

Snake Anti-Venoms: Venoms, Antibodies and ELISA Kits

Snake venom is highly modified saliva containing **zootoxins** used by snakes to immobilize and digest prey or to serve as a defense mechanism against a potential predator or other threat. The venom produced by the snake's venom gland apparatus is delivered by an injection system of modified fangs that enable the venom to penetrate into the target. Venoms contain more than 20 different compounds, 100s proteins and polypeptides. Some of the proteins in snake venom have very specific effects on various biological functions including blood coagulation, blood pressure regulation, and transmission of the nervous or muscular impulse and have been developed for use as pharmacological or diagnostic tools or even useful drugs.

Envenomation is the process by which venom is injected into animals and humans. Although the majority of snake species are non-venomous and typically kill their prey with constriction rather than venom, venomous snakes can be found on every continent except Antarctica. The morbidity and mortality associated with snake bites is a serious public health problem in many regions of the world, particularly in rural areas lacking medical facilities, and each year tens of thousands of people die from snake bites.



Indian Cobra (Naja-Naja) Indian Krait (B. Caeruleus) Russell's Viper (V. Russellii) Saw Scaled Viper (E. Carinatus)

Antivenom (or **antivenin** or **antivenene**) is a biological product used in the treatment of venomous bites or stings. Antivenom is created by milking venom from the desired snake, spider or insect. The venom is then diluted and injected into a horse, sheep or goat (**antivenom host**). The subject animal will undergo an immune response to the venom, producing antibodies against the venom's active molecule which can then be harvested from the animal's blood and used to treat envenomation. Antivenoms can be classified into **monovalent** (when they are effective against a given species' venom) or **polyvalent** (when they are effective against a range of species, or several different species at the same time). Antivenoms for therapeutic use are often preserved as freeze-dried ampoules (powder), but some are available only in liquid form and must be kept refrigerated. The majority of

antivenoms (including all snake antivenoms) are administered intravenously; however, stonefish and redback spider antivenoms can be given intramuscularly but are less effective. **Antivenoms bind to and neutralize the venom**, halting further damage, but do not reverse damage already done. Thus, they should be administered as soon as possible after the venom has been injected. Antivenom is typically the sole effective treatment for a life-threatening condition.



Horse Polyvalent Antivenoms (antivenoms mix against 4 snake venoms) are available from Indian companies (Pics L to R: Serum Institute of India, Haffkine Inst., VINS Bio, and Bharat Serum) are made in horses and typically purified (Fab2). Supplied as lyophilized powder; used intravenously.

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Diamond-back Rattlesnake (Crotalus atrox), Russell's Viper Copperhead (Vipera Russellii) Water Moccasin (Agkistrodon contortrix)

remove most serum proteins leaving mostly immunoglobulin (Ig's). Whole crude antibodies may also be subjected to antibody fragmentation to prepare only the **Fab2 fragments** of the antibodies to minimize exposure to the foreign proteins to minimize subsequent hypersensitivity reaction (anaphylaxis) or a delayed hypersensitivity (serum sickness). In the U.S. the only approved antivenom for pit viper (rattlesnake, copperhead and water moccasin) snakebite is based on a purified product made in sheep known as **CroFab** (Crotalidae Polyvalent Immune Fab (Ovine/Sheep)) is the only widely available antivenom indicated for the management of patients with minimal to moderate North American Crotalid envenomation (rattlesnake, water moccasin/cottonmouth and copperheads).



Sheep (Ovine) Polyvalent Antivenoms (mixture of antivenoms against the 3 snake venoms) are available from **CroFab** (USA) and **Bioclon** (Mexico) are made in **Sheep/Ovine** and typically purified (Fab2). Supplied as lyophilized powder; used intravenously.

Snake Anti-Venoms: Venoms, Antibodies and ELISA Kits

About ADI's Venom and Anti-venom ELISA Kits-ADI has developed antibody ELISA kits to determine the efficacy of various antivenoms. These kits will not only identify the type but the biological potency of the antivenoms. It will also be possible to test the potency of the antivenoms at various stages of production, purification, vialing, lyophilizing, and shelf life under various conditions and age. In addition, ADI has produced new antivenoms in rabbits and chicken to further promote research and test new vaccine or antivenom formulations. All ELISA kits are supplied with necessary controls and measure antivenom subtype antibody activity (IgG or IgM) against individual venom. Additional ELISA kits are available to establish residual concentrations of Horse or Sheep IgG-FC or whole IgG in antivenom formulations containing Fab.

