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When Innovation meets Tradition:
Apple Derived Extracts from Italian Golden Delicious PDO (Val
di Non, Trentino)
for Human Well-being in the Context of Circular Bioeconomy

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PDO

Golden, Red, RENETTA CANADA

1994: DOP for golden, red e renetta



Disciplinary code of production of the P.D.O. Mela Val di Non

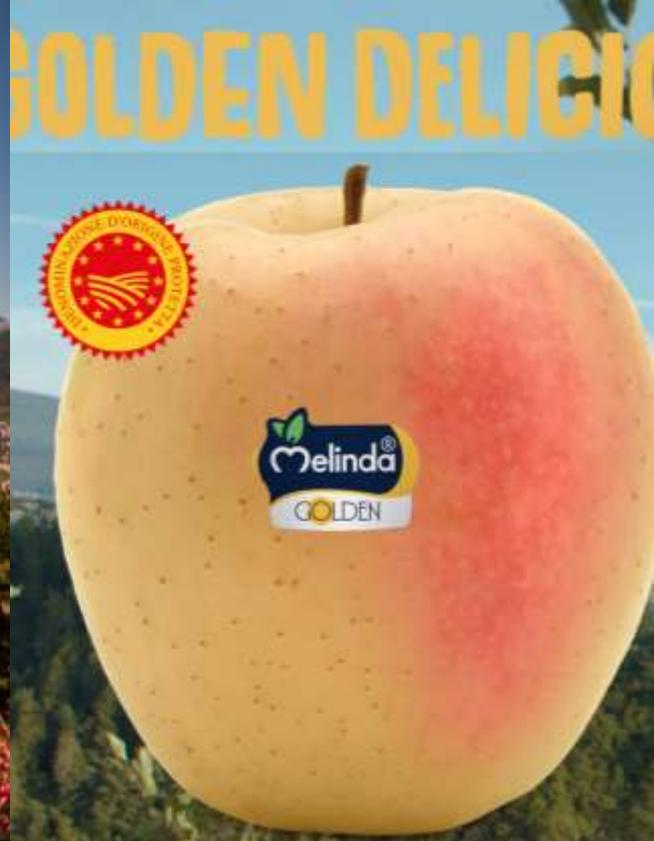


Disciplinary production code of Melinda



- quality of the apples (minimum standards of sugars, acidity and pureness),
- quantity of fruit produced (maximum yield/hectare)
- maximum number of trees/hectare

- Respect of the orchard as essential part of the valley's ecosystem
- Integrated Farming
- diversified picking according to the characteristics of the orchard
- manual packaging of the apples



SUSTAINABILITY



SUSTAINABILITY



1. USE ONLY RENEWABLE SOURCES

We use 100% renewable energy resources, 11% of which is self-produced by a photovoltaic system on our structure's roof. The rest is supplied by a hydroelectric power system.



2. NEVER WASTE EVEN A DROP OF WATER

Melinda uses drop irrigation over 97% of its apple orchards. This system improves water distribution among the plants vs traditional overhead irrigation, with 30% less water consumption.



3. RESPECT NATURE'S TIMING

Melinda Consortium farmers are aware that good products like Melinda apples require time and effort. They have always grown them respecting the biological cycle of the orchard, the rhythm of the seasons and climate.



4. BUILD AN ANIMAL-FRIENDLY ECOSYSTEM

In our orchards you can find a strong presence of fauna (insects, birds, wildlife), this is an index of the environment's wellness. In our valleys, apiculture and farming go arm in arm, and pollinating insects, like bees, are becoming more numerous for the increasing number of beehives and beekeepers.



32.903
Beehives

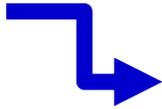


2060
Beekeepers

SUSTAINABILITY

The use of apples not for the market to produce other food products:

300.000 tons



5%
15.000 tons

- Succhi
 - Snack
 - Mousse
 - Aceto di mele
- ... and in the next future other innovative food products ?





