

Proceedings of an International Conference on Trends in Biochemical and Biomedical Research: Advances and Challenges

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ABSTRACT

Biochemistry is fundamentally connected to multidisciplinary areas of research. Many breakthrough discoveries in biochemistry have contributed comprehensively to understand the fundamental biological processes. The subject helps in understanding the pathogenesis of several chronic diseases including but not limited to cancer, diabetes, obesity, mental disorders, arthritis, cardiovascular, pulmonary, and infectious diseases. To discuss the existing concepts, recent findings, and challenges associated with the applications of Biochemistry in modern biology, Department of Biochemistry, Institute of Science, Banaras Hindu University, Varanasi, India organized an international conference on *Trends in Biochemical and Biomedical Research: Advances and Challenges* from February 13-15, 2018. Over 350 delegates including scientists, clinicians, research students, and industry representatives across the globe participated in the conference. Innovative talks by the experts of the global scientific community were included. The conference also provided a platform for sharing experiences, ideas and latest developments, and in establishing future collaborations. This issue is comprised of the abstracts of different talks presented by the speakers and participants of the conference.

KEYWORDS: Biochemical, biomedical, research, cancer, diabetes, obesity, mental disorders, arthritis, cardiovascular, pulmonary, and infectious diseases.

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taxon. Lupeol, used as the marker compound in the analysis, is considered as one of the pharmacologically important ingredients of the taxa investigated. **Conclusion:** The outcome of the study establishes that it is appropriate to use both the roots of *B. prionitis* and *S. ciliatus* as the source of 'Sahachara', as these plants were outstanding in scavenging free radicals and bringing down inflammation. HPTLC analysis led to the development of characteristic fingerprint profile for each taxon that can be used for identification and quality evaluation of the plants used as 'Sahachara'. (DOI:10.9777/rr.2018.1090)

Biological action of bis(3,5-diiodo-2,4,6-trihydroxyphenyl) squaraine as a photosensitizer for "breast cancer"

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Background: Photodynamic therapy (PDT) is one of the emerging anticancer treatment modality via photosensitizer mediated oxidative cytotoxicity. Squaraines are a class of dyes possessing all beneficial characteristics of a photosensitizer and considered to be a potent candidate for clinical PDT. In this study we used iodo derivative of squaraine called Diiodo-squaraine (Bis (3,5-diiodo-2,4,6-trihydroxyphenyl) squaraine) which is well known for its tumor specificity but least studied for its molecular basis of action. **Aim:** In this study we aim at validating various molecular events initiated by oxidative stress in squaraine based PDT. **Methods:** To delineate various molecular pathways, we performed proteomic profiling

followed by analysis using DAVID Bioinformatics Resources. Protein profiling with LC-MS/MS followed by bioinformatics analysis in breast adenocarcinoma. Further confirmation and role of key molecules involved was studied using Western blotting and Real time PCR and established relation oxidative stress an unfolded protein response (UPR) and endoplasmic reticulum(ER) stress. Confocal microscopy and Flow-cytometric analysis for oxidative stress, Mitochondrial Membrane Potential (MMP) and actin cytoskeletal changes demonstrate regulation of Reactive Oxygen Species (ROS) mediated cell death pathways. **Results:** MDA MB 231 cells showed activation of response to unfolded protein (RUP), cell redox homeostasis (CRH), actin cytoskeletal organization (ACO) and programmed cell death (PCD) pathways. **Discussion:** Squaraine PDT induces oxidative stress and it induces a series of pro and anti-apoptotic pathways which include cell redox homeostasis, response to unfolded protein response, regulation of programmed cell death, actin cytoskeleton organization and cell redox homeostasis. We showed for the first time that squaraine PDT induces ROS mediated ER stress, which leads to loss of mitochondrial membrane potential which in turn induces a caspase cascade finally leading to apoptosis even in the presence of redox signaling. **Conclusion:** Here we demonstrated the death and survival signals in photodynamic therapy using squaraine as photosensitizer. This will give rise to novel therapeutic strategies for enhancement of the effect of PDT. Modulation of redox signaling may enhance the efficacy of PDT. Molecular basis of squaraine PDT was identified and redox associated gens have a prominent role in PDT resistance so further studies will give rise to potent molecular