Antivenom Test Related ELISA kits

(See Details at the website) http://4adi.com/commerce/catalog/spcategory.jsp?category_id=2782

| Items | Description | Cat# |
|---|---|-------------|
| Horse Ant venoms (Indian) | Horse Anti-Cobra (Naja Naja) Antibody ELISA Kits | 570-100-CHG |
| | Horse Anti- Indian Krait (Bungarus Caeruleus) Antibody ELISA Kits | 570-110-KHG |
| | Horse Anti- Russell's Viper (Vipera Russellii) Antibody ELISA Kits | 570-120-RHG |
| | Horse Anti- Saw Scaled Viper (Echis Carinatus) Antibody ELISA Kits | 570-130-SHG |
| | Horse Anti-Common (Cobra, Crait, Russels and Saw scaled vipers) Antibody ELISA Kits | 570-140-XHG |
| Sheep/Ovine Antivenoms (N. America) | Sheep Anti-Diamond-back Rattlesnake (Crotalus atrox) Antibody ELISA Kits | 570-200-DSG |
| | Sheep Anti- Pit Viper Copperhead (Agkistrodon contortrix) Antibody ELISA Kits | 570-210-CSG |
| | Sheep Anti- Water Moccasin/cottonmouth pit viper (Agkistrodon piscivorus) Antibody ELISA Kits | 570-220-MSG |
| Sheep | Sheep/Ovine Fab ELISA kit (measure total concn of antivenom Fab) | 7610-Fab |
| | Sheep/Ovine Antivenom Fc residue/contamination measurement ELISA | 7615-Fc |
| Horse | Horse/Equine Fab ELISA kit (measure total concn of antivenom Fab) | 7710-Fab |
| | Horse/Equine Antivenom Fc residue/contamination measurement ELISA | 7715-Fc |
| | Horse Fab2 ELISA Kit, 96 tests, Quantitative | 7710-Fab |
| | Horse IgG-Fc ELISA Kit, 96 tests, Quantitative | 7715-Fc |
| | Horse IgA ELISA Kit, 96 tests, Quantitative | 7720 |
| | Horse IgG ELISA Kit, 96 tests, Quantitative | 7730 |
| | Horse IgM ELISA Kit, 96 tests, Quantitative | 7740 |
| Papain | Carica papaya Papain ELISA kit (for measuring papain residue/contaminant in therapeutics), 96 tests | 800-160-CPP |

Antibody and other reagents for research use

Please refer to the complete list of snake venom antibodies on our website at: http://4adi.com/commerce/catalog/spcategory.jsp?category_id=2782

| Catalog# | Product Description | Product Type |
|----------|---|--------------|
| APVS11-S | Anti-Black Mocassin (Agistrion piscovirus) venom antiserum | Antibodies |
| APVS12-S | Chicken Anti-Black Mocassin (Agistrion piscovirus) venom antiserum | Antibodies |
| APVS14-S | Sheep Anti-Black Mocassin (Agistrion piscovirus) venom antiserum | Antibodies |
| CADM11-S | Anti-Eastern Diamondback (Crotalus adamanteus) venom antiserum | Antibodies |
| CADM12-S | Anti-Eastern Diamondback (Crotalus adamanteus) venom antiserum | Antibodies |
| CADM14-S | Sheep Anti-Eastern Diamondback (Crotalus adamanteus) venom antiserum | Antibodies |
| CATX11-S | Anti-Western Diamondback Rattlesnake (Crotalus atrox) venom antiserum | Antibodies |
| CATX12-S | Chicken Anti-Western Diamondback Rattlesnake (Crotalus atrox) venom antiserum | Antibodies |
| CATX14-S | Sheep Anti-Western Diamondback Rattlesnake (Crotalus atrox) venom antiserum | Antibodies |
| CATX15-S | Anti-Common N. American (Diamondback, copperhead and Mocacassin snakes) venom antiserum | Antibodies |
| CATX16-S | Chicken Anti- N. American (Diamondback, copperhead and Mocacassin snakes) venom antiserum | Antibodies |
| CATX17-S | Sheep Anti- N. American (Diamondback, copperhead and Mocacassin snakes) venom antiserum | Antibodies |
| CKT11-S | Anti-Indian krait (Bungarus caeruleus) venom antiserum | Antibodies |
| CKT12-S | Chicken Anti-Indian krait (Bungarus caeruleus) venom antiserum | Antibodies |
| CKT13-S | Horse Anti-Indian krait (Bungarus caeruleus) venom antiserum | Antibodies |
| ICO11-S | Anti-Indian Cobra (Naja naja) venom antiserum | Antibodies |
| ICO12-S | Chicken Anti-Indian Cobra (Naja naja) antiserum | Antibodies |
| ICO13-S | Horse Anti-Indian Cobra (Naja naja) venom antiserum | Antibodies |
| RVR11-S | Anti-Russell's Viper (Vipera russelli) venom antiserum | Antibodies |
| RVR12-S | Chicken Anti-Russell's Viper (Vipera russelli) venom antiserum | Antibodies |
| RVR13-S | Horse Anti-Russell's Viper (Vipera russelli) venom antiserum | Antibodies |
| SSV11-S | Anti-Saw-scaled Viper (Echnis carinatus) venom antiserum | Antibodies |
| SSV12-S | Chicken Anti-Saw-scaled Viper (Echnis carinatus) venom antiserum | Antibodies |
| SSV13-S | Horse Anti-Saw-scaled viper (Echis crinatus) venom antiserum | Antibodies |
| VNM11-S | Anti-Common Asian (Cobra, Crait, Russell's and Saw-scaled vipers) venom antiserum | Antibodies |
| VNM12-S | Chicken Anti-Common Asian (Cobra, Crait, Russell's and Saw-scaled vipers) venom antiserum | Antibodies |
| VNM13-S | Horse Anti-Common Asian (Cobra, Crait, Russell's and Saw-scaled vipers) venom antiserum | Antibodies |

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