- OUR GOAL

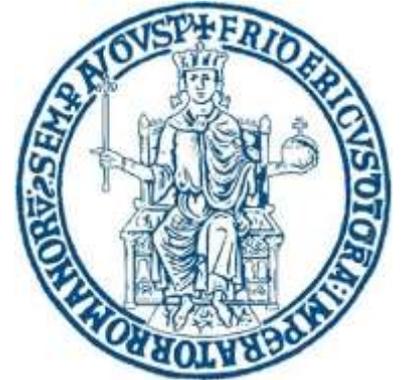
The Golden Delicious PDO apple serves as a case study to examine how bioactive compounds, apple derived vesicles, extracted through innovative green processes, contribute to health and well-being.



In this project, the Consorzio Melinda, which represents the apple producers, provides the raw materials and extracts, while UNIFE and Maria Cecilia Hospital-Gruppo Villa Maria evaluates the biological properties, and UNINA analyzes their chemical composition and metabolite profiling.



Maria Cecilia Hospital
Cotignola

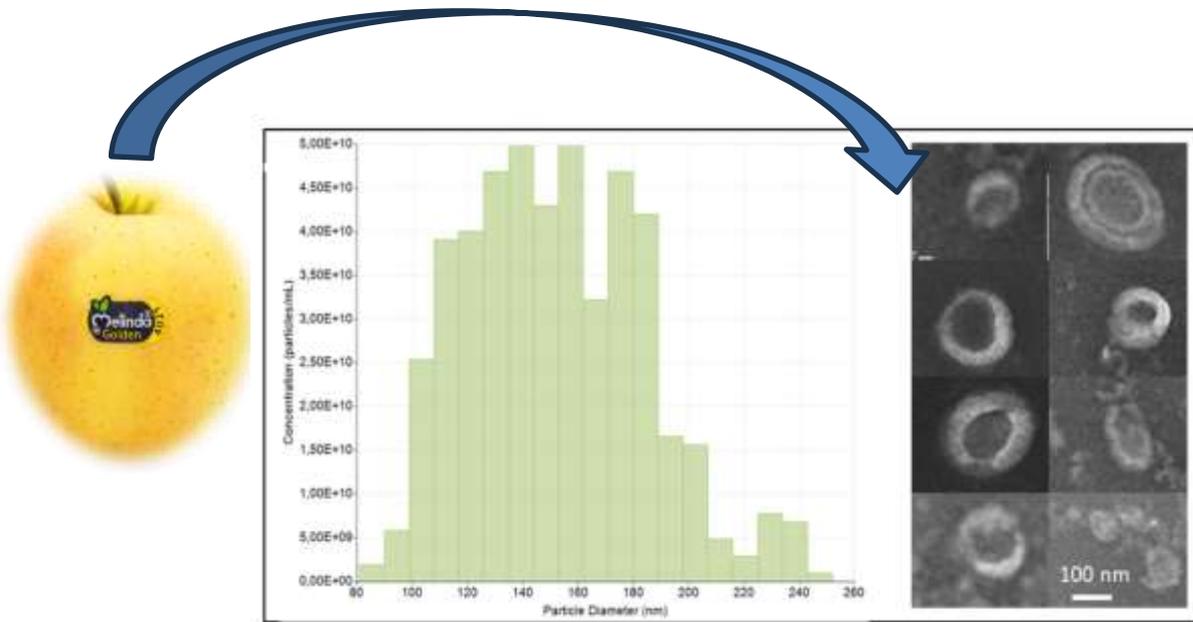


Plant-derived extracellular vesicles are lipid bilayer vesicles with protein receptors on the outside that determine:

- **the sender** (cells from the source)
- **the recipient** (cell designated to receive them)



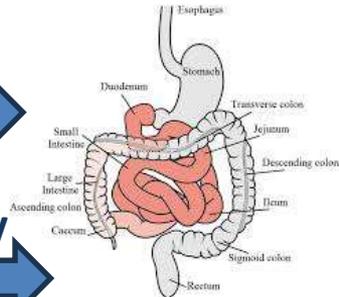
high information content, mainly consisting of miRNA instructions to change the biological behavior of the receiving cell



