order to determine the stability of the screened diarylhydrazones and Schiff-bases.

The compounds have been tested in standard cytotoxicity assays using *Escherichia coli*, *Micrococcus luteus* and *Staphylococcus aureus* strains. It was observed that the diarylhydrazones showed considerable activity against all three bacterial strains, while the diaryl Schiff-bases exhibited moderate to weak activity. The precursor compounds appeared to be inactive against the bacteria. The stability studies also indicated that the hydrazones as well as the Schiff-bases remained stable under the assay conditions.