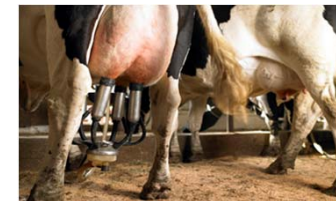




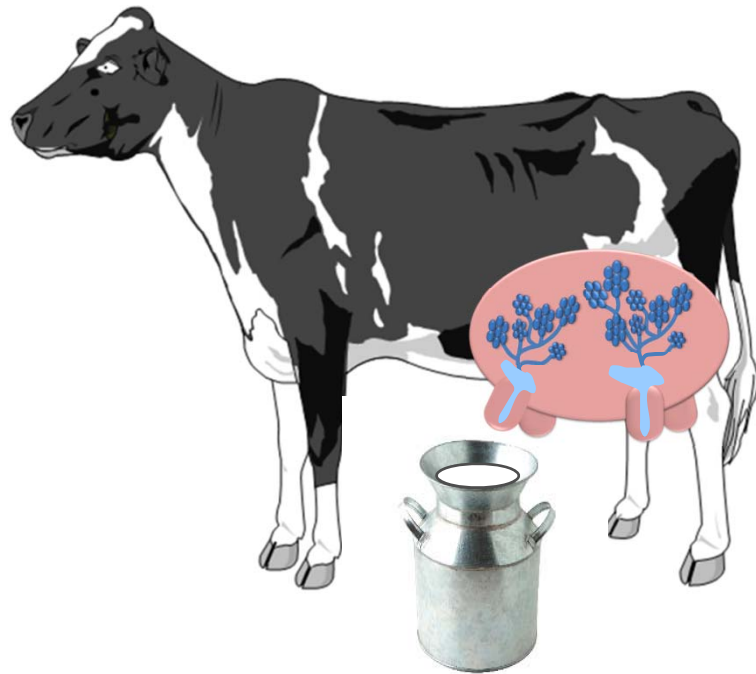
Myoepithelial cell contraction participates in mammary epithelial cell exfoliation in cow milk

L. Herve, H. Quesnel, S. Wiart, P. Lamberton, C. Mustière, V. Lollivier, M. Boutinaud
INRA/Agrocampus Ouest, UMR PEGASE, France

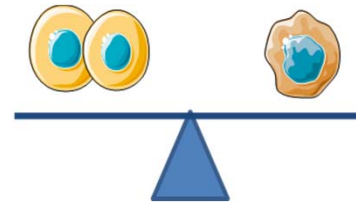
67th Annual Meeting of the European Federation of Animal Science
Belfast UK, 29 Aug – 2 Sept 2016



Milk yield depends on the number of Mammary Epithelial Cell (MEC) in the mammary gland

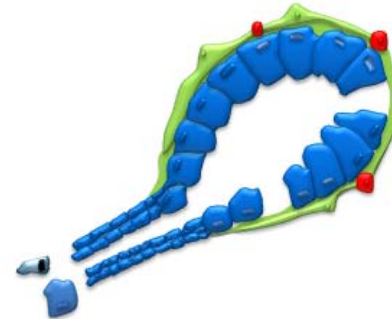


Proliferation / Apoptosis Balance



Knight & Peaker (1984)
Capuco et al. (2003)
Boutinaud et al. (2004)

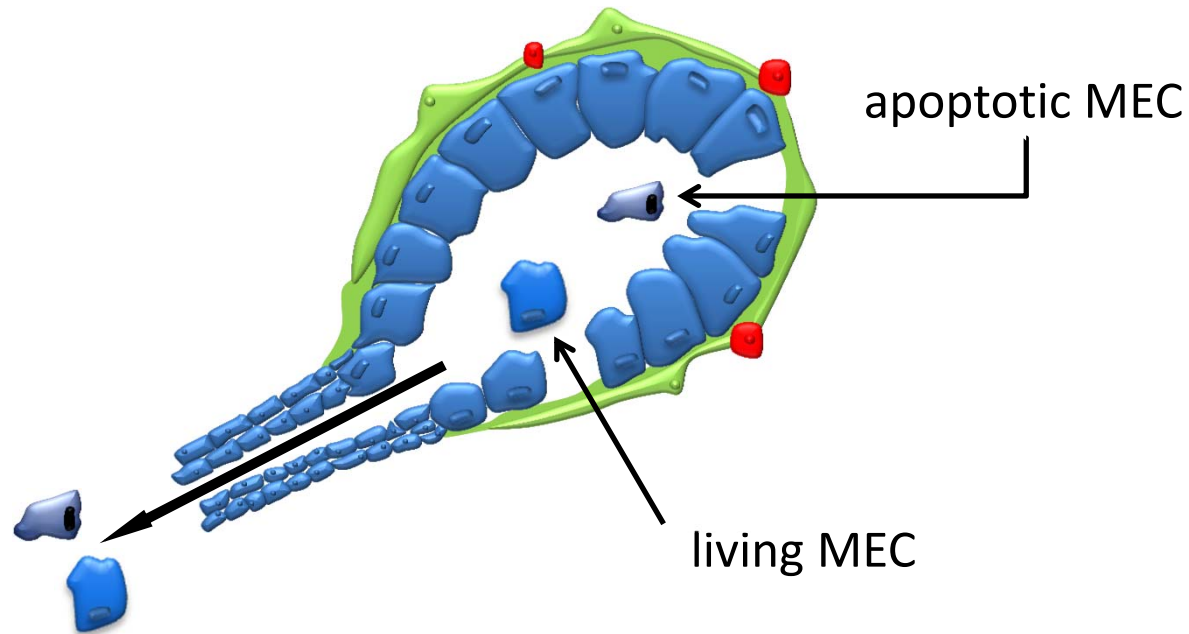
MEC exfoliation into milk



Herve et al. (2016)

MEC exfoliation process

= Shedding of MEC from the mammary epithelium into milk
Ruminant milk contains exfoliated MEC

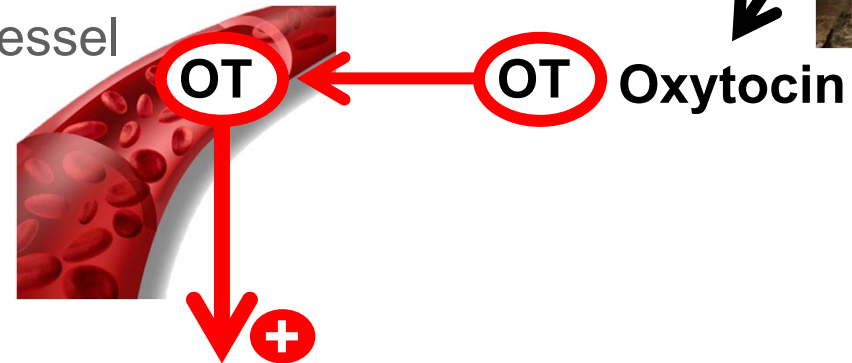


Associated with a loss of mammary epithelium integrity ([Herve et al., 2016](#))