PDNVs carry:
small RNAs – miRNA,
messenger RNAs,
cytosolic proteins,
Vitamin precursors

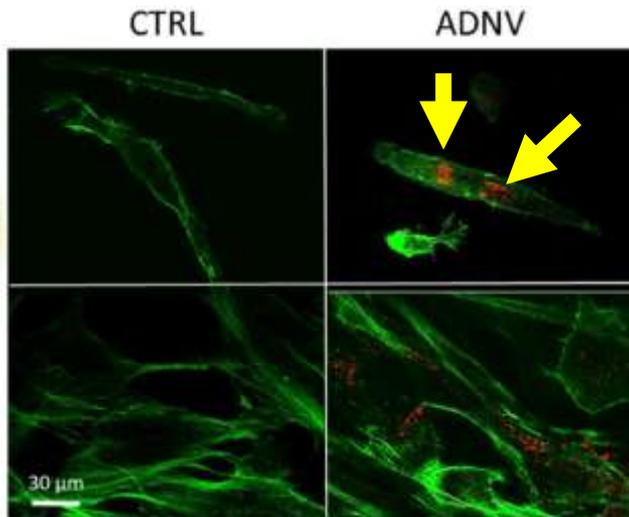
the vesicles are stable in →

Are absorbed by →





FU

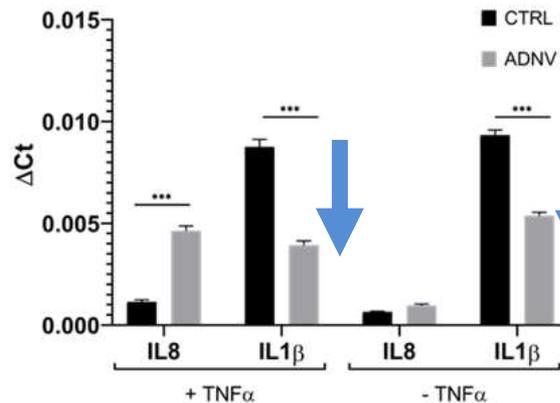
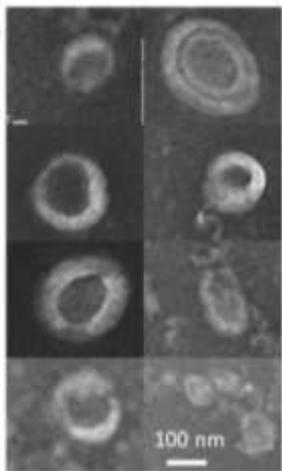


ADNVs stained with fluorescent dye (in red) have been absorbed by THP-1 derived macrophages and fibroblasts (FU) stained in green



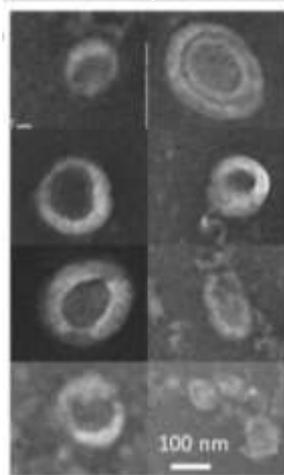
An Apple a Day Keeps the Doctor Away: Potential Role of miRNA 146 on Macrophages Treated with Exosomes Derived from Apples

Martina Trentini^{1,2}, Federica Zanotti³, Elena Tiarago³, Franческа Camposopora³, Margherita Doganetti³, Danilo Licastro³, Luca Lovati² and Barbara Zavan^{1,2*}



IL-1b is a potent pro-inflammatory cytokine, which stimulates:

