
Old origin of an endogenous retroviral protective copy in sheep.

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Abstract

During their replication cycle, retroviruses integrate their genome into the host's DNA. If integration takes place into the germline, endogenous retrovirus (ERV) copies can be vertically transmitted like any other part of the genome. Even if they have long been considered as "junk DNA", ERVs have now restored their badge of honour. Their differential insertions between individuals can be used as neutral markers and they also played underestimated roles in shaping the mammalian genome.

In sheep, a well-studied beta-retrovirus called Jaagsiekte Sheep Retrovirus (JSRV) is known to have a close and strong coevolution with his host. JSRV is the causative agent of an ovine pulmonary adenocarcinoma, a transmissible lung cancer. The sheep genome hosts multiple endogenous copies of JSRV (enJSRV). If most of them are degraded, some have intact ORFs and are suspected to play roles in sheep physiology, impacting placentation and immunity.

By re-sequencing whole genomes of 250 individuals from different species of the *Ovis* genus, we aimed at characterising enJSRV copies. One of the copies of enJSRV, duplicated at the locus 6q13, is known to have a protective role against JSRV infection by expressing a mutated Env protein.

We tested the hypothesis of selection for the duplication of this copy during domestication. We were able to detect a varying number of copies of the protective locus, which was not related to domestication. These duplications would have been selected a long time before, probably in the common ancestor to all Eurasian *Ovis* species.

Keywords: Sheep, endogenous retroviruses, JSRV, CNV, domestication

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