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Synthesis and application of novel tricyanofuran hydrazone dyes as sensors for detection of microbes

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Acknowledging the need to develop rapid and sensitive bacterial recognition approaches, we functionalized the tricyanofuran hydrazone molecular switch. Of significant interest in relation to the synthesized hydrazones is the formation of two different conjugated structures upon exposure to different pH values. Many bacteria release ammonia gas, which alkalizes environments. Herein we report the synthesis of a tricyanofuran hydrazone having the function of a colorimetric pH sensor. The UV-visible absorption and fluorescence spectra exhibit reversible color changes of the tricyanofuran hydrazone solution in acetonitrile under acid-base conditions. Our results indicate that the tricyanofuran hydrazone probe can identify the bacterial targets quickly with high sensitivity. The infected samples exhibit a significant color change from orange to blue and in the mean time there is a decrease in fluorescence emission as a function of ammonia and volatile amines released from bacterial metabolites. This tricyanofuran hydrazone chromophore is proposed for use in food packaging with a pH-sensing capability.

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Alpha cyano-4-hydroxy-3-methoxycinnamic acid inhibits proliferation and induces apoptosis in human breast cancer cells

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Breast cancer is the leading cause of cancer death in women worldwide and a critical public health concern. In this context, the present work has examined the in vitro and in vivo antiproliferative and pro-apoptotic effects of α-cyano-4-hydroxy-3-methoxycinnamic acid ACCA on human breast cancer cell lines, MDA-MB-231, MCF-7 and T47D. Treatment with ACCA resulted in dose and time-dependent decrease of cell proliferation, viability in colony formation assay and in induction of programmed cell death (apoptosis) with minimal effects on non-tumoral cells. The ability of ACCA to suppress growth in cancer cells not expressing or containing defects in p53 gene indicates a lack of involvement of this critical tumor suppressor element in mediating ACCA-induced growth inhibition. The stimulation of breast cancer cells with ACCA would increase the expression of the ratio of Bax to Bcl-2, a process widely involved in the stimulation of apoptosis. Besides, we have demonstrated the ability of ACCA to inhibit the migration and invasion of MDA-MB231 cells. Additionally, tumor growth of MDA-MB-231 breast cancer cells was dramatically affected in vivo by ACCA. Therefore, these results show that ACCA might be very promising therapeutic targets in the treatment of breast cancer.

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