
Lab-Scale Technology Available for Licensing and Co-development at NIPER, SAS Nagar, India



Recombinant human paraoxonase 1 variant

Novel Agent for the Treatment of Organophosphate-Poisoning and Cardiovascular & Inflammatory Disorders

Background: Organophosphates (OPs) are neurotoxic chemicals commonly used as pesticides in agriculture and other industries. Certain OPs are also exploited as nerve agents in terrorist attacks and chemical warfare. Current treatments available for OP-poisoning are inadequate and unsatisfactory and more effective treatment is urgently needed. Human paraoxonase 1 (h-PON1) is an enzyme present in serum and inactivate nerve agents/pesticides in blood. Thus, h-PON1 is considered as a new generation antidote for the **pre-treatment of OP-poisoning**.

H-PON1 also exhibit anti-inflammatory, anti-oxidative, anti-atherogenic, and anti-diabetic properties. Administration of purified recombinant PON1 have been shown to prevent/retard the development of various diseases (e.g, coloitis, stroke, hyperlipidemia, atherosclerosis, diabetes) in animal models. Thus, h-PON1 is a strong candidate for the **treatment of various disease in human** (either alone or in combination with existing therapies).

However, there are numerous limitations regarding large-scale production and use of h-PON1 as a therapeutic candidate which include low enzymatic activities of native h-PON1, difficulties in expression & purification of recombinant h-PON1, and poor stability of purified enzymes.

Technology Description: Our technology provide (a) recombinant human paraoxonase 1 (rh-PON1) enzymes as a **novel prophylactic** for OP-poisoning, (b) a simple and cost effective method for **mass production** of rh-PON1 enzymes, and (c) novel formulations for **long-term storage stability** of purified rh-PON1 enzymes.

Applications:

- Treatment of OP-poisoning from exposure to nerve agents (in chemical warfare and terrorist attack) alone or in combination with existing treatments.
- Treatment of OP-poisoning from accidental/intentional exposure to insecticides, pesticides, fungicides, etc, alone or in combination with existing treatments
- Prevention and treatment of various cardiovascular and inflammatory diseases (either alone or in combination with existing therapies).
- Process described in our technology can be used to for the industrial scale production of such enzymes with moderate investment.

Stage of development: Purified rh-PON1 enzymes are produced and verified *in vitro*, *ex vivo* (in human blood) and *in vivo* (in mice) for their stability, toxicity and protective properties. New and improved variants of rh-PON1 enzyme are continuously being developed and analyzed in the lab.

Intellectual Property Information: National and International patent applications filed.

Collaboration Options: Co-development with industry partner.

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