An Environment Activable Nanoprodrug: Two-Step Surveillance in the Anticancer Drug Release

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The major concern in cancer treatment is the severe host toxicity of chemotherapeutic agents. First, localize the cancer and in second, delivery of the chemotherapeutic agents to the particular affected areas will provide the best therapeutic activity and selectivity. However, cancer cells are found to have increased level of reactive oxygen species (ROS) such as hydrogen peroxide (H_2O_2), assisting the concept of ROS mediated activation.[1,2,3] Herein, we designed and developed a nano prodrug ANPD-X (Activable Nano Pro-Drug-X) which will be activated by H_2O_2-mediated boronate oxidation leading to a switching in fluorescent colour (signal 1), resulting in the actual localization of tumor and in the next anticancer drug chlorambucil will be released upon irradiation of light with high spatial and temporal precision, which in turn produce another fluorescence colour (signal 2) intimating the real time information over the drug delivery, thus, generating a two-step surveillance in the anticancer drug delivery. Activation of the ANPD-X after addition of H_2O_2 and drug release from upon photoirradition was investigated in vitro by monitoring the fluorescence using HeLa cell line. So, this H_2O_2 responsive nanoprodrug ANPD-X exhibited potential therapeutic activity as a novel treatment of cancer via two step fluorescence cellular imaging as well as highly selective release of anticancer drug clorambucil in a controlled manner.

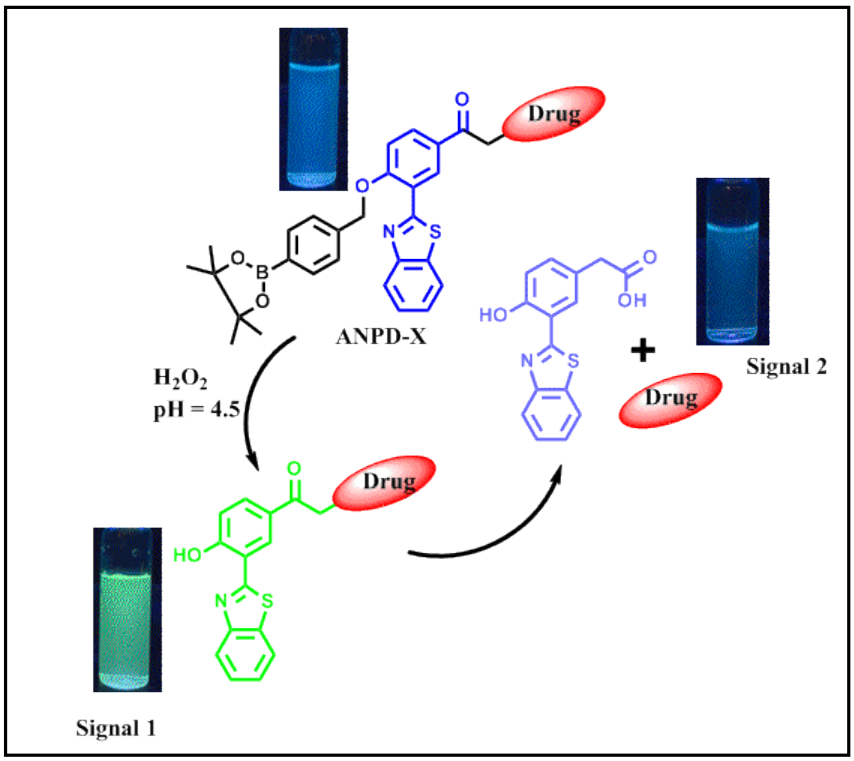

Figure 1: Working protocol of ANPD-X as H_2O_2 activable photoresponsive drug delivery system.

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