



EFFECT OF SELECTED FOOD AND MEDICAL PLANTS AND PLANT MOLECULES ON OVARIAN FUNCTIONS

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Food



Supply with energy (calories)

Supply with structural elements (proteins, lipids, carbohydrates)

Supply with regulatory molecules (antioxidants, phytohormones etc.)



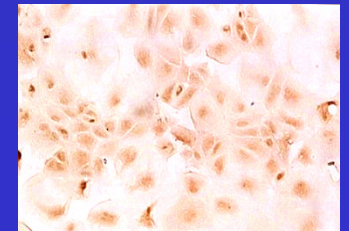
Hormones



Intracellular regulators of cell proliferation, apoptosis, differentiation



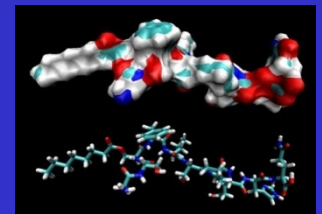
Physiological state and health



FOOD REGULATORY MOLECULES AND REPRODUCTION:



- can food plants affect reproductive functions?
- what can be endocrine and intracellular mechanisms of such action?
- what for plant molecules are responsible for their action?
- can some food plants jeopardize or improve reproduction?



AIMS OF THE STUDY: to examine

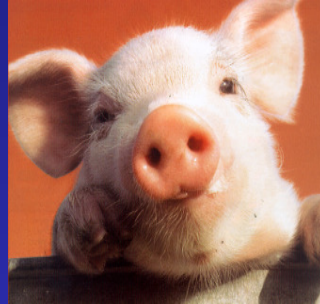


- **the effect of some food plants** (curcuma/turmeric, green tea, rooibos, ginkgo, flaxseed, yucca) **and their components - phytoestrogens and antioxidants** (resveratrol, quercetin, daidzein, diosgenin) **on ovarian cell functions**
- **mechanisms of action:** whether these additives work through changes in hormones release, cell proliferation, apoptosis or response to hormonal stimulators
- **application** of some plants to improve reproduction

MATERIAL & METHODS

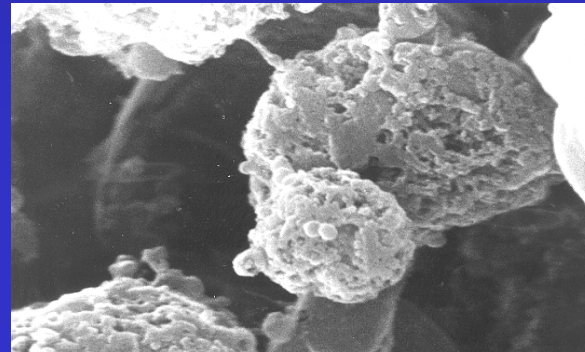
A. Species:

- pigs
- rabbits



B. Objects:

- living animals
- ovarian granulosa cells



MATERIAL & METHODS

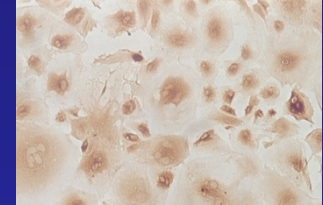
C. Manipulations:



Animals



Cells



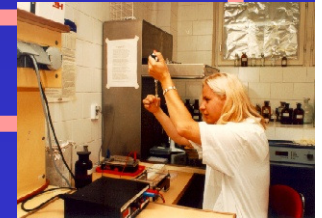
Treatments with:

- **plant extracts** (curcumin, green tea, rooibos, ginkgo, flaxseed, yucca)
- **plant molecules** (resveratrol, quercetin, daidzein, diosgenin)
- **hormones** (FSH, IGF-I) + **plants and plant molecules**



Analysis:

reproduction, proliferation, apoptosis, hormones release (RIA, Western, immunocytochemistry, RT-PCR a.o.)

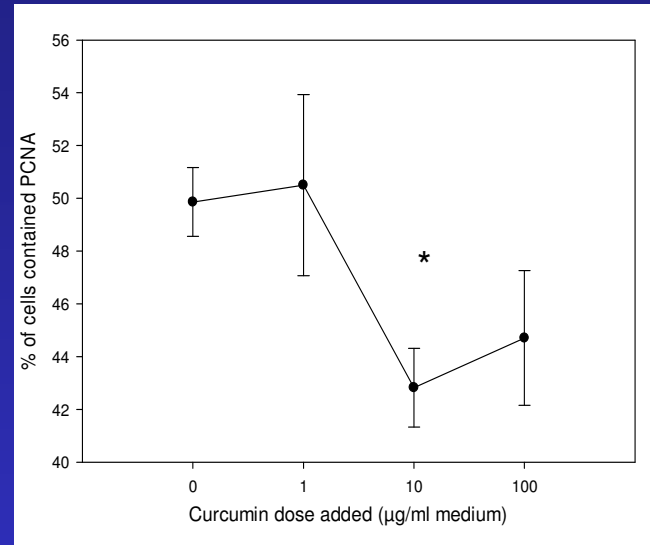




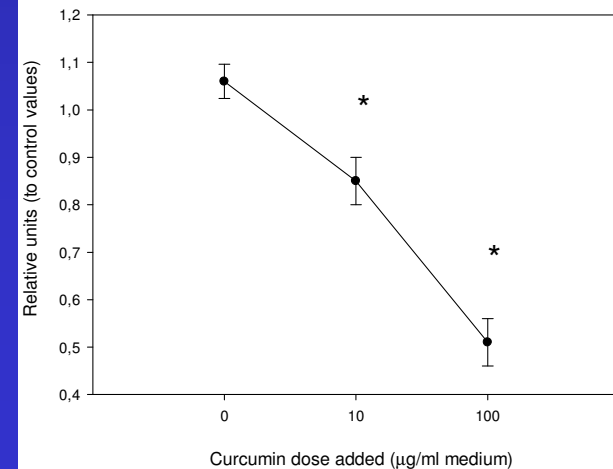
CAN FOOD PLANTS (curcumin, green tea, rooibos, flaxseed, ginkgo, yucca etc.) DIRECTLY AFFECT OVARIAN CELL FUNCTIONS?

