Drug discovery technologies to achieve pain relief through drug repositioning approaches

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Neuropathic pain associated with cancer, diabetic neuropathy, chemotherapy or nerve trauma is an intractable chronic pain characterized by mechanical allodynia and abnormal pain hypersensitivity evoked by innocuous stimuli. Unfortunately, this disorder has no specific treatment. To discover potential new pain medications, I am merging high-throughput screening technologies with a drug discovery strategy that seeks new effects of approved drugs known as "drug repositioning". In this seminar, I will show that by using high-throughput Ca\(^{2+}\) imaging instrument, the compound duloxetine (a serotonin-norepinephrine reuptake inhibitor) inhibits the function of the purinergic receptor P2X4 (a subtype of ATP-gated non-selective cation channels), which is a potential therapeutic target for treating neuropathic pain. In addition, by using a newly established in vitro high-throughput phenotypic assay, we have discovered that fulvestrant (a drug for treatment of postmenopausal women with advanced breast cancer) exhibits a protective effect on oxaliplatin-induced neuronal damage and allodynia.