WATER-SOLUBLE FLUORESCENT POTASSIUM INDICATORS FOR CELL-BASED ASSAYS AND HIGH-THROUGHPUT SCREENING

Tech ID: 19062 / UC Case 2006-008-0

FULL DESCRIPTION

Potassium-sensing fluorescent indicators have applications in the measurement of cellular K+ content. For example, K+ sensors could be used to study K+ transport from K+ channels both in vivo and in vitro. K+ channels are important targets for drug discovery as they are involved in cardiac and neuronal excitability and epithelial fluid transport. Currently, patch clamp is the standard technique to assay K+ channel function. However, it is technically tedious, especially for high-throughput screening. There is thus a need for a robust assay for screening and cellular assays.

DESCRIPTION: UCSF investigators have synthesized a fluorescent K+ sensor, called TAC-red. The sensor is constructed so that the fluorescence of the compound is rendered sensitive to K+ binding. Thus, the fluorescence strongly increases in the presence of increasing K+ concentrations. Additionally, the compound is highly sensitive to K+, has a rapid response, and is water-soluble. The researchers also synthesized TAC-Crimson and TAC-Lime, both of which have similar properties to TAC-red. The investigators performed experiments demonstrating proof-of-concept that TAC-conjugated compounds can be used for in situ neurobiological assays to detect extracellular K+ levels (e.g. detecting differences in K+ concentrations in the extracellular space between communicating neurons) and simple, in vitro cell-based assays for high-throughput screening (e.g. for compounds that affect K+ efflux).

FEATURES/BENEFITS

- Water-soluble
- Multiple fluorophores
- High potassium sensitivity that facilitates detection of cellular K+ levels
- High K+ vs. Na+ selectivity
- Bright, long-wave fluorescence that minimizes background cellular fluorescence and photobleaching
- Insensitive to pH
- Rapid response - especially useful for rapid neural signal transduction and ion channel gating
- Impermeable to cell membranes
- Low cellular toxicity
- Quantitative
- Can be used with commercially available plate-readers

APPLICATIONS

- Cell-based assays
- High-throughput screening
- Potassium sensing in the brain

STATE OF DEVELOPMENT

The investigators are currently working on a simpler, faster, cheaper, high-yield synthesis scheme for the TAC compounds.


PATENT STATUS

<table>
<thead>
<tr>
<th>Country</th>
<th>Type</th>
<th>Number</th>
<th>Dated</th>
<th>Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Of America</td>
<td>Issued Patent</td>
<td>8,129,365</td>
<td>03/06/2012</td>
<td>2006-008</td>
</tr>
</tbody>
</table>