



The Chinese University of Hong Kong
Non-confidential Abstract of Technology Disclosure

Title:

Use of SCN2A Gene Polymorphisms to Predict Anti-epileptic Drug Response

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Inventor(s):

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Patent Status:

- ◆ US Patent Pending

Non-confidential abstract:

Affecting up to 1% of the population, epilepsy is among the commonest serious neurological disorder. Patients with epilepsy experience recurrent seizures, which are clinical manifestation of abnormal, synchronised, excessive discharge of cortical neurons.

Anti-epileptic drugs (AEDs) are the mainstay of treatment. There are a variety of AEDs, which can often very effectively prevent seizures. However, many patients only respond to some AEDs but not to others, and epilepsy is inadequately controlled by medication in up to one third of patients. Since it is difficult to predict which AEDs will work for which patients on an individual level, drugs must often be tested one-after-another in each patient until an effective AED is found. This trial-and-error process exposes patients to the risk of side effects which each drug possesses, and extends the period during which patients risk suffering seizures, each of which carries a danger of injury or death.

AEDs act via different mechanisms of action to enhance attenuation of excitation and/or facilitation of inhibition of neurotransmission. One class of AEDs is believed to act by blocking the repetitive firing of neuronal voltage-gated sodium channels, which are responsible for the upstroke of the neuronal action potential and ultimately control the intrinsic excitability of the nervous system. The main structural component of the neuronal sodium channel is the alpha-subunit, which forms the ion conducting pore and confers voltage-dependency. Several isoforms of alpha-subunits are expressed in the brain, and SCN2A is the gene that encodes one such channel in the brain. We have discovered associations of SCN2A polymorphisms with effectiveness of the above class of AEDs in epilepsy patients. A test which genotypes these or associated polymorphisms in epilepsy patients could help doctors decide whether or not to prescribe this class of AEDs in each patient. This is an example of a pharmacogenetic test.

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