



Tomatoes, lycopene and cardiovascular diseases.
LYCOCARD project

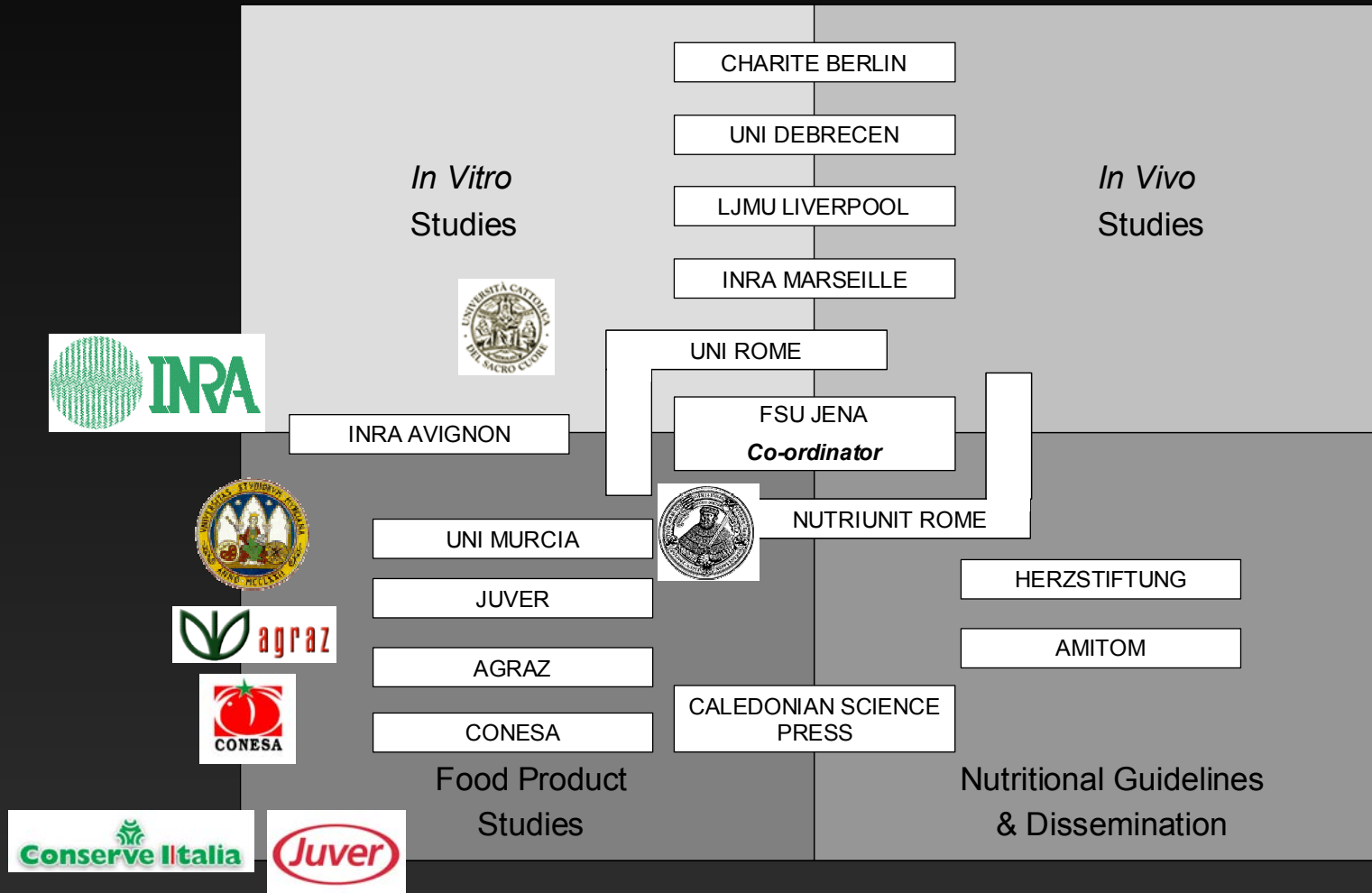
FOOD PRODUCT STUDIES

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LYCOCARD's partner tasks





LYCOCARD®



5-6% dry matter

Chemical composition

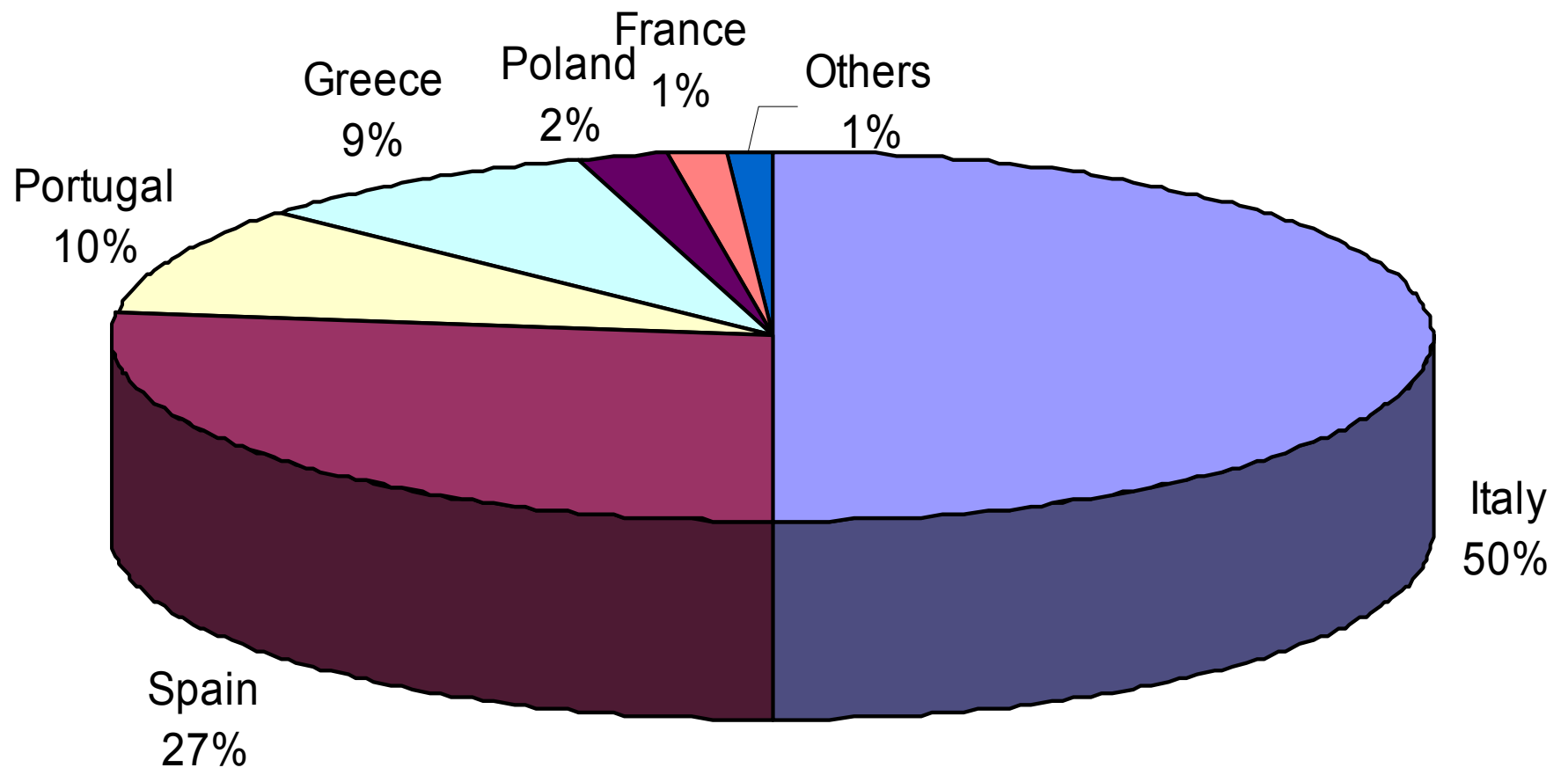
- ✓ Carbohydrates= 4%
- ✓ Protein= 0.5-1%
- ✓ Lipids= trazas
- ✓ Ash= 0.3%
- ✓ Vitamin A and E
- ✓ Vitamin C
- ✓ Vitamins B₁, B₂ and niacin
- ✓ Folate (vitamin B₉)
- ✓ Phenolic compounds
- ✓ Carotenoids (lycopene)



**Total EU 25
(fresh + processed)
16.376 million tonnes**



Volume of tomatoes processed in the EU (2005/2006)





