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Apoptosis pathway in cytopathic and non-cytopathic BVDV infection

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Bovine Viral Diarrhea Virus (BVDV) infections are seen in all ages and breeds of cattle worldwide and have significant economic impact due to productive and reproductive losses. Previous reports showed that the cytopathic (cp) BVDV biotype, but not the non-cytopathic (ncp) BVDV biotype, induces apoptosis in infected cells, particularly in monocytes. Existence of these antigenically related biotype 'pairs' makes BVDV an important model in studies of virus-induced apoptosis.

Having undertaken a proteomic approach, we identified significantly altered bovine proteins in BVDV-infected monocytes compared to non-infected cells. Functional analysis of these proteins using the Gene Ontology (GO) showed multiple under- and over-represented GO functions in molecular function, biological process and cellular component categories between the two BVDV biotypes. Characterizing these proteins through pathway analysis showed that mitochondrial dysfunction and oxidative phosphorylation pathways were one of the top significant pathways affected by cp BVDV biotypes. The mitochondria are responsible for the production of vast majority of cellular energy in addition to free radicals, and were shown to control the intrinsic apoptosis pathway. We demonstrate that in contrast to ncp BVDV, cp BVDV biotype down-regulated the majority of proteins involved in those pathways.

Overall, our data showed changes in the expression of specific host mitochondrial proteins and antioxidant enzymes by BVDV biotypes that can control the fate of infected cell and determine whether BVDV biotypes produce cytopathic effect or replicate non-cytopathically to establish persistent infection. In addition, our data support previous report that showed that the induction of apoptosis by cp BVDV is due to the intrinsic pathway of apoptosis.

Biography

Mais Ammari is a Virology/Computational biology PhD candidate in the Collage of Veterinary medicine at Mississippi State University.