TITLE: Synthesis of 1-phenyl-3,5-diaryl-4-bromopyrazoles, 1-phenyl-3-t-butyl-5-aryl-4-bromopyrazoles, and 1-phenyl-3-t-butyl-5-aryl-4-bromoisoaxazoles.


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Introduction:
Previous studies conducted have shown the C4 of different heterocyclic compounds to be sensitive to substituent effects on aryl groups [1]. We seek to investigate if the same transmission effects discovered in those heterocyclic systems will occur in 1-phenyl-3-aryl/t-butyl-5-diaryl-4-bromopyrazoles (Br-Pz) and 1-phenyl-3-t-butyl-5-aryl-4-bromoisoaxazoles using $^{13}$C NMR spectroscopy. The addition of a bulky bromine atom to the C4 position of the aromatic systems causes the aryl groups on the C3 and C5 to twist in 3,5-diarylisoaxazole [1]. We seek to determine if the same torsional strain is present when a non-aromatic bulky group is on C3 position.

Methods:
1-Phenyl-3-aryl/t-butyl-5-arylpyrazole (Pz) derivatives will be synthesized from their corresponding 1-Phenyl-3-aryl/t-butyl-5-arylpyrazolines by DDQ (2,3-Dichloro-5,6-dicyano-1,4-benzoquinone) oxidation in toluene. Meanwhile, 1-phenyl-3-t-butyl-5-aryl-isoxazoles will be synthesized from dibromide derivatives that are synthesized from the corresponding chalcones in a Br2/acetic acid solution with heat. Following, Pz’s and 1-phenyl-3-t-butyl-5-aryl-isoxazoles will be brominated at the C4 position by a reaction with NBS in acetic acid to yield Br-Pz’s and 1-phenyl-3-t-butyl-5-aryl-4-bromoisoaxazoles. Compounds will be purified and characterized by standard methods. $^1$H NMR spectra and $^{13}$C NMR spectra will be collected in CDCl3 and DMSO-d6 respectively using standard NMR parameters. Molecular modeling (MM) studies were conducted using the Spartan ’14 MMFF force field.

Results:
MM results predicted 1-Phenyl-3-aryl-5-arylpyrazole to have a torsion angles of 3° and 54° for the C3 and C5 aryls respectively. Bromination of the compound yielded torsion angles of 30° and 60° for the same aryl groups. 1-Phenyl-3-aryl/t-butyl-5-arylpyrazole was predicted to have a C3 of 59° and a C5 of 53° while the brominated compound had a C3 of 61° and a C5 of 59°. Results however showed that torsional angles of the 1-phenyl-3-t-butyl-5-arylisoaxazole and 1-phenyl-3-t-butyl-5-aryl-4-bromoisoaxazole essentially did not change.

Discussion:
We have yet to successfully synthesize the 4-bromo compounds. If our bromination method fails, we will have to discover a new method to make the 4-bromo compounds.

References: