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Synthetic BIOLOGICS

## Intramammary Infusion of a Live Culture of *Lactococcus lactis* in Lactating Ewes with Subclinical and Clinical Mastitis: A Promising New Alternative for the Treatment of Mastitis?

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### Abstract

Alternatives to antibiotic therapy for mastitis in ruminants are needed. We present an evaluation, in two trials, of the efficacy of an intramammary infusion of a live culture of *Lactococcus lactis* for the treatment of subclinical and clinical mastitis in lactating ewes. Sixty-seven animals were enrolled: 19 lactating ewes (Study 1), including healthy (N=6) and CNS-infected ewes (N=13); and 48 lactating ewes (Study 2) with either CNS mastitis (N=32), or *S. aureus* mastitis (N=16), for a total of 123 mammary glands. Intramammary infusions were performed with either *L. Lactis* or PBS for three (Study 1) or seven (Study 2) consecutive days. Antibiotic-treated and untreated control glands were included. Milk samples for microbiology, somatic cell analysis and milk production were collected before and after treatment. *L. lactis* rapidly activated the mammary glands' innate immune response and initiated an inflammatory response as evidenced by the recruitment of PMNs and increased somatic cell counts. But while leading to a transient clearance of CNS in the gland, this response caused mild to moderate clinical cases of mastitis characterized by abnormal milk secretions and udder inflammation. Moreover, *S. aureus* infections did not improve, and CNS infections tended to relapse. Further studies are needed to elucidate the efficacy and potential risks involved in the use of bacterial cultures as alternatives for the prevention and treatment of mastitis in ruminants. This work was supported by the Italian Ministry of Health, grant number RF-2010-2313040.

## Gut Microbiome Modulators to Regulate Energy Balance

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### Abstract

Obesity and type 2 diabetes are highly epidemic around the world. Microbiome contributes significantly in pathophysiology of obesity and diabetes. Role of probiotics in obesity is questionable due to the fact that probiotics have been used as growth promoter in farming industry. Our initial studies show that probiotics supplemented fermented milk products (Indian yogurt/dahi) exhibit beneficial effects against diet induced insulin resistance and hyperglycemia. Recently, we demonstrated that selected probiotics are not detrimental for induction of high fat diet induced obesity (DIO) in mice. Interestingly, we have observed that one of probiotics (VSL#3) was potent to suppress and reverse diet induced obesity and insulin resistance. Beneficial effects of VSL#3 feeding were due to decreased food intake via increased hypothalamic satiety signals and decrease hunger signals. We found that VSL#3 treatment significantly changed gut microbiome that resulted to produce differential metabolites i.e. short chain fatty acids. Specially, VSL#3 feeding increased butyrate production that resulted to increased production of gut hormones such as glucagon like protein-1 (GLP-1). Here we described mechanism(s) of action of probiotics (i.e. VSL#3), suggesting that VSL#3 modulated gut microbiome derived short chain fatty acids (butyrate) and gut hormone axis to modulate energy homeostasis. Our further studies are aimed to describe detailed role of short chain fatty acids, and molecular mechanisms to regulate energy metabolism against obesity and diabetes.

### Biography

Hariom Yadav is an expert to study role of probiotics on metabolic health. He answered several key questions in the field to define the role of probiotics against obesity and diabetes. Recently his group demonstrated that probiotics metabolic effects were mediated through microbiome-produced butyrate, which induces gut hormone (GLP-1) release to reduce obesity and type 2 diabetes. His group is developing new probiotics for better management of obesity and diabetes. In addition, his group is investigating the contribution of gut microbiome and its metabolites and cell signaling mechanism(s) to neuronal circuit communication and regulation of energy balance.