At milking, oxytocin stimulates the myoepithelial cell contraction

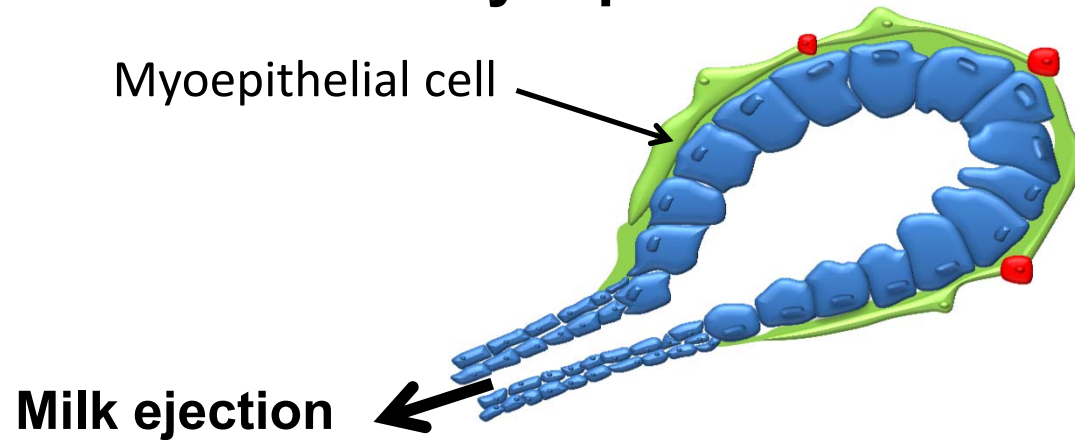


Blood vessel



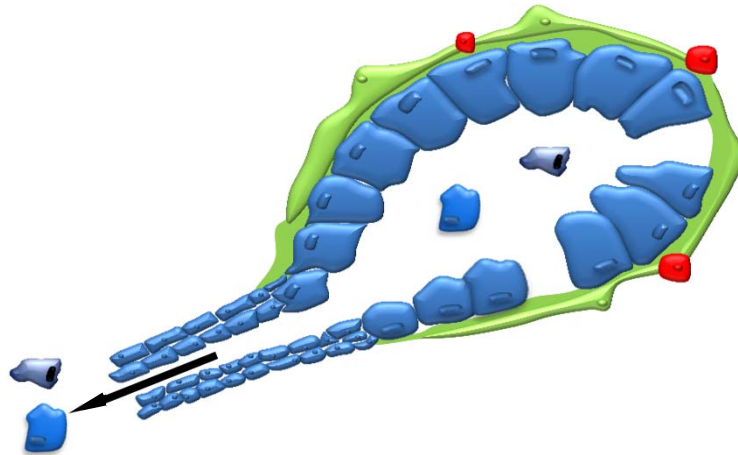
Myoepithelial cell contraction

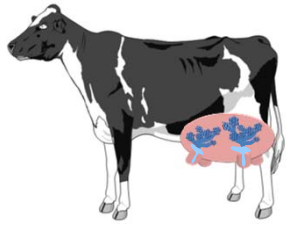
Myoepithelial cell



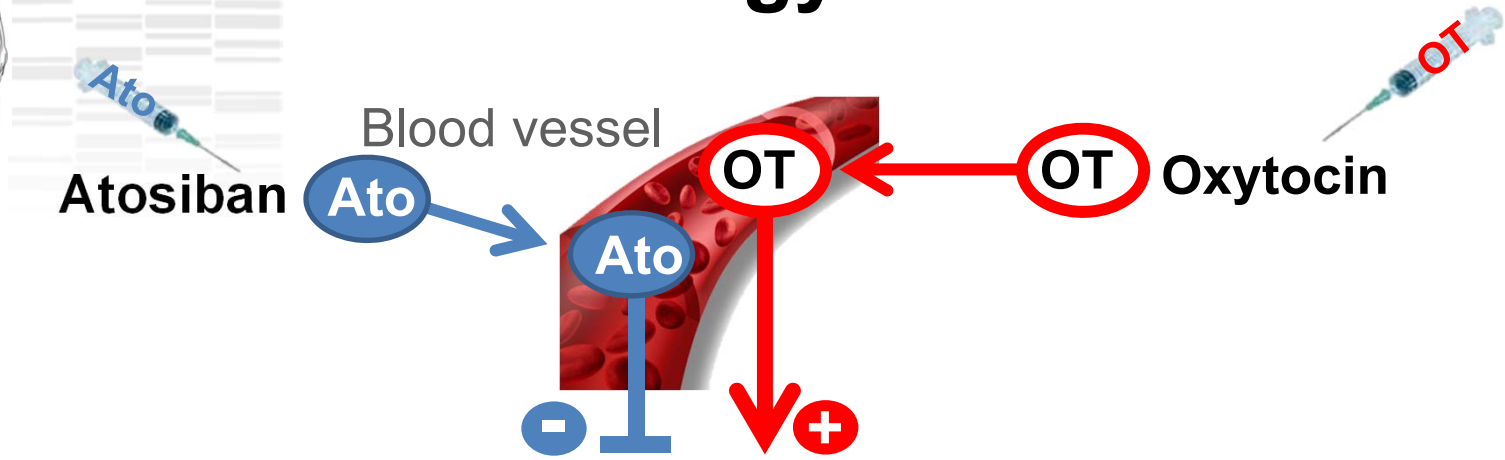
Hypothesis:

The myoepithelial cell contraction at milking stimulates MEC exfoliation into milk through mechanical forces and is associated with a loss of mammary epithelium integrity

