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LCM combined with MALDI-TOF Mass Spectrometry to demonstrate that α_{s1} -casein is required for efficient export of the other caseins from the Endoplasmic Reticulum to the Golgi apparatus

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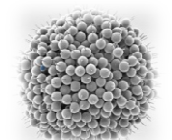


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Background

Caseins, the main milk proteins, aggregate in the secretory pathway of **mammary epithelial cells (MEC)** into large supramolecular structures, the so-called **casein micelles**.

The role of individual casein in this process and the detail structure of the casein micelle remain poorly understood. In the goat species, a **deficit in α_{s1} -casein is responsible for the accumulation of caseins in distended RER cisternae** and for a perturbation of the secretion process of proteins and lipids that are synthesized as triglycerides at the ER level. In contrast, no accumulation was recorded in MEC lacking β -casein expression.

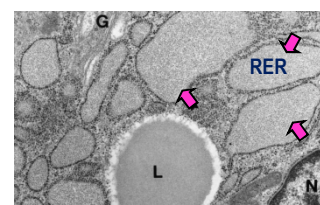
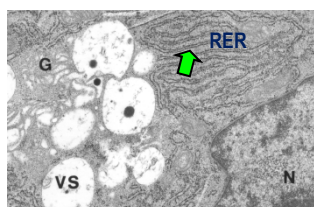


Casein micelles



Defective:
Homozygous O/O at the *CSN1S1* locus

Wild type: Homozygous A/A at the *CSN1S1* locus

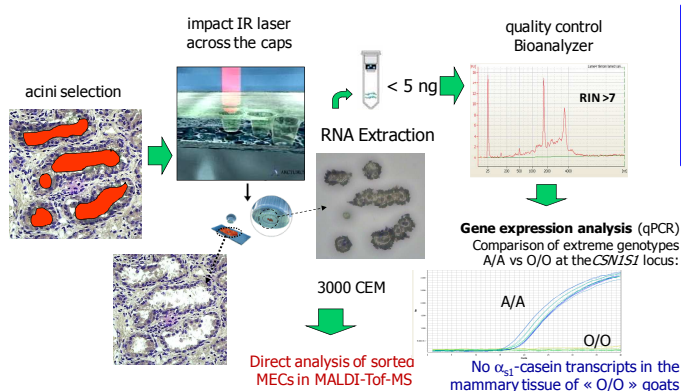


Swelling of the Rough Endoplasmic Reticulum

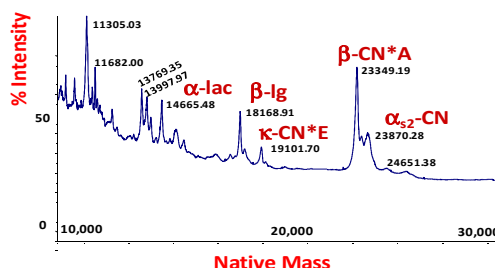
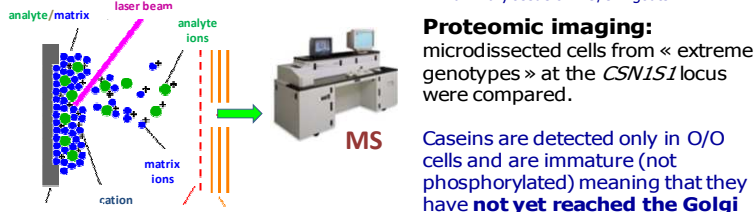
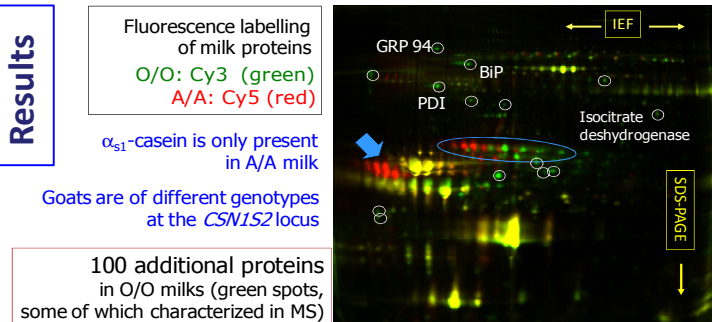
What are the mechanisms involved in MEC dysfunction?

Materials & Methods

Laser Capture Microdissection coupled with MALDI-ToF MS



Differential proteomic analysis O/O vs. A/A milks using 2D-DIGE



Conclusions

Materials accumulating in the ER of MEC from goats homozygous O/O at the *CSN1S1* locus are immature milk proteins (without post-translational modifications). Our data strongly suggest that α_{s1} -casein interacts with the other caseins in the rough endoplasmic reticulum to form a complex that is required for their efficient export to the Golgi apparatus where they will be phosphorylated to interact with Ca^{2+} ions.

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