

## Indian Cobra Genome Decoded

### Why in News?

An international team of researchers have sequenced the genome of the Indian cobra, in the process identifying the genes that define its venom.

### What is the significance?

- This genome sequence can provide a blueprint for developing more effective anti-venom.
- The cobra genome sequence is of really high quality.
- Sequence information of the genes that code for venom proteins is very important for the production of recombinant anti-venoms.

### Are existing anti-venoms not effective enough?

- Their **efficacy varies**, besides producing side effects.
- In India, the challenge has been producing anti-venom for the species known collectively as the “big four”,
  1. The Indian cobra (*Naja naja*),
  2. Common krait (*Bungarus caeruleus*),
  3. Russell’s viper (*Daboia russelii*), and
  4. Saw-scaled viper (*Echis carinatus*).
- **Common anti-venom** is marketed for the treatment of bites from the “big four”, but its effectiveness came under question in a recent study.
- The common anti-venom worked against the saw-scaled viper and the common cobra.
- But this anti-venom fell short against some neglected species and also against one of the “big four” - the common krait.
- **Facts** - Accidental contacts with snakes lead to over 100,000 deaths across the world every year.
- India alone accounts for about 50,000 deaths annually, and these are primarily attributed to the “big four”.

### Why has production of effective anti-venom been challenging?

- Venom is a **complex mixture** of an estimated 140-odd protein or peptides.
- Only some of these constituents are toxins that cause the physiological symptoms seen after snakebite.

- But anti-venom available today does not target these toxins specifically.
- Anti-venom is currently produced by a century-old process.
- In this process, a small amount of venom is injected into a horse or sheep, which produces antibodies that are then collected and developed into anti-venom.

### **What are the issues with this 'horse technique'?**

- This is expensive, cumbersome technique and comes with complications.
- Some of the antibodies raised from the horse may be completely irrelevant.
- The horse also has a lot of antibodies floating in its blood that have nothing to do with the venom toxins.
- One more problem with horse antibodies is that our immune system recognises it as foreign and when anti-venom is given our body mounts an antibody response. This leads to what is called **serum sickness**.

### **How does decoding the genome help?**

- In the Indian cobra genome, the researchers have identified 19 key toxin genes, the only ones that should matter in snakebite treatment.
- They stress the need to leverage this knowledge for creation of safe and effective anti-venom using synthetic human antibodies.
- The next step would be obtaining the genomes and the venom gland genes from the other three of the "big four" and the deadly African species.
- However, there is a very long way to go from genomes to effective anti-snake venoms.

**Source: Indian Express**

