Optical Properties And Antiangiogenic Activity Of A Chalcone Derivate

Lemes, Susy Ricardo; Júnior, Luizmar Adriano; Da Silva Manoel, Diego; De Sousa Montes, Maria Alice; Fonseca Rodriguez, Ruben Dario; Lima Silva, Rosa S; Noda Pérez, Caridad; De Melo Reis, Paulo Roberto; Cardoso Gomes, Cléver; De Paula Silveira Lacerda, Elisângela; Souza Rodrigues, Marcio Adriano; Mendonça, Cleber Renato; Gonçalves, Pablo José; De Boni, Leonardo; Da Fonseca, Tertius Lima; Da Silva Júnior, Nelson Jorge.

Abstract

Chalcones and their derivatives exhibit numerous pharmacological activities such as antibacterial, antifungal, cytotoxic, antinociceptive and anti-inflammatory. Recently, they have been assessed aiming for novel application in nonlinear optics and in the treatment of immune diseases and cancers. In this study, we investigate the optical properties of synthetic chalcona 1E,4E-1-(4-chlorophenyl)-5-(2,6,6-trimethylcyclohexen-1-yl)penta-1,4-dien-3-one (CAB7β) and its antiangiogenic potential using the chorioallantoic membrane (CAM) with the S180 sarcoma cell line. Experimental and theoretical results show intense absorption in the UVA-UVC region, which is associated with a $\pi \rightarrow \pi^*$ transition with intramolecular charge transfer from the trimethyl-cyclohexen-1-yl ring to the chlorophenyl ring. Quantum chemical calculations of the first hyperpolarizability, accounting for both solvent and frequency dispersion effects, are in very good concordance with hyper-Rayleigh scattering measurements. In addition, two-photon absorption allowed band centered at 650 nm was observed. Concerning antiangiogenic activity, CAB7β causes a significant reduction in the total number, junctions, length and caliber of blood vessels stimulated by S180 cells reducing the presence of blood vessels, inflammatory cells and others elements related to angiogenic process. It is found that CAB7β is a versatile compound and a promising candidate for linear and nonlinear optical applications, in therapy against sarcoma and phototherapy.

Keywords

Antiangiogic Activity; Chalcona; Optical Properties; Sarcoma.