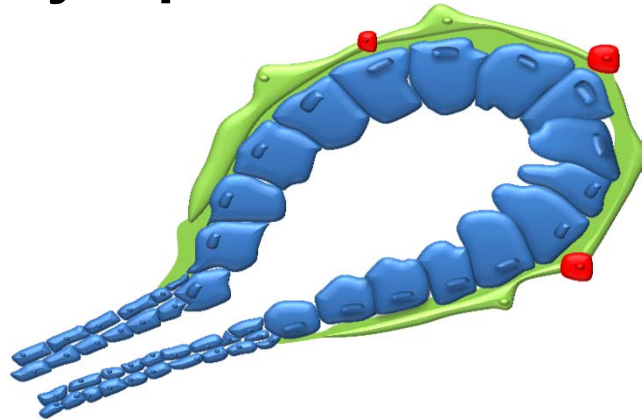




Strategy



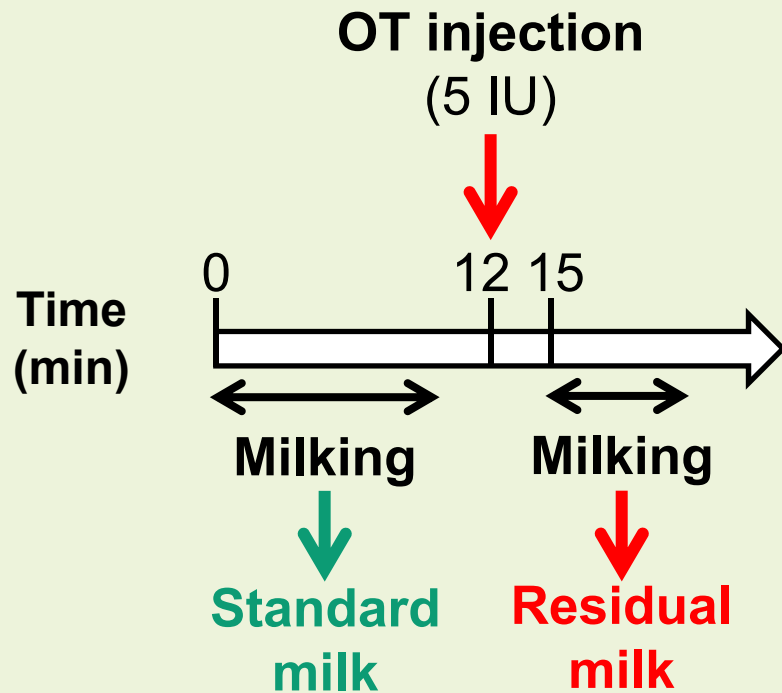
Myoepithelial cell contraction



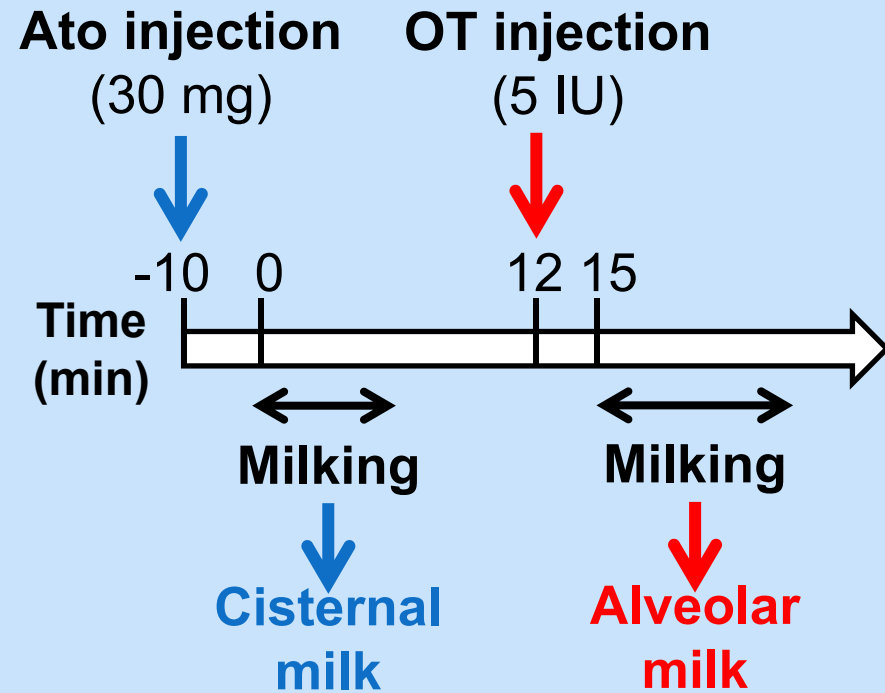
Animals and Treatments

8 multiparous dairy cows at morning milking - Crossover experimental design

Control + OT Treatment



Ato + OT Treatment



OT = Oxytocin Ato = Atosiban

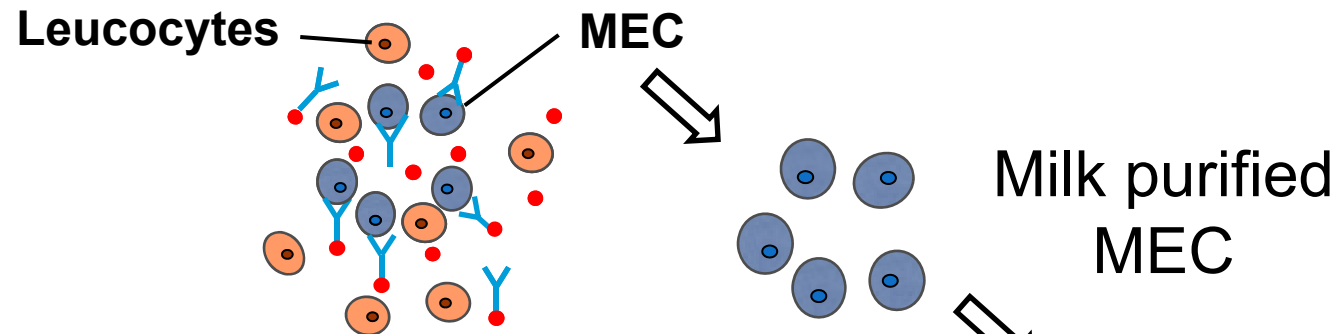


Milk MEC purification

1. Milk centrifugation



2. **Purification** of milk MEC using **magnetic beads** coated with an anti-cytokeratin antibody



4. Determination of the % of apoptotic MEC by flow cytometry analysis



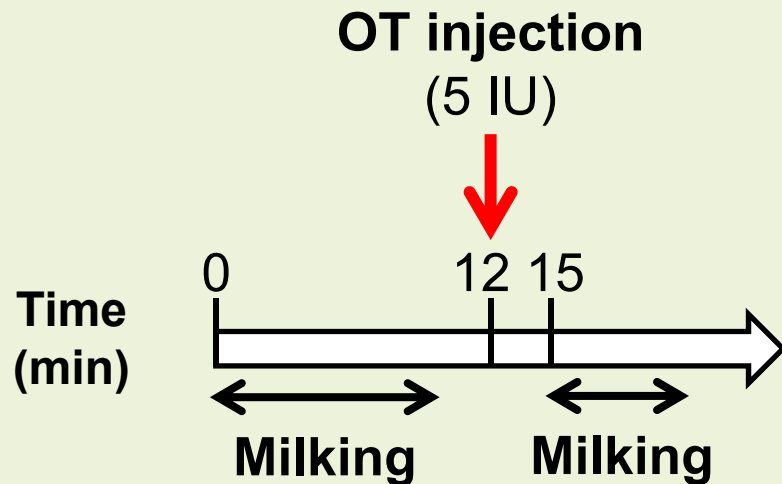
3. Cell count determination

Boutinaud et al. (2008)

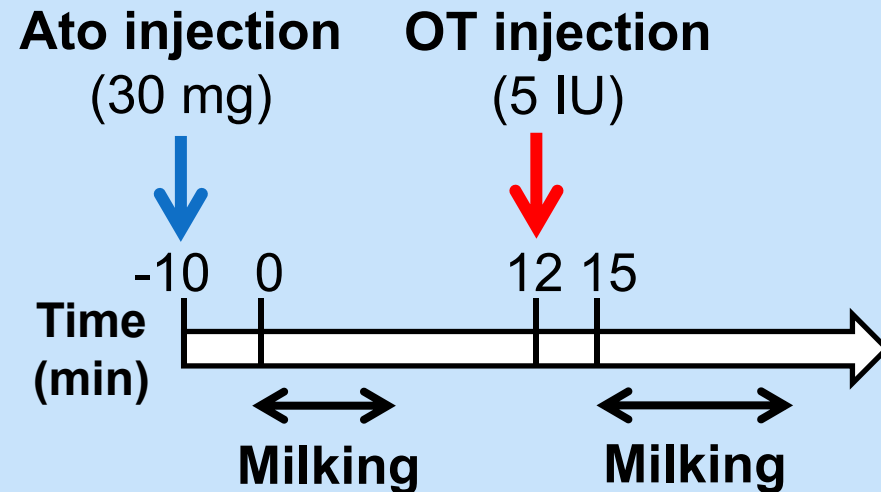
Animals and Treatments

8 multiparous dairy cows at morning milking - Crossover experimental design

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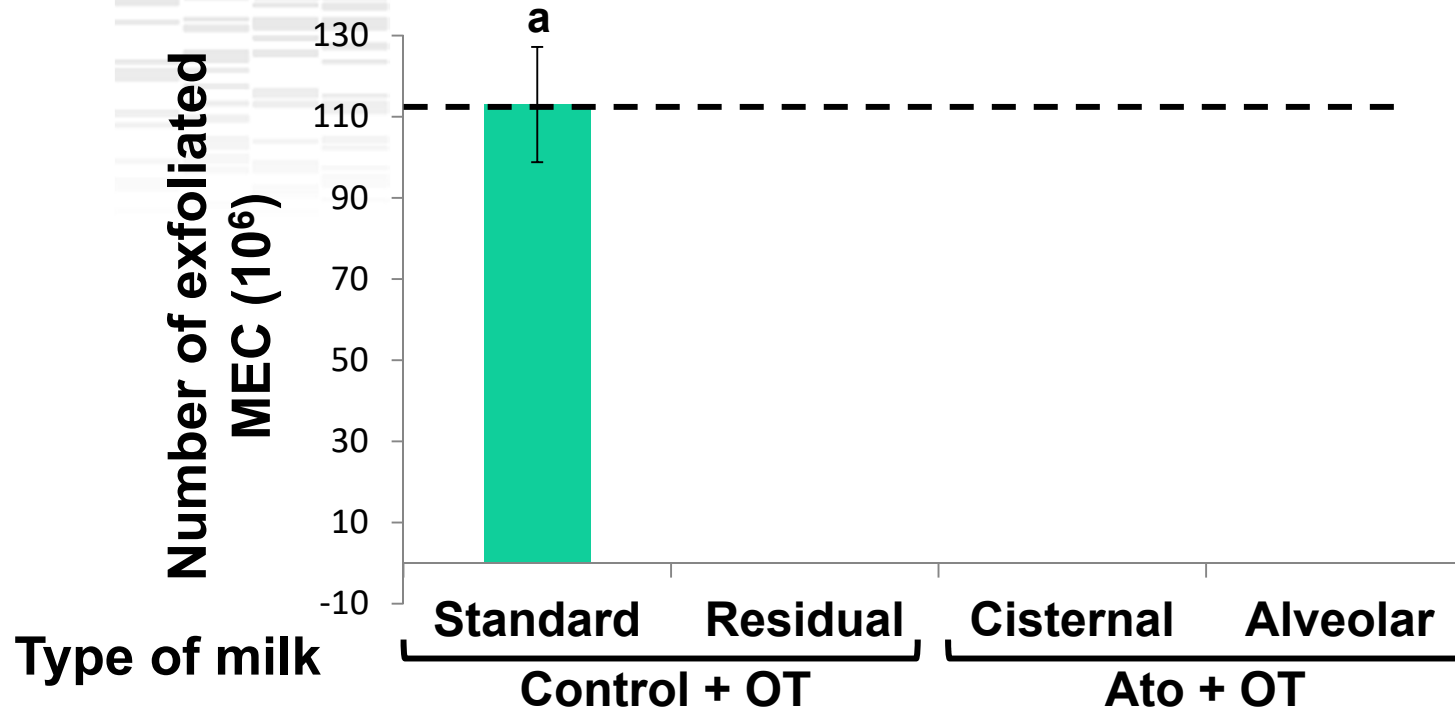
Ato + OT Treatment



+ Blood sampling for the assessment of mammary epithelium integrity by plasma lactose concentration determination

Results: MEC exfoliation

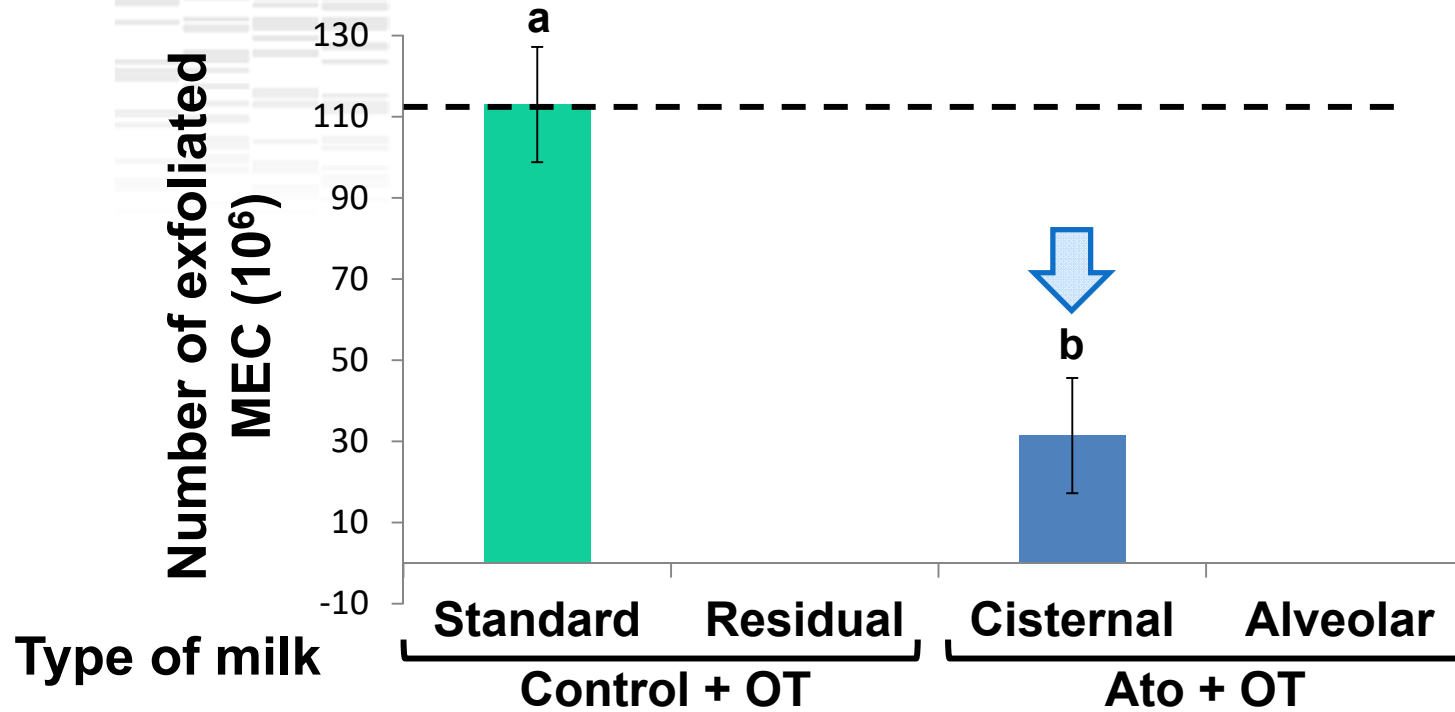
a, b, c, d, for P < 0.05



Milk yield (kg)	22.9 ^a	3.0 ^b	5.9 ^c	13.3 ^d
Milk MEC concentration (10 ³ cells/mL)	4.9 ^a	19.3 ^b	6.1 ^a	4.3 ^a
% apoptotic MEC	32.6 ^a	20.5 ^b	28.6 ^{ab}	37.6 ^a

Results: MEC exfoliation

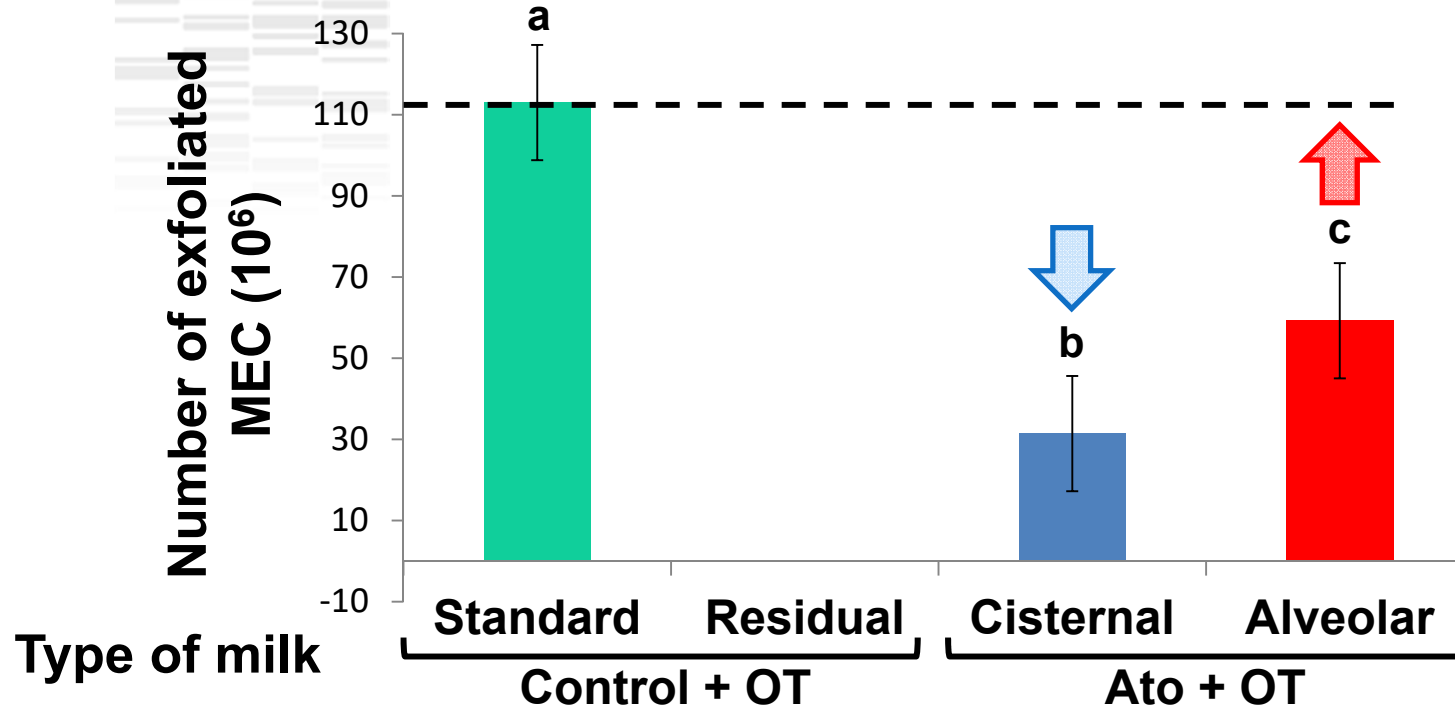
a, b, c, d, for P < 0.05



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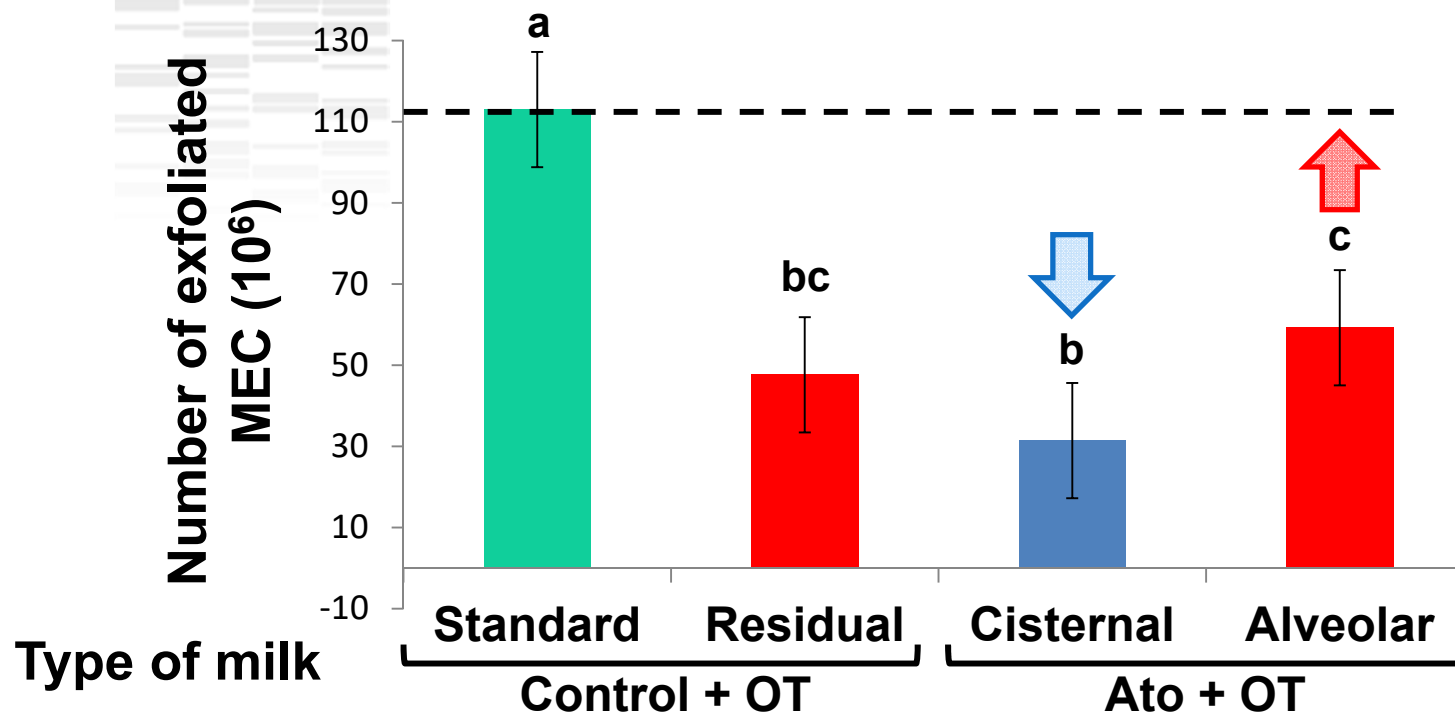