LYCOCARD®



SIXTH
FRAMEWORK
PROGRAMME

**INDUSTRIAL
PROCESSING**

**INCREASE
BIOACTIVE
COMPOUNDS
AVAILABILITY**



Tomato and tomato products and cardiovascular diseases

- Lycopene
- Phenolic compounds
- Vitamin C
- Folate



ANTIOXIDANT ACTIVITY
Prevention of oxidative stress

NO ANTIOXIDANT EFFECT
Modulation of cholesterol and homocysteine metabolism
Regulation of the endothelial function

Main tasks of Food Product Studies



- **Selection and testing of tomato varieties** with high contents of lycopene and other of bioactive components, evaluating their antioxidant activity and their bioaccessibility and bioavailability.
- **Evaluate the effect of processing technologies, packaging and storage** on *isomerization* of lycopene and in the content of bioactive compounds of tomato-based products, in order to enhance the content of bioactive compounds and to increase the bioavailability.
- **Design and development tomato products** with the enough scientific information to produce and introduce into the market new tomato-based products with health-related impact on the prevention of cardiovascular diseases.
- **To enhance opportunities for SMEs and strengthen European competitiveness in the food industry**



WP 24 To 30



Which main factors determine the lycopene content and other bioactive compounds such as phenolic compounds, vitamin C and folates?

Several tomato cultivar used in the industry have been selected

- Preliminary results
- All-trans-lycopene increased according to the maturity stage. As increase lycopene content, also increase the isomerization percentage, ranging between 3 and 10%.
- In general, total phenolic compounds, vitamin C and folates increase from green to pink stage and decreased from pink to red stage.



How can tomatoes be handled in the field and post-harvest to improve the content of lycopene and other bioactive compounds?

Agronomical conditions of the different cultivars is being registered every year, to determine the effect of the different conditions used during growing.

To determine the post-harvest conditions during the second year are considered the following parameters:

- Uv light exposition**
- off-vine maturation**
- storage with lightness o darkness**



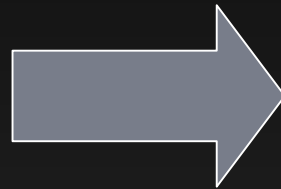


What is the contribution of the different antioxidant compounds to the antioxidant activity of tomatoes, considering the lipophilic and hydrophilic activity?

Lycopene
Phenolic compounds
Vitamin C

Folate

 **Preliminary results**




TAA activity

ABTS method

Carotene-linoleic acid system

FRAP method

Cell cultures

 The hydrophilic antioxidant activity increase from green to pink tomatoes and decreased from pink to red, showing a correlation with hydrophilic bioactive compounds (vitamin C and phenolic compounds).

 However lycopene exhibit a low antioxidant activity when it is evaluated with the ABTS or FRAP methods



How does industrial processing and storage affect the total content of lycopene as well as the antioxidant compounds and lycopene isomerization?

Homogenization
Pasterization
Concentration
Esterilization
Drying

Shelf Life Test
Storage at different
temperatures
during 12 months

Effect on the content of lycopene, *cis*-isomers,
phenolic compounds, vitamin C and folates



How does industrial processing and storage affect the total content of lycopene as well as the antioxidant compounds and lycopene isomerization?



Industrial processing

– Pasterization, homogenization and concentration



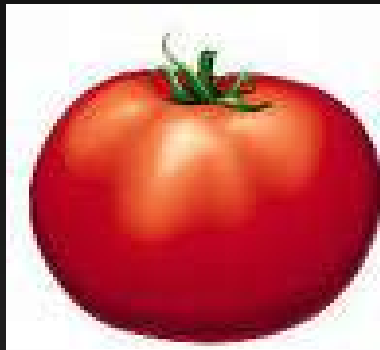
Preliminary results

– The time and temperature conditions used in the industrial processing of tomato to obtain juice, passata and paste products do not increase the percentage of cis-isomers of lycopene.



LYCOCARD®

What happens during gastric and intestinal digestion of tomatoes and tomato products?



*All-trans
lycopene*

Isomerization

Processing
Gut
Enterocyte
Other tissues

*Cis-isomers
of lycopene*





Could a functional tomato product with a tested effect in the prevention of cardiovascular disease be developed?

In Vitro Studies

In Vivo Studies

Food Products Studies



Scientific information



FUNCTIONAL TOMATO PRODUCT



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www.lycocard.com

Thank you for your attention !