Anticoagulant profiling of elapid snake venoms

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Abstract

Animal venoms are a complex mixture of bioactive proteins and peptides (enzymes, peptide toxins). Venom components are of considerable interest because of their potential biopharmaceutical properties. Animal venoms have been the origin of several drugs and many drug leads with anticancer, antifungal, antithrombotic and blood pressure regulating activities. Nowadays, much research is focused at identification of new venom peptides with therapeutic potential, especially in the area of anticoagulation. This study aims at profiling elapid snake venoms in the effort to find and identify new anticoagulant peptides. An integrated analytical approach was used in which venoms were analysed by liquid chromatography followed by nanofractionation on a 384-well plate for bioassaying coagulopathic properties of eluting venom constituents. Via a post-column split to mass spectrometry (MS), parallel identification of eluting venom peptides was accomplished[1]. The venom of the elapid snake species Dendroaspis polylepis, Dendroaspis angusticeps, Naja naja, Naja pallida, Naja nigricolis and Naja mossambica were studied. As controls, viper venoms of Echis coloratus, Echis pyramidium leakeyi, Echis ocellatus, Bothrops asper and Bothrops jararaca were analysed. After vacuum centrifuging the nanofractionated 384-well plates, a spectrophotometric bioassay kinetically measured coagulation for 1.5h after rapid automated pipetting of 20 μL of CaCl2 (20mM) followed by 20μL citrated bovine plasma. Calcium ions titrate away the citrate in the plasma and thereby initiate coagulation. Data processing involved plotting the coagulation potency measured for each well against the fraction time to create bioactivity chromatograms. All venoms from the Dendroaspis (mamba) genus and from the Naja (cobra) genus showed (extremely) potent anticoagulant properties. Furthermore, E.oellatus showed significant procoagulation activity. B.asper and B.jararaca indicated both anticoagulant and procoagulanta ctivity.

References