Near Infrared Small Molecule Probes for the Detection of Cellular Senescence

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Technology description

Background

Senescence, a state of permanent cell-cycle arrest, plays an important role in tumor suppression, tumorigenesis and aging. The hallmark of cellular senescence is growth arrest, primarily caused by the activation of cell-cycle inhibitors and tumor suppressors, and cells lacking senescence characteristics are cancer-prone. DNA-damaging agents, such as chemotherapeutics, can induce both cellular senescence and apoptosis. DNA-damage induced apoptosis is the primary target of anticancer therapy, but also has a significant role in determining treatment outcome for cancer patients. Cellular senescence has been identified as an additional drug-responsive measure, particularly when cells enter their senescent state but not going through the programmed cell death, rendering the detection of cellular senescence an urgent need.
Multiple agents are currently being developed for the detection of senescent cells, but these tools lack the capability for real time imaging of senescence in live animals. Although there are probes that detect beta-galactosidase (β-gal) - a lysosomal indicator of senescent cells- the industry lacks real-time imaging technology to detect senescence in live animals. There exists a present market need for suitable imaging probes for senescence detection, particularly in living subjects.

Technology Description

University of New Mexico researchers have developed a near infrared (NIR) small molecular probe that detects β-gal in human tumor xenograft models. The probe is capable of differentiating between senescent (treated) tumors and untreated tumors.
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Application area

Provides real-time, near infrared imaging of DNA-damage induced senescent human tumors
Detects senescence associated β-gal (SABG) in xenograft tumors that have been treated with DNA-damaging agents associated with chemotherapy
Differentiates between treated and untreated human xenograft tumors
Applications in monitoring drug-responsiveness of cancer treatments/therapeutics, image guided surgeries of senescent cell removal

Institution

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