



## TITLE Compound for detection of senescent cells and the use of it

### DESCRIPTION OF THE TECHNOLOGY

The main role of cellular senescence is the prevention of the proliferation and accumulation of damaged or stressed cells and its subsequent removal. Cellular senescence acts triggering tissue repair and regeneration processes. However, this tissue repairing processes may become inefficient due to aging or a persistent cellular damage, hence allowing the accumulation of senescent cells in damaged tissues or organs. This accumulation can trigger local inflammation processes, tissue destruction, different aging diseases and even tumor formation. For this reason, the detection of senescent cells as soon as they appear and start to accumulate is very important. Most of the current detection methods are not able to detect senescent cells and practically none of them can be used in *in vivo* models. Therefore, there is a need to develop diagnostic tools that detect and quantify cellular senescence levels, as this would allow the discovery of potential accumulations, and the tracking of different diseases associated to the accumulation of these senescent cells.

The innovation provides a compound that can be used as a fluorescent probe for measuring the level of senescence of an individual in the urine, *in vivo*. This compound is formed by a signaling unit that consists of a fluorophore which includes at least an anionic group to provide diuretic properties, and a targeting unit that consists of a saccharide, where both units are bonded directly through a covalent bond.

Senescent cells can be characterized by an overexpression of lysosomal hydrolyses enzymes, which triggers the hydrolysis between the signaling unit and recognized unit. The disconnection of the recognized unit produces the activation of the signaling unit and the subsequent increase in the emission of fluorescence. The presence of anionic groups in the signaling unit allows the expulsion of the compound by the urine. The intensity of the fluorescence observed in the urine samples is proportional to the quantity of senescent cells, therefore allowing the quantification and tracking of senescence.

### MARKET APPLICATION SECTORS

- Level of Senescence measurement kits
- Treatments for cellular aging and senescence
- Urine cancer detection and monitoring

### TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

- *In vivo* detection method, based on fluorescence, simpler method and can be measured using cheaper and more common equipment than the usual ones using halogen radioisotopes.
- Non-invasive technique based on urine analysis, which allows for sample storage and repeatability. It does not require biopsies or tissue extraction.
- Simpler synthesis route (only two stages) using low-cost commercial compounds.
- It can be used to monitor the results of treatments with senolytic or senescence-inducing drugs.
- It allows the treatment of cancers to continue without localized tumors, such as those of the blood and bone.
- Easy modification of the signaling unit for simultaneous use in other diseases.



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### CURRENT STATE OF DEVELOPMENT

The probe, operating as a laboratory prototype, has been tested in different senescence processes:

- It has been used in murine models with induced tumors for the detection of senescent cells after treatment with palbocyclib.
- The efficiency of the system for the detection of senescent cells has been corroborated in models of older mice compared to young mice, where the levels of senescent cells are much lower.
- The detection of senescent cells in murine models of early aging has been studied against individuals of similar age and normal aging.
- Studies have been conducted that demonstrate a correlation between "the degree of cell senescence" using immunohistochemical techniques and the fluorescence measured in urine samples.

### INTELLECTUAL PROPERTY RIGHTS

Patent Pending

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Priority Date: 10/10/2019

### COLABORATION SOUGHT

The UPV is looking for a collaboration that will lead to a commercial exploitation of the presented invention. The ideal scenario for the university would be to reach an agreement to transfer the use of the technology through the sale or a license (exclusive or non-exclusive) of the patented procedure.

### RELATED IMAGES

Image 1:

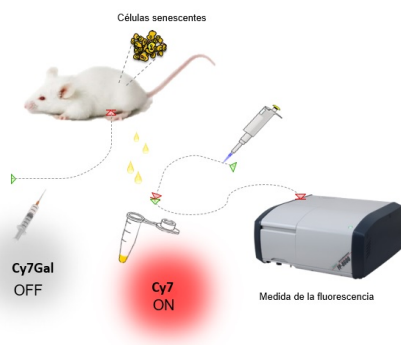


Image 2:

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