Synthesis and Biological Evaluation of Benzoylferrocene as an Anti-Cancer and Antioxidant Agent

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This research involved the synthesis of Benzoylferrocene and evaluation of Benzoylferrocene's potential anti-breast cancer and antioxidant activity. No investigation has been done surrounding Benzoylferrocene's effects on MDA-MB-231 cancer cells or antioxidant potential. Ferrocene has been found to possess anti-cancer properties. The purpose of this investigation was to shed light on novel therapeutic compounds for breast cancer and oxidative stress and to determine if Benzoylferrocene would act as a dual action compound and show anti-cancer and/or antioxidant effects. The first step was the synthesis of Benzoylferrocene. Ferrocene and benzoyl chloride were reactants, Aluminum chloride was the catalyst, and Dichloromethane was the solvent, the product was Benzoylferrocene. The product was characterized using Melting Point Testing, FT-IR, & NMR spectroscopy. The second phase was the biological testing. This involved the cell culture of the MDA-MB-231 cancer cells, allocation of various concentrations of Benzoylferrocene in cell culture, and finally, the cell viability assay. Antioxidant testing involved mixing various concentrations of Benzoylferrocene (dissolved in methanol) with a DPPH solution and evaluating radical scavenging. As Benzoylferrocene concentration increased, cell viability decreased; as Benzoylferrocene concentration increased, radical scavenging also increased. The greatest concentrations tested (73.41mM – anticancer, and 1000µg/mL – antioxidant) were the most effective in each assay. The promising dual-action properties of Benzoylferrocene pave the way for new cancer therapies and offer a potential breakthrough in the fight against oxidative stress, opening avenues for future research and clinical applications.

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