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Compositions and Methods Useful in Promoting Milk Production

Tech ID: 33011 / UC Case 2018-394-0

BACKGROUND

The mammary gland is responsible for producing milk in mammals. Producing a milk supply involves significantly accelerated cell growth and differentiation. It is thought that alveologenesis, the process by which milk-producing alveoli are made, occurs when alveolar progenitor cells differentiate into milk-producing alveolar cells. Thus, promoting alveolar differentiation is important in increasing milk production.

Various industries, such as the dairy industry, may be interested in increasing milk production generally or increasing milk production without the use of hormones.

TECHNOLOGY DESCRIPTION

To promote milk production, researchers at UC Santa Cruz have developed methods and compositions that promote accelerated cell growth and differentiation. The methods and compositions include agents that affect the disinhibitory signaling circuit ROBO2 –|ROBO1–|NOTCH4, a signaling circuit that affects the number of alveolar progenitor cells that differentiate into milk-producing alveoli. For example, an agent such as a ROBO1 extracellular domain can inhibit NOTCH4, thereby promoting alveologenesis. Also included are related polypeptides, pharmaceutical compositions, antibodies, RNAi constructs, and transgenic mammals.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

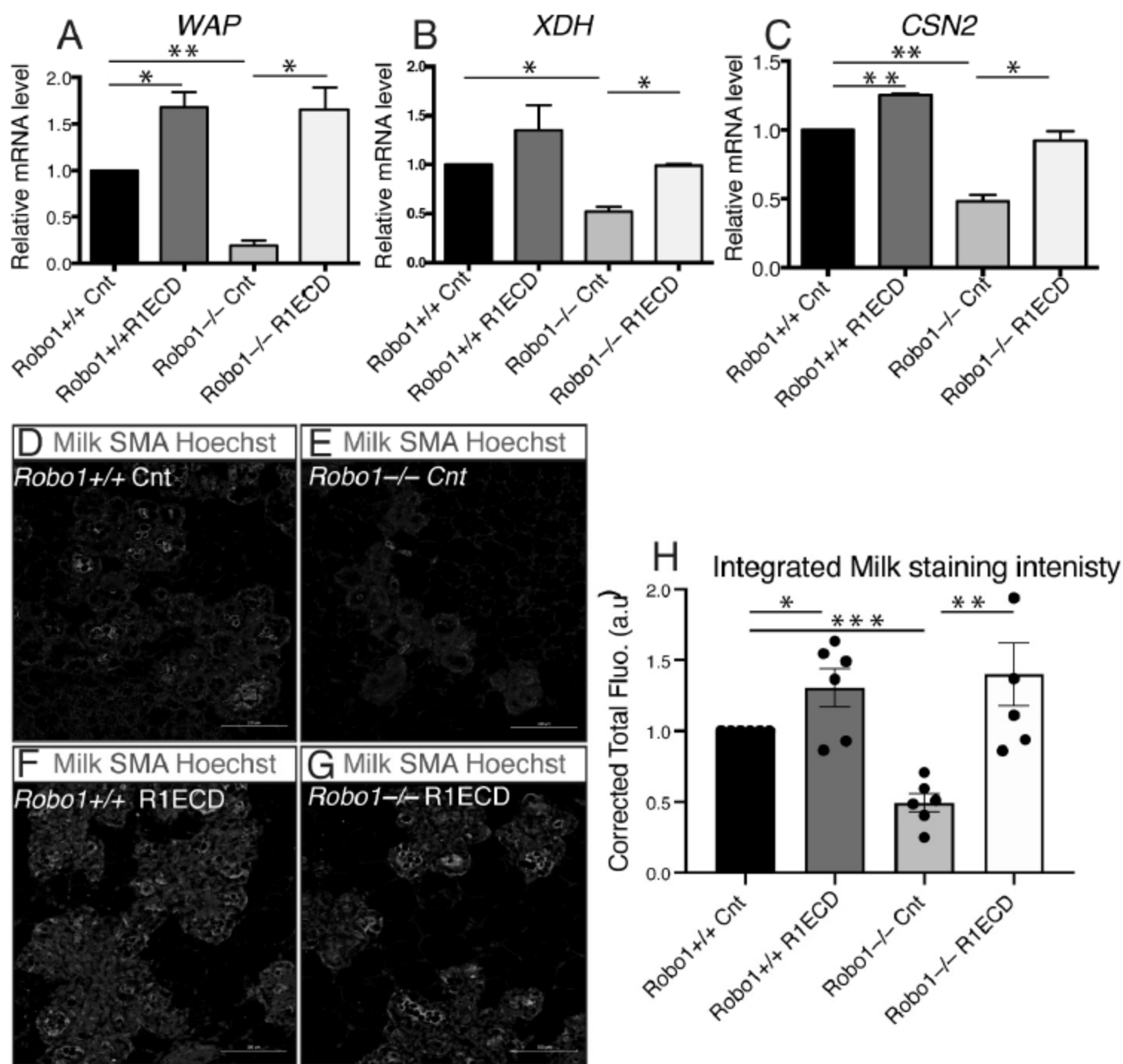
mammary gland, robo, notch, milk production, dairy, transgenic, ROBO1/ROBO2/NOTCH4, veterinary therapeutics

CATEGORIZED AS

- ▶ **Agriculture & Animal Science**
 - ▶ Transgenics
- ▶ **Biotechnology**
 - ▶ Other
- ▶ **Materials & Chemicals**
 - ▶ Agricultural
 - ▶ Biological

RELATED CASES

2018-394-0



ROBO1 Extracellular Domain Fragments Increase Milk Production. (A-C) RT-qPCR shows significantly reduced expression of WAP (A), XDH (B) and CSN2 (C) in mock-injected Robo1^{-/-} compared to Robo1^{+/+} animals. There is significantly increased expression of WAP, CSN2 and a trending increase in XDH in Robo1^{+/+} animals injected with ROBO1 ECD-Fc (R1ECD). There is significantly increased expression of WAP, XDH and CSN2 in Robo1^{-/-} animals injected with ROBO1 ECD-Fc (R1ECD). (D-H) Immunohistochemistry (D-G) and quantification (H) demonstrates a significant decrease in milk protein expression in the mock-injected Robo1^{-/-} mammary gland tissue compared to control Robo1^{+/+} tissue and significant increases in milk protein expression with the injection of ROBO1 ECD-Fc (R1ECD) fragment into either Robo1^{+/+} or Robo1^{-/-} animals. (SEM, *p < 0.05, **p < 0.01, ***p < 0.001).

APPLICATIONS

- ▶ milk production
- ▶ pharmaceutical intervention
- ▶ biopharmaceutical intervention
- ▶ transgenic animals
- ▶ RNAi

ADVANTAGES

- ▶ promotes milk production

INTELLECTUAL PROPERTY INFORMATION

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,139,531	11/12/2024	2018-394
United States Of America	Published Application	20250092129	03/20/2025	2018-394
China	Published Application	114401982	04/26/2022	2018-394
European Patent Office	Published Application	3959231	03/02/2022	2018-394

Additional Patents Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

► [Dna Damage Increases Functional Differentiation Of Mammary Gland Alveolar Cells During Lactation](#)

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