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Scorpion model of influenza A/H1N1: Hemagglutinin (HA) contains a scorpion toxin, binding to voltage-gated sodium Na^+ channel: Na^+ channel inhibitors as therapy

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Background

Despite therapeutic progress in receptor binding inhibition, some deaths continue to occur, especially in young people. We try to find new approaches to fight against Influenza virus resistance. We were interested in Guillain-Barré syndrome (GBS) during the 1976 US vaccination campaign, because Breurec JY in France described a case of GBS after a scorpion sting by a Centruroides noxius species.

Methods

We compared amino acid sequences of Influenza virus A/H1N1 with scorpion venom toxins.

Results

The cysteine-rich region (56-109) with C59, C72, C84, C107 was aligned in 3 dimensions with scorpion toxin Figure 1.

a) HA of pandemic Influenza virus A/H1N1 2009 Mexico (466-VKEYI-462) [ACY77964], Canada-AB (56-109), Japan (246-YYWKLV-251)

b) scorpion toxin (AaH II/Cn II-13 VKEGYI) (AaH IT4 YFWKLA)

Discussion

The finding of a three dimensional scorpion toxin in HA means that Influenza virus binds to the scorpion toxin receptor, i.e. the voltage-gated sodium Na^+ channel; in fact, flecainide, a sodium channel ligand, can alleviate experimental auto-immune neuritis induced by P2 myelin protein in Lewis rat (Bechtold DA, 2005). Many drugs act on the sodium channel: Local anaesthetics, antiarythmics, antiepileptics, antimalarials, fatty acid omega 3, Tacrine. Quinine was used as an antipyretic against Influenza, but it may by serenpidity be an antiviral by inhibiting the sodium channel. Omega 3 is particularly interesting, as it is very well tolerated even at high doses and can also be given I.V. (Omegaven).

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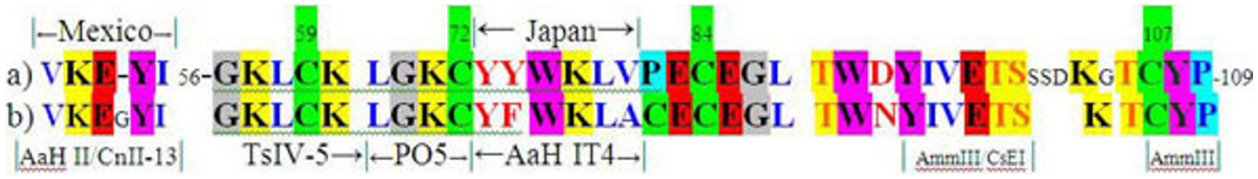

Figure 1