

The Interaction of the Mu Opioid Receptor and the Chemokine Receptor CCR5 in Neurological Disorders

Drug abuse has major implications on the prevention and treatment of human immunodeficiency virus (HIV). Use of the opioid morphine has been observed to accelerate the onset of HIV infection through the up-regulation of chemokine receptor CCR5, used by the HIV virus to infect host cells. Recent studies have shown the mu opioid receptor (MOR), which is bound by morphine, forms a putative MOR/CCR5 heterodimer. This could revolutionize treatment options for opioid addicted HIV patients. Current treatments involve simultaneous opioid substitution therapy and HIV antiretroviral agents, but this treatment regime has been observed to have an adverse drug-drug interaction. Further characterization of the MOR/CCR5 heterodimer should be performed to explore the possibilities of the simultaneous treatment of opioid dependence and HIV infection.

The technology

This is a novel bivalent ligand that binds both the MOR and CCR5 receptors. Through a unique 16 step reaction, a compound is synthesized such that two distinct pharmacophores, Naltrexone and Maraviroc, are joined by a 21 atom linkage. Both Naltrexone and Maraviroc interact with MOR and CCR5, respectively, while retaining their original antagonistic properties. This bivalent ligand can serve as a pharmacological probe to study the function of MOR/CCR5 dimers and their involvement in opiate addiction and HIV infection.

Benefits

- » Bivalent ligand containing Naltrexone and Maraviroc pharmacophores
- » Binds both MOR and CCR5 receptors
- » Ligand binding does not affect function of MOR or CCR5
- » Developed synthesis reaction with moderate to good yields

Applications

- » Further research into the dimerization of MOR and CCR5 receptors
- » Potential development of new treatments for opioid addicted patients with HIV

Patent status:

Patent issued: U.S. rights are available.
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License status:

This technology is available for licensing to industry for further development and commercialization.

Category:

Biomedical

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