Researchers describe the mechanism of a protein upon infection of the 'Fasciola hepatica'

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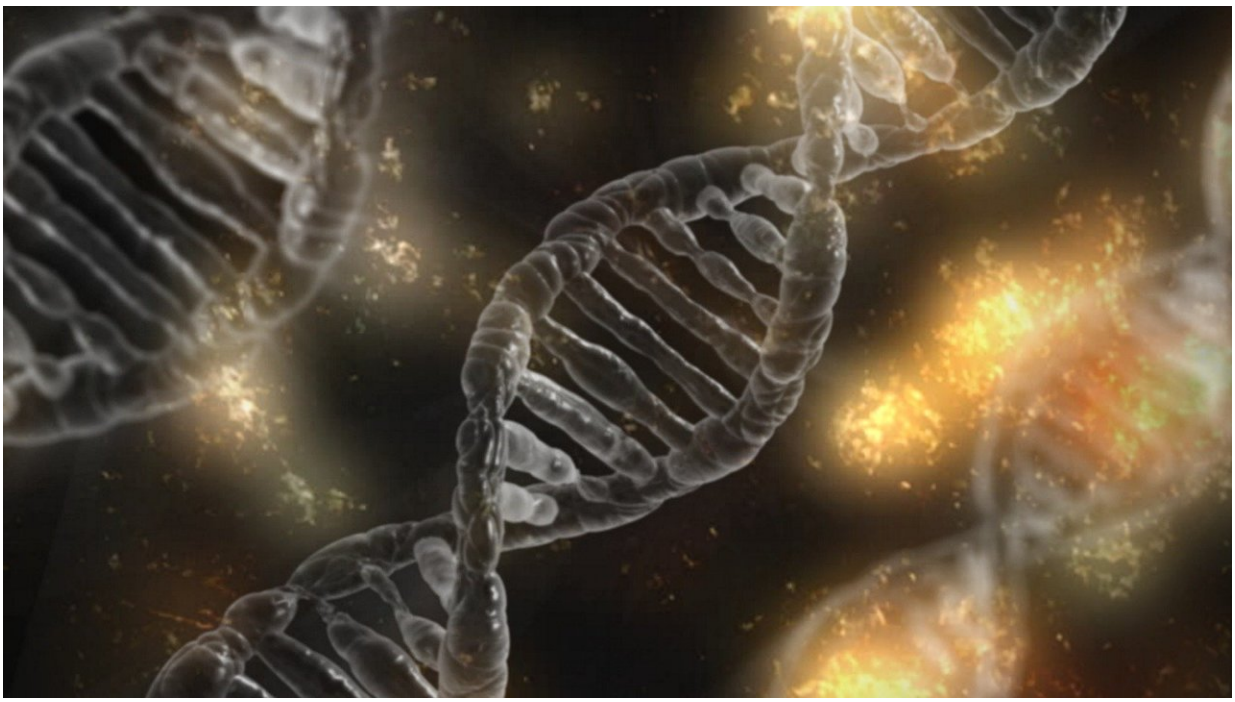

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Fasciola hepatica is a parasite that causes on average 3.2 million in losses in the agricultural sector every year worldwide. It is a two-centimeter-long worm at adult size that mainly affects ruminants by means of water or raw vegetables that act as vehicles of infection. Moveover, in

developing countries with deficient sanitary control systems, more than five million people have been infected. Though it does not have high death rates, it causes liver damage and makes the host more prone to catching other diseases.

Now, for the first time, several research groups at the University of Cordoba have observed that the parasite induces an overexpression of a protein which determines whether the pathogen makes itself at home within the infected animal or not. The gene in question is FOXP3, present in a regulatory lymphocyte that interferes with the immune response of the infected organism. That is to say, a protein that sends the false message that everything is alright to the organism's defense system. According to the results of the research, from a sheep's first day of infection, this protein's genetic expression increases in the tissues in which the pathogen is circulating. This increase is no coincidence—the parasite itself, in a way, handles the task of stimulating proliferation of the gene in order to eliminate the host's immune response and survive better within the host.

This is one of the main findings of the research published in *Scientific Reports*, but certainly not the only one. In addition, the same study was able to validate three reference or housekeeping genes in sheep to be used as controls in quantitative PCR techniques, a molecular biology technique that can quickly, easily and simultaneously quantify transcriptions of dozens of genes involved in a specific biological process.

These genes were selected from among ten analyzed candidate genes, and from now on they will allow researchers to delve more deeply into the host-pathogen relationship because they can now be used as markers to analyze cytokine activity. Cytokines are a kind of middleman that are able to activate inflammatory cells that regulate immune responses.

These proteins spend little time in the blood and therefore are hard to analyze in the most common kinds of blood tests. Nevertheless, as explained by José Pérez Arévalo, one of the main researchers on this study, identifying new genetic markers will help enable future quantitative PCR studies on cytokines in sheep to be carried out successfully.

This research on sheep, one of the primary victims of Fasciola hepatica, could mean an important step toward improving the effectiveness of vaccines in the future. Although some of them have had promising results in the laboratory, none have demonstrated enough protection to be developed commercially. For this reason, current control of this disease is based on using high-cost drugs, which also make the parasite more resistant, as well as adding residues in products such as milk and meat.

More information: I. L. Pacheco et al, Identification of reference genes for real-time PCR cytokine gene expression studies in sheep experimentally infected with Fasciola hepatica, *Scientific Reports* (2019). DOI: 10.1038/s41598-018-37672-7

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