

FEATURES

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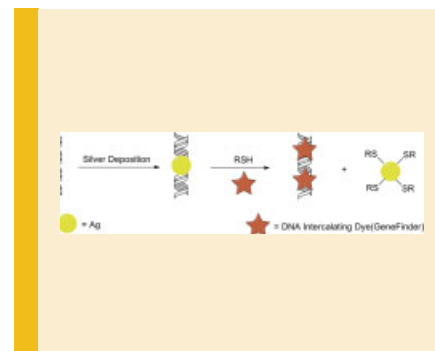
Recent Advances in Thiol and Sulfide Reactive Probes

Ke Wang, Hanjing Peng, and Binghe Wang

1007

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Due to the biological relevance of thiols and sulfides such as cysteine, homocysteine, glutathione and hydrogen sulfide, their detection has attracted a great deal of research interest. Fluorescent probes are emerging as a new strategy for thiol and hydrogen sulfide analysis due to their high sensitivity, low cost, and ability to detect and image thiols in biological samples. In this short review the authors summarized recent advances in the development of thiol and hydrogen sulfide reactive fluorescent probes. The probes are compared and contrasted with regard to their designing strategies, mechanisms, photo-physical properties, and/or reaction kinetics. Biological applications of these probes are also discussed.



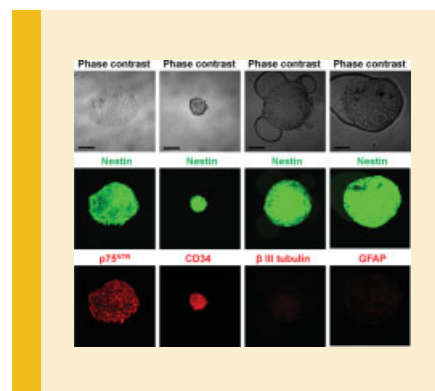
Comparison of Nestin-Expressing Multipotent Stem Cells in the Tongue Fungiform Papilla and Vibrissa Hair Follicle

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The authors have previously reported that hair follicles contain multipotent stem cells which express nestin and participate in follicle growth at anagen as well as in the extension of the follicle sensory nerve. The nestin-driven green fluorescent protein (ND-GFP) transgenic mouse labels all nestin-expressing cells with GFP. The hair follicle nestin-GFP cells can differentiate into neurons, Schwann cells, and other cell types. In this study, the authors describe nestin-expressing multipotent stem cells in the fungiform papilla in the tongue. The nestin-expressing multipotent stem cells in the fungiform papilla are located around a peripheral sensory nerve immediately below the taste bud and co-express the neural crest cell marker p75^{NTR}. The results of the current study indicate nestin-expressing fungiform papilla cells and the nestin-expressing hair follicle cells have common features of cell morphology and ability to differentiate into multiple cell types, suggesting their remarkable similarity.

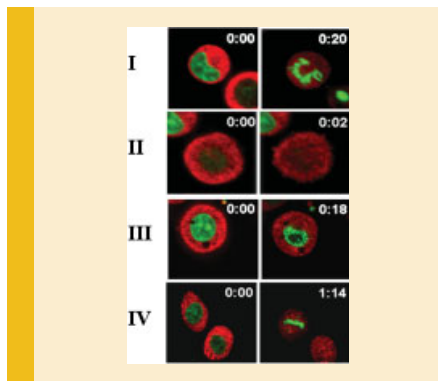


DNA-PKcs Associates With PLK1 and Is Involved in Proper Chromosome Segregation and Cytokinesis

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Accurate mitotic regulation is as important as intrinsic DNA repair for maintaining genomic stability. It is believed that these two cellular mechanisms are interconnected with DNA damage. The DNA-dependent protein kinase catalytic subunit (DNA-PKcs) is a critical component of the non-homologous end-joining pathway of DNA double-stranded break repair, and it was recently discovered to be involved in mitotic processing. However, the underlying mechanism of DNA-PKcs action in mitotic control remains unknown. The authors demonstrate that depletion of DNA-PKcs leads to the dysregulation of mitotic progression in response to DNA damage, which eventually results in multiple failures, including failure to segregate sister chromatids and failure to complete cytokinesis, with daughter cells becoming fused again. The depletion of DNA-PKcs results in a notable failure of cytokinesis, with a high incidence of multinucleated cells. Importantly, DNA-PKcs was found to associate with PLK1 in the mitotic phase, and the depletion of DNA-PKcs resulted in the overexpression of PLK1 due to increased protein stability. However, deficiency in DNA-PKcs attenuated the recruit-

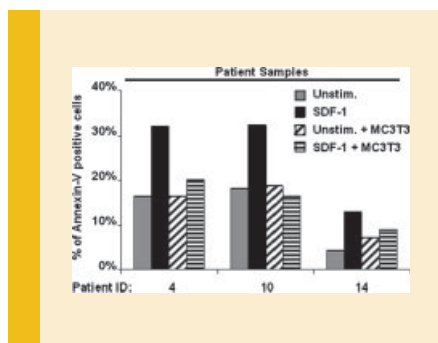
ment of phosphorylated PLK1 to the midbody but not to the kinetochores and centrosomes. The results demonstrate the functional association of DNA-PKcs with PLK1, especially in chromosomal segregation and cytokinesis control.

Osteoblasts Protect AML Cells From SDF-1-Induced Apoptosis

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The bone marrow provides a protective environment for acute myeloid leukemia (AML) cells that often allows leukemic stem cells to survive standard chemotherapeutic regimens. Targeting these leukemic stem cells within the bone marrow is critical for preventing relapse. The authors recently demonstrated that SDF-1, a chemokine abundant in the bone marrow, induces apoptosis in AML cell lines and in patient samples expressing high levels of its receptor, CXCR4. In the current study, the authors show that a subset of osteoblast lineage cells within the bone marrow can protect AML cells from undergoing apoptosis in response to the SDF-1 naturally present in that location. The results indicate that osteoblasts in the process of differentiation potentially inhibit the SDF-1-driven apoptotic pathway of CXCR4-expressing AML cells residing in the bone marrow. Drugs targeting this protective mechanism could potentially provide a new approach to treating AML by enhancing the SDF-1-induced apoptosis of AML cells residing within the bone marrow microenvironment.