

Endogenous Retroviruses as an Integral Part of the Mammalian Genome

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Introduction. Several viruses have the ability to be implemented in the human genome and essentially become like its own genes. This primarily refers to the so-called retroviruses. Initially, the genome of these viruses is RNA. But when the virus enters the cell it on its RNA, using reverse transcriptase, it builds DNA copy. After this DNA copy of the viral genome integrates into the cell, which is a prerequisite for the life cycle of retroviruses. Built into the genome of human cells copy DNA virus was named provirus. Then the provirus synthesized viral RNA on which new virus particles are formed.

Materials and methods. This problem is very relevant now. That's why there are a lot of methods of research such as: PCR (polymerase chain reaction), restriction analysis, hybridization by Southern, compositional fractionation, RT-PCR (reverse transcription - polymerase chain reaction), nucleotide sequence mining, phylogenetic analyses, analysis of computer databases EST.

Results and Discussion. In many cases retroviruses behave like any other ordinary virus. Similarly, the benefits and drawbacks of it can be found. Firstly, the presence of endogenous retroviruses in the body contributes to blocking infection by other viruses. In some ways they help our immune system. Secondly, they brought a large number of regulatory elements for cell such as: enhancers, a lot that bind transcription factors and can work more efficiently with neighbouring genes. Such sequences are the ones from which transcription begins DNA. Thirdly, they are part of a regulatory element that controls the operation of PRODH gene. PRODH gene involved in the synthesis of neurotransmitters and its importance for the brain confirmed that mutations in it affect the risk of developing schizophrenia. Retrovirus contains two sections, to which is attached a regulatory protein SOX2, which increases PRODH activity in the brain. The totality of the data indicates that this retroviral insertion played a role in the evolution of the human brain. But most important is that retroviruses are involved in the formation of the placenta. Numerous experiments have shown that if to suppress the activity of VRE, the maturing is not possible. Despite all the good, it also brings lots of damage. To better understand all the mechanisms of infection, the structure of a retrovirus was examined. Typical retroviral genome contains from four structure genes: gag (group specific antigen), pol (polimerase), env (envelope) and onc (oncogene). Regulatory genes include: tat, rev, vif, vpr, nef, vpx. Gag polyprotein is a precursor of the structural components of the virion envelope protein. Protein env, synthesized from subgenomic mRNAs after glycosylation is also subjected to cutting and is included in the lipid envelope of the particle. Pol gene product in most retroviruses originally synthesized fused to the gag gene product, and in cases where these overlapping genes differently phased, the ribosome during translation can be programmed to carry out a shift reading frame (ORF). In the normal state of the onc gene is not included in the job. But when there is a failure in the process of programming or other problems arise, then the gene is activated, and has been actively participating in the reincarnation of normal cells into cancer cells. Some of viruses are: T-lymphotropic viruses 1 and 2 (HTLV-1 & HTLV-2); Human Immunodeficiency Virus 1 and 2 (HIV-1 & HIV-2).

Conclusions. There are many retroviruses and they are transmitted mostly hereditary. They at the same time help the body and contribute to its death. Many retroviruses can be in the body and does not give any signs of their presence for a long time. Thus, potentially, some of them after millennia continue to pose a potential danger to humans.