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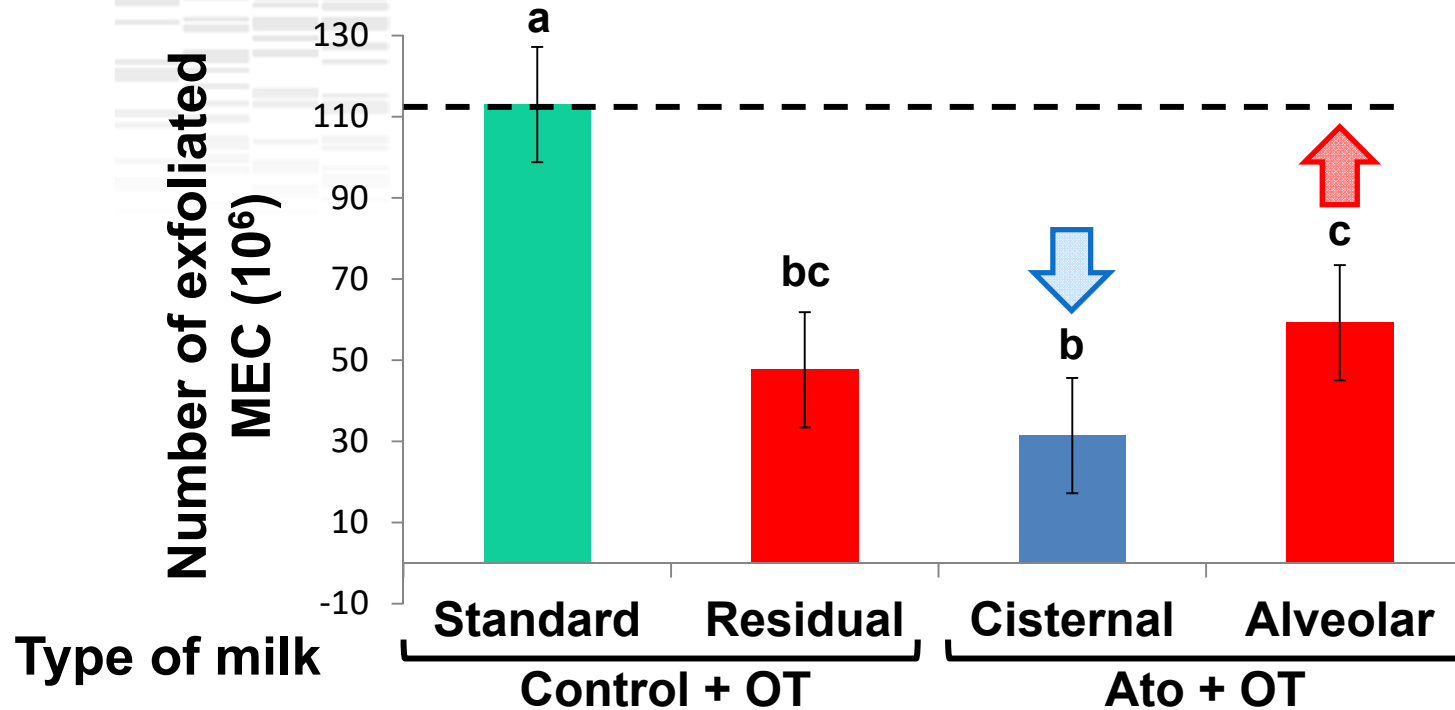
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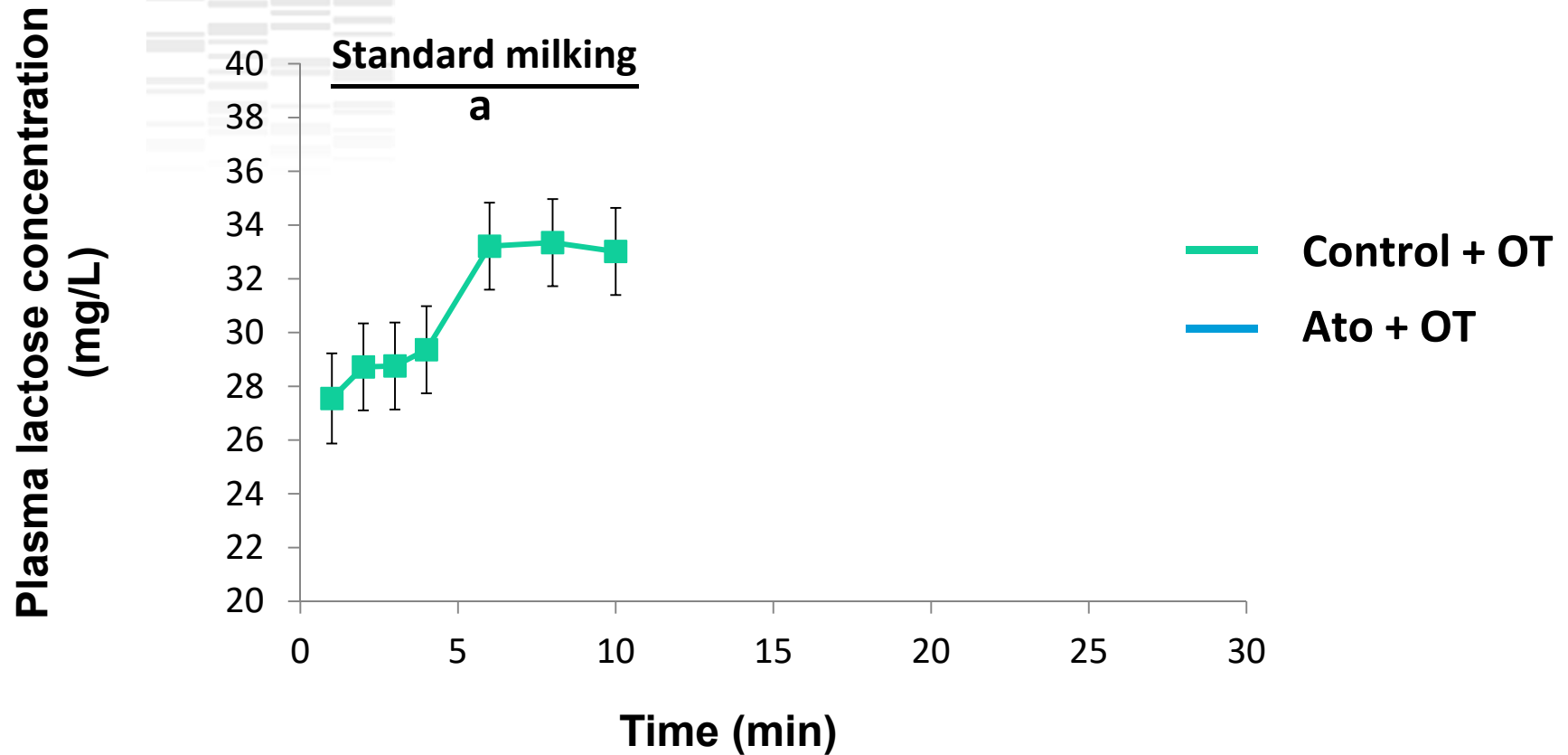
Results: MEC exfoliation

