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Ministry of Health

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### Israeli Medical Abstracts Repository (IMAR)

Research Number: 12020

Title: Improved anti-oxidative properties of milk by ultra-high pressure homogenization pasteurization

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**Background:** In recent years there is an increasing interest in the anti-oxidant capacity of food products including milk. The limited scientific reports clearly show degradation of some of the anti-oxidants, the formation of some pro-oxidants and a decrease in the total anti-oxidative capacity during thermal processing and especially during shelf life of milk. Ultra high pressure homogenization (UHPH) is a novel processing technology capable of ensuring microbial safety of milk with a lower thermal detrimental effect. It was previously suggested that a deeper understanding of the complex interplay of pro- and antioxidants in milk may lead to an optimized milk handling and processing, possibly resulting in better health promotion of large populations.

**Hypothesis:** In this project we hypothesize that the anti-oxidant capacity of processed (to ensure microbial safety) milk during the shelf life and consumption can be improved by utilization of UHPH in a one-step preservation-homogenization process. The main suggested contribution of UHPH will be a decreased degradation of riboflavin due to optimized light scattering.

**Methods:** A wide array of analytical methods to study the effects of pasteurization and UHPH on the content of Riboflavin, Vitamin C and anti-oxidative properties during shelf life in cold storage with light were used.

**Results:** The smaller obtained particle size in UHPH treated milk resulted in a lower degradation rate of riboflavin and a lower (compared to pasteurized) degradation of Vitamin C, while the total bacterial count significantly decreased. The antioxidative properties measured by the ORAC method showed a better conservation of the antioxidant capacity during shelf life of UHPH treated milk compared to pasteurized milk while the ABTS method did not confirm this results.

**Conclusions:** Our results clearly show that by optimization of the homogenization process in general and specifically by utilization of UHPH treatments it is possible to



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obtain smaller particles compared to regular homogenization and a better control of the degradation rate of riboflavin during storage in packaging that allow the transmission of light (for example in supermarkets). Additional effects of this method may contribute to improved antioxidant capacity. As milk is a primary product consumed practically during all life stages it is possible that even small improvements in its health promoting properties, like vitamin content and anti-oxidative capacity, can result in a large and continues beneficial contribution and to prevention of many chronic illnesses.

**Key words:** (Ultra) high pressure homogenization, Milk, Riboflavin, Vitamin C, Antioxidative capacity

**Publications associated with the project:** "Changes in the shelf life stability of riboflavin, vitamin C and antioxidant properties of milk after (ultra) high pressure homogenization: Direct and indirect effects" Sharabi, S., Okun, Z., Spigelman, A., Innovative Food Science & Emerging Technologies, 2018, *in Press*, <https://doi.org/10.1016/j.ifset.2018.02.014>.

**Patents associated with the project:**

None