

## 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



**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.

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.



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 Biocon (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

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 Russelli) 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:

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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