a, b, c, d, for $P < 0.05$



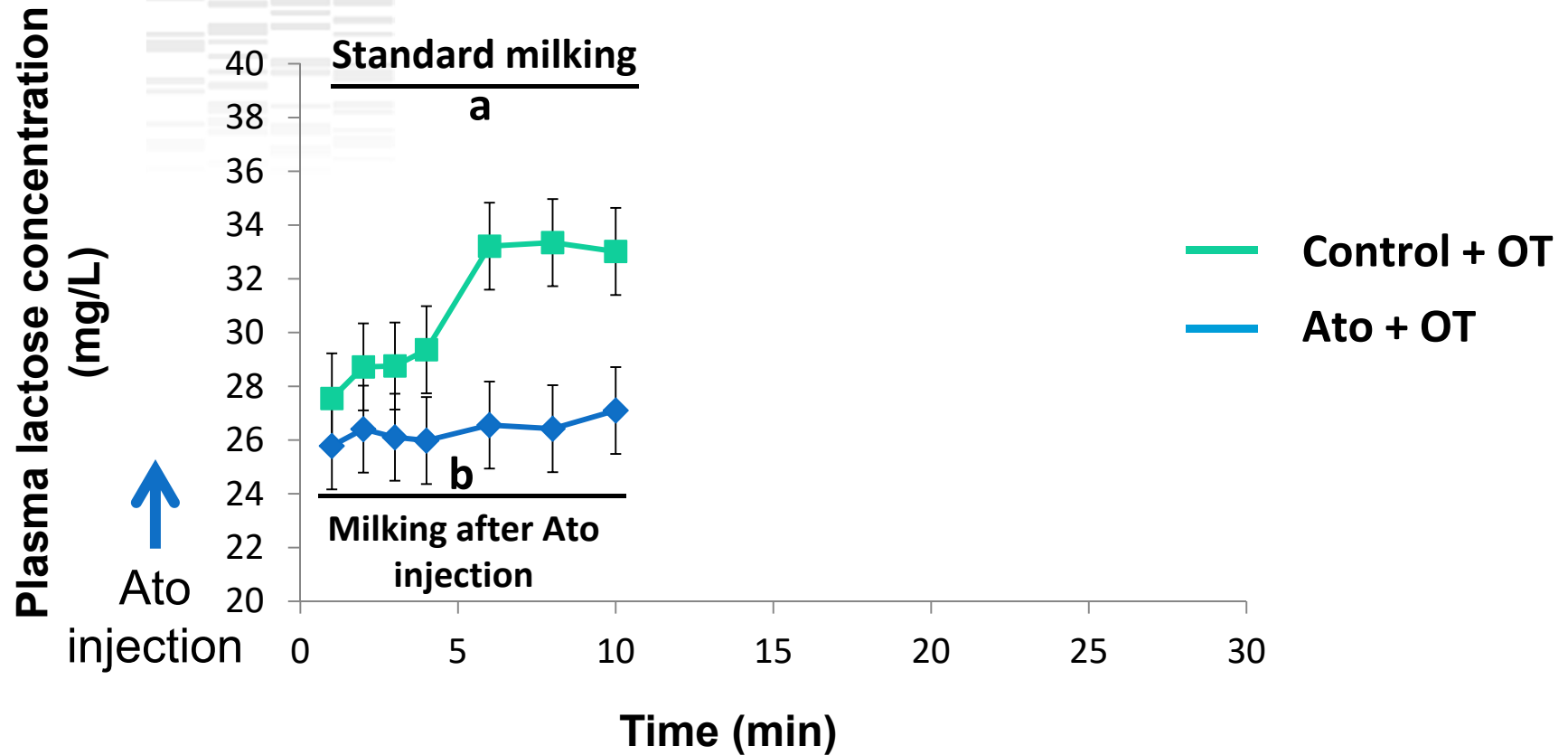
- ✓ Less exfoliation when myoepithelial cell contraction was inhibited.
- ✓ More exfoliation when myoepithelial cell contraction was induced.