- prostaglandin synthesis
- neutrophil activation
- cytokines productions



ELSEVIER

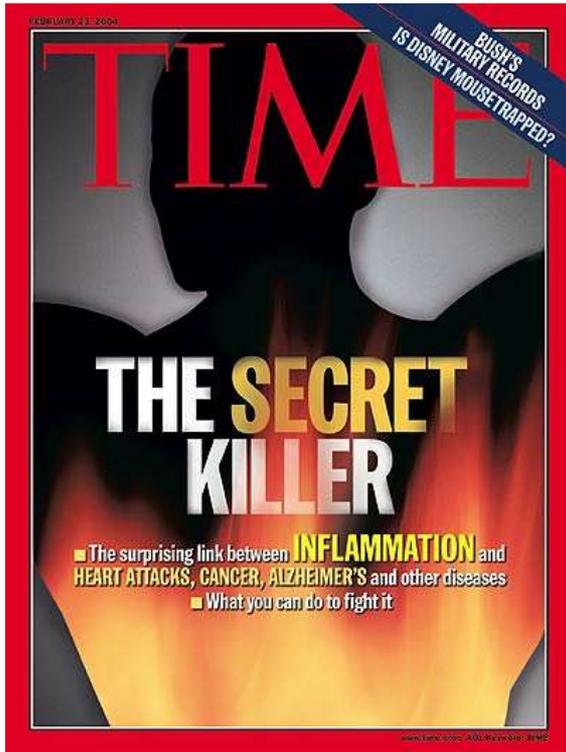


Apple vesicles: Revolutionary gut microbiota treatment for Inflammatory Bowel Disease



Article

Apple Derived Exosomes Improve Collagen Type I Production and Decrease MMPs during Aging of the Skin through Downregulation of the NF- κ B Pathway as Mode of Action

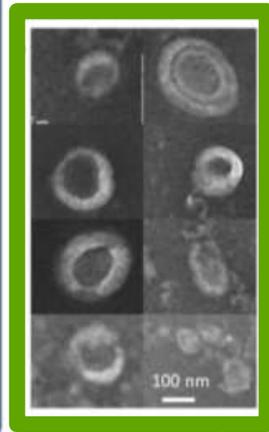


 *cells*  **2024**

Inflammation: The Cause of All Diseases

chronic tissue damage
development of chronic diseases:

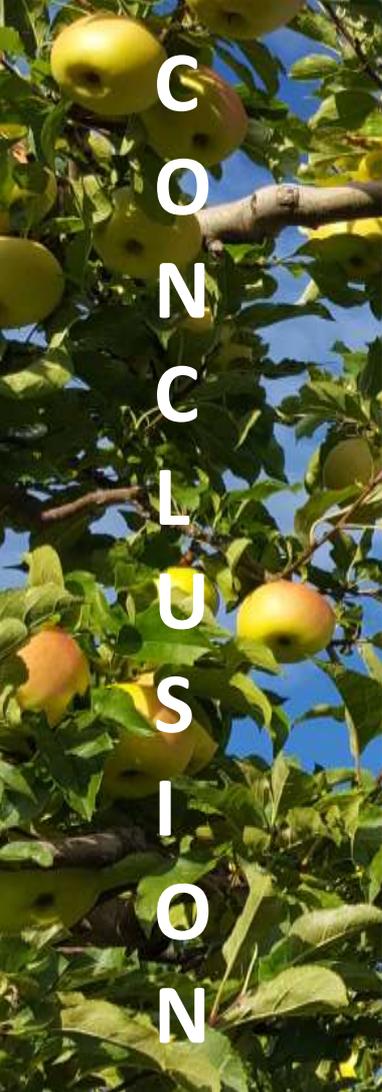
- type-2 diabetes
- cancer
- chronic obstructive pulmonary disease
- cardiovascular diseases
-



Feb. 23, 2004

2025

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- **Sustainability:** “meeting the needs of the present without compromising the ability of future generations to meet their own needs”
- **Circular bioeconomy:** “the production of renewable biological resources and the conversion of these resources and waste streams into value-added products.”

PROJECT: **Apple-derived vesicles**, obtained from by-products of the **Golden Delicious PDO apple**, are being developed in a **circular bioeconomy**, with **collaborative research efforts** between industry, private research organizations, and academia driving innovations



a model for how tradition and modernity can coexist, offering a sustainable path for



primary production systems



food manufacturing industry



market and consumers

- An HISTORY OF COOPERATION



- THANK YOU FOR THE ATTENTION

