

# Steps towards fighting Ebola

The Ebola virus hijacks human cells to inject its genome and turn the cells into virus factories. Recent advances in molecular biology suggest that **gene-silencing drugs** could block this process

Diameter 80 nanometres, one thousandth width of human hair, length around 1,000nm

**Viral envelope:** Outer membrane is studded with peplomers – **glycoprotein** – which bind to receptors on host cell

**Human protein:** Layer taken from host cell increases infectivity

**Matrix layer:** Contains viral proteins – **VP40** and **24** – which enable virus **budding** and disable infected host's immune response

**Genome:** One molecule strand of **negative-sense RNA (ribonucleic acid)** which contains genes and **polymerase protein**. Polymerase kick-starts replication. Negative-sense RNA is mirror-image of **messenger RNA (mRNA)**, version required for replication

**A. Symptoms:** Fever, headache, joint and muscle pain and lack of appetite

**B. Cytokine storm:** Immune cells get caught in endless loop, releasing extreme levels of **cytokines** – proteins which cause inflammation

**C. Septic shock:** Infected cells detach from blood vessels, causing massive blood loss throughout body, kidney and liver failure

Blood vessel

## Gene-silencing

**RISC: RNA-Induced Silencing Complex** contains strand of **small interfering RNA (siRNA)** – a synthetic RNA, plus protein **Argonaute**

siRNA strand

Argonaute

GUAC

**Target:** RISC uses siRNA as template for recognising viral mRNA

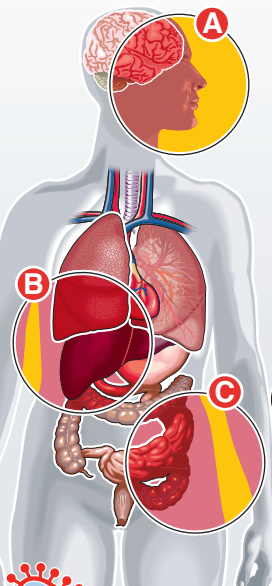
Viral mRNA

**Gene silencing:** When siRNA finds mRNA strand, it activates Argonaute. RISC package cuts RNA into harmless strands and blocks replication

**1. Attachment:** Glycoprotein binds to **TIM-1 receptor molecules** on epithelial cells lining respiratory tract, conjunctiva around eyes, skin or body cavities. **Infection of immune cells** allows spread throughout body

**5. Budding:** New copies of virus **bud** from cells then search for new cells to infect

**Ebola virus**  
Disease is transmitted by contact with blood or bodily fluids, including sweat, of infected person



Virus

TIM-1 receptors

Cytoplasm

**2. Penetration:** Viral envelope fuses with host cell, passes into cytoplasm

**3. Uncoating:** Viral envelope releases nucleic acid. **Polymerase protein** turns negative-sense RNA into positive-sense **mRNA template**

Nucleus

**4. Translation:** mRNA uses host-cell systems to replicate viral RNA