Personalized Pain Therapy Using Gene Polymorphism Related to Sensitivity to Analgesic Agents

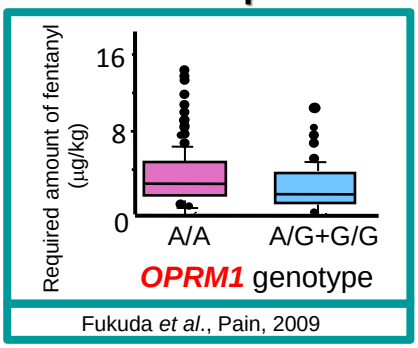
The technology we have currently developed allows to predict individual sensitivity to analgesics by examining the individual's genes, thus making possible an adoption of an appropriate pain therapy from an early stage.

◆Association Analysis

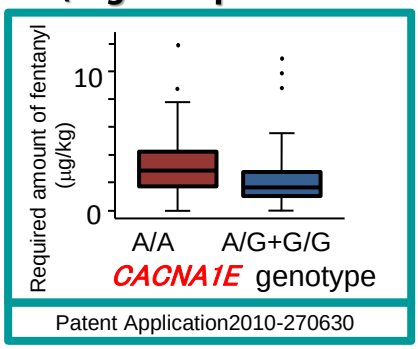
・Examination is conducted for a total of 5 gene polymorphisms on chromosomal locus of μ-opiod receptor (*OPRM1*), calcium channel alpha 1E subunit (*CACNA1E*), β_2-adrenergic receptor (*ADRB2*), potassium inwardly-rectifying channel GIRK2 subunit (*GIRK2*), and cAMP responsive element binding protein 1 (*CREB1*), genes which are related to sensitivity to analgesic agents.

Significant associations with required amounts of analgesics were revealed.

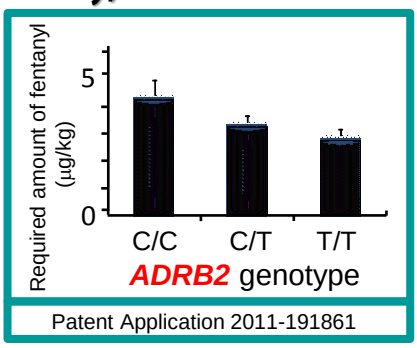
◆Patients with pain after SSRO (sagittal split ramus osteotomy)



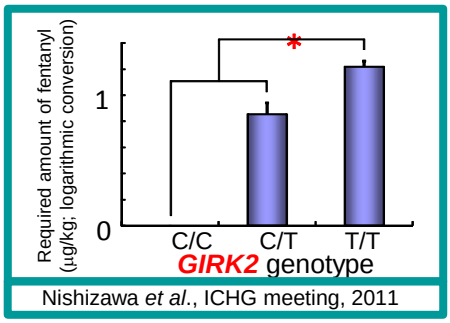
Fukuda *et al*., Pain, 2009



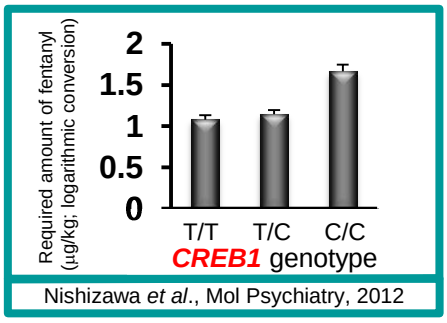
Patent Application2010-270630



Patent Application 2011-191861



Nishizawa *et al*., ICHG meeting, 2011



Nishizawa *et al*., Mol Psychiatry, 2012

Proper Dosage Calculation Method

・Proper dosage is computed based on an equation obtained by regression analysis of currently available data.

y = -0.667 + (-0.006) × [age] + 0.194 × [gender variable] + 0.012 × [height (cm)] + (-0.007) × [weight (kg)] + (-0.088) × [logarithmic conversion・pre-op perceived pain perception (s)] + 0.213 × [polymorphic variable value 1] + 0.241 × [polymorphic variable value 2] + 0.183 × [polymorphic variable value 3] + 0.247 × [polymorphic variable value 4] + 0.542 × [polymorphic variable value 5]

$y = \mathrm{Ln}(1 + x'')$, $x' = x'' / 4$, $0.2 \leqq x' \leqq 1$

x = {weight (kg)} × x'

y : Predicted logarithmically converted value of fentanyl administration amounts per weight required during post-op 24 hours.

x'' : Predicted value of fentanyl administration amounts per weight required during post-op 24 hours (μg/kg).

x' : Amount of fentanyl per weight of a single administration by PCA pump (μg/kg).

x : Amount of fentanyl per weight of a single administration by PCA pump adjusted for each patient (μg).

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