

Interferons

Interferons (IFNs) are a class of similar antiviral proteins produced by certain animal cells, such as lymphocytes and macrophages, after viral stimulation .

One of the principal functions of interferons is to interfere with viral multiplication.

Human interferons are of three principal types:

- alpha interferon (IFN - α),
- beta interferon (IFN - β),
- gamma iuterferoll (IFN- γ).

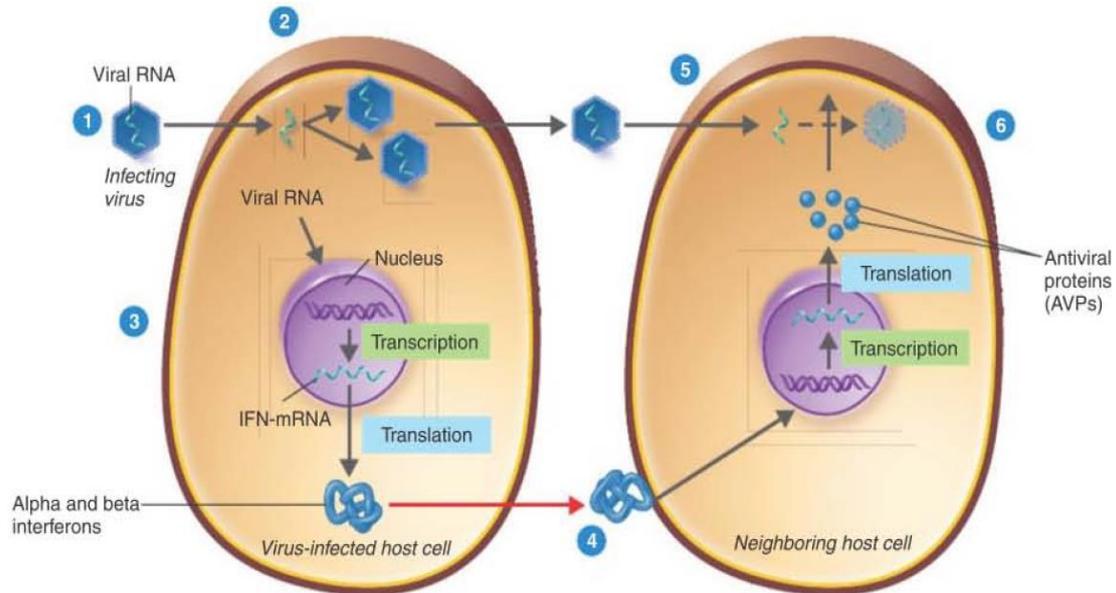
In the human body, interferons are produced by fibroblasts in connective tissue and by lymphocytes and other leukocytes. Each of the three types of interferons produced by these cells can have a slightly different effect on the body.

All interferons are small proteins, with molecular weights between 15,000 and 30,000. They are quite stable at low pH and are fairly resistant to heat.

Gamma interferon is produced by lymphocytes; it induces neutrophils and macrophages to kill bacteria. IFN- γ causes macrophages to produce nitric oxide that appears to kill bacteria as well as tumor cells by inhibiting ATP production.

Both IFN- α . and IFN- β are produced by virus-infected host cells only in very small quantities and diffuse to uninfected neighboring cells. They react with plasma or nuclear membrane receptors, inducing the uninfected cells to manufacture mRNA for the synthesis of antiviral proteins (AVPs). These proteins are enzymes that disrupt various stages of viral multiplication.

- interferons are effective for only short periods
- they do not remain stable for long periods of time in the body.
- And when injected, interferons have side effects, such as nausea, fatigue, headache, vomiting, weight loss, and fever.
- High concentrations of interferons are toxic to the heart, liver, kidneys, and red bone marrow.
- They typically play a major role in infections that are acute and short term, such as colds and influenza.
- Another problem is that they have no effect on viral multiplication in cells already infected.
- Also, some viruses, such as adenoviruses (which cause respiratory infections), have resistance mechanisms that inhibit AVPs.
- Further, some viruses, such as the hepatitis B virus, do not induce the production of sufficient amounts of interferon in host cells following viral stimulation.



- 1 Viral RNA from an infecting virus enters the cell.
- 2 The infecting virus replicates into new viruses.
- 3 The infecting virus also induces the host cell to produce interferon mRNA (IFN-mRNA), which is translated into alpha and beta interferons.
- 4 Interferons released by the virus-infected host cell bind to plasma membrane or nuclear membrane receptors on uninfected neighboring host cells, inducing them to synthesize antiviral proteins (AVPs). These include oligoadenylate synthetase and protein kinase.
- 5 New viruses released by the virus-infected host cell infect neighboring host cells.
- 6 AVPs degrade viral mRNA and inhibit protein synthesis—and thus interfere with viral replication.

Antimicrobial Peptides

antimicrobial peptides (AMPs) may be one of the most important components of innate immunity. Antimicrobial peptides are short peptides that consist of a chain of about 12 to 50 amino acids synthesized on ribosomes. The modes of action of AMPs include inhibiting cell wall synthesis; forming pores in the plasma membrane, resulting in lysis; and destroying DNA and RNA.

Among the AMPs produced by humans are dermcidin, produced by sweat glands; defensins and cathelicidins, produced by neutrophils, macrophages, and epithelium; and thrombocidin, produced by platelets.