Results: Mammary epithelium integrity



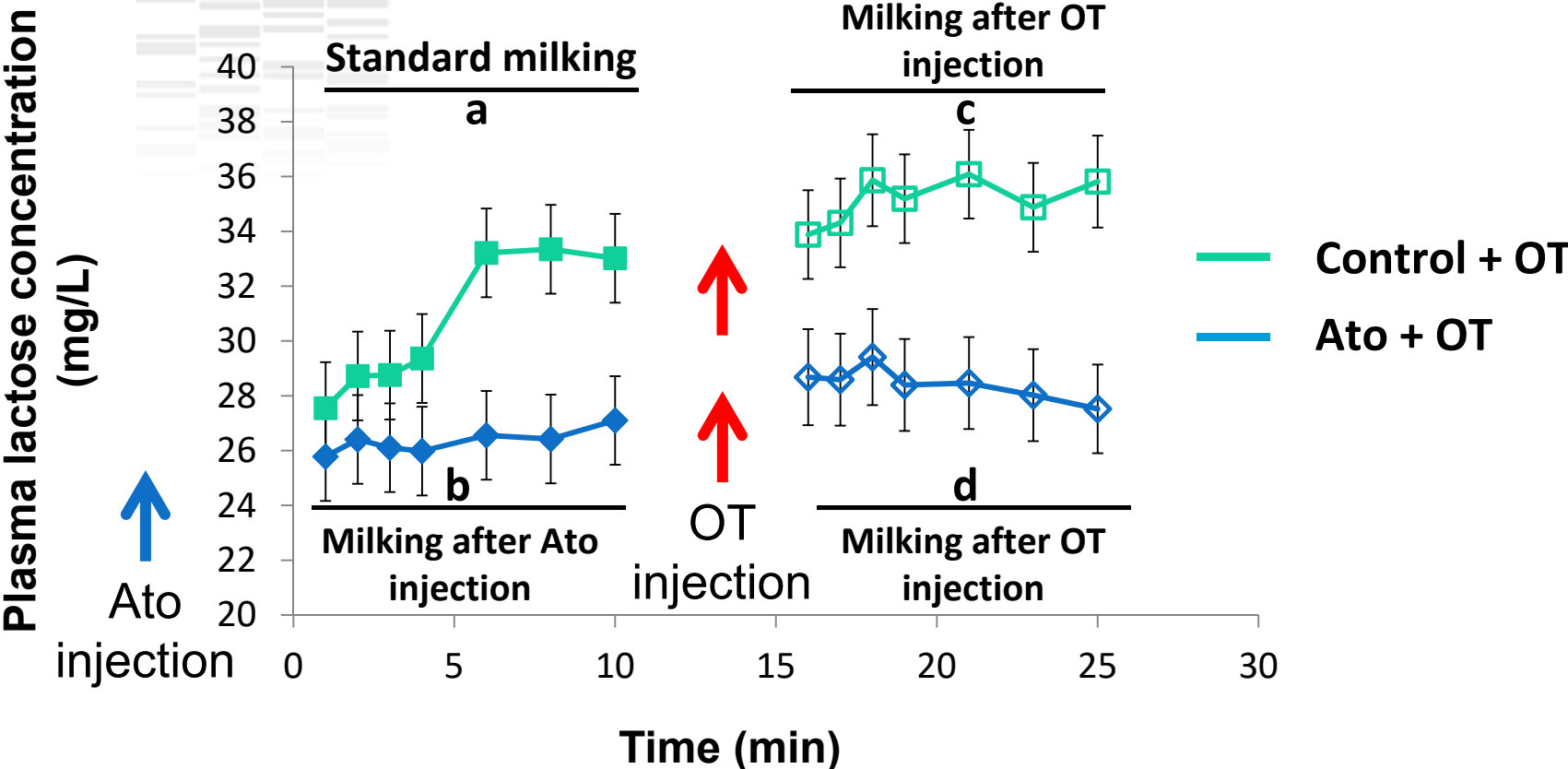
a, b, c, d, for $P < 0.05$

Results: Mammary epithelium integrity



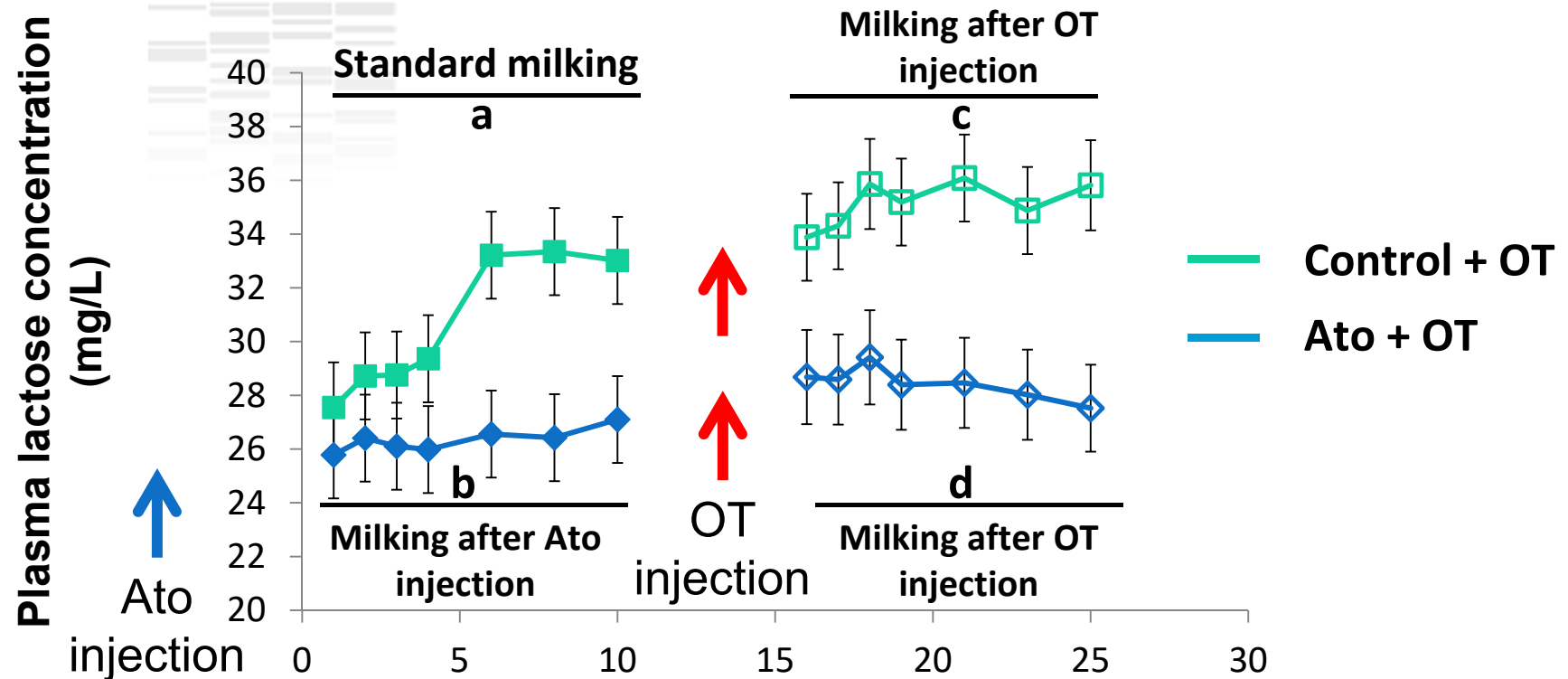
a, b, c, d, for $P < 0.05$

Results: Mammary epithelium integrity



a, b, c, d, for $P < 0.05$

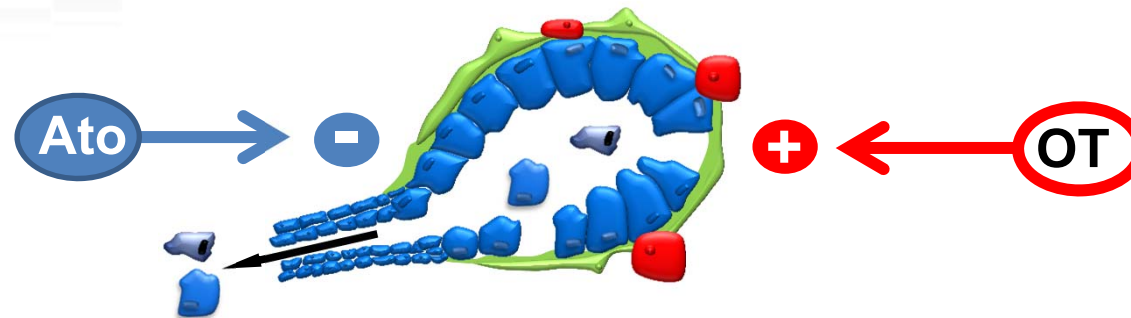
Results: Mammary epithelium integrity



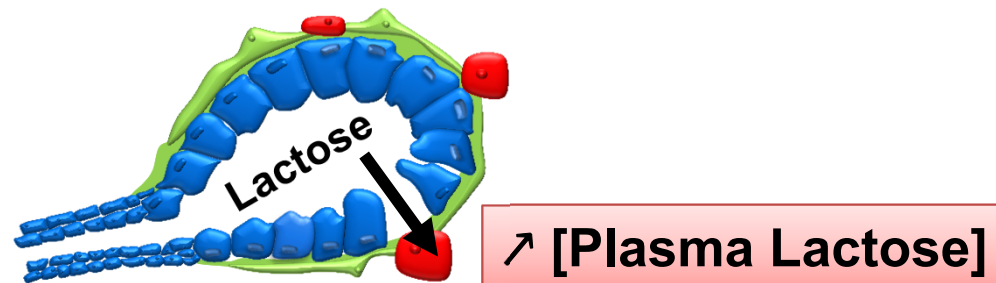
Myoepithelial cell contraction was associated with a loss of mammary epithelium integrity.

Conclusions

1. Oxytocin stimulated MEC exfoliation whereas Atosiban inhibited it.



2. The MEC exfoliation process was associated with a loss of mammary epithelium integrity.



Thank you for your attention and great thanks to:

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