Curcumin reduces ovarian cell proliferation:

- accumulation of PCNA

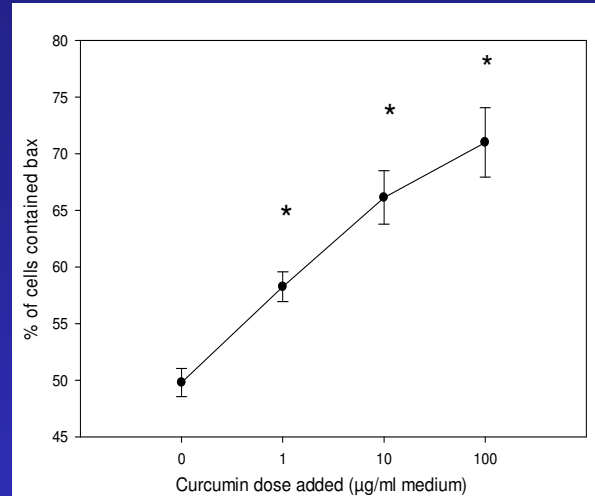


- accumulation of PCNA mRNA

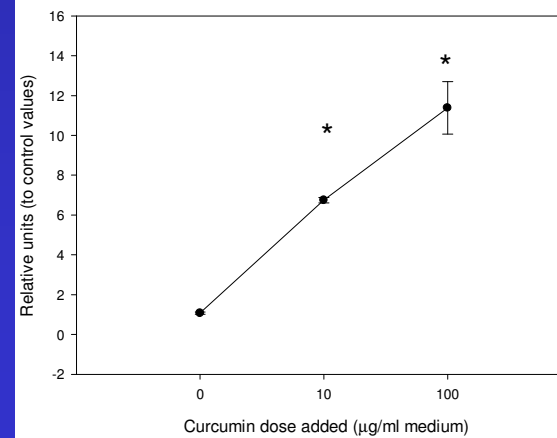


Curcumin promotes ovarian cell apoptosis:

- accumulation of bax

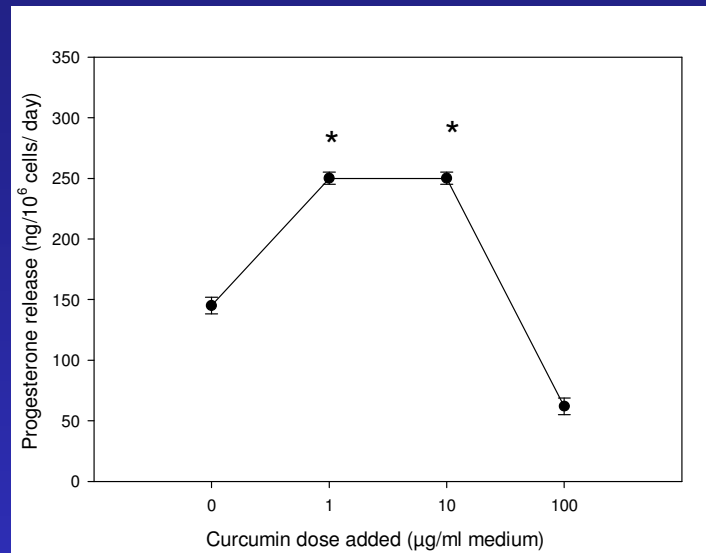


- accumulation of bax mRNA

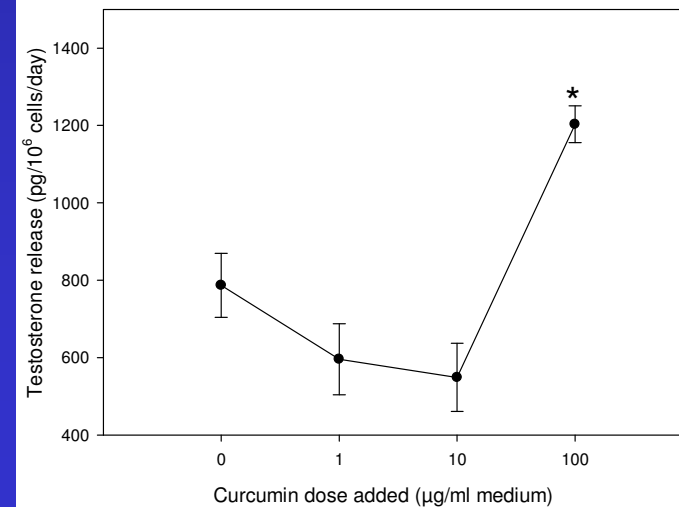


Curcumin promotes the release of hormones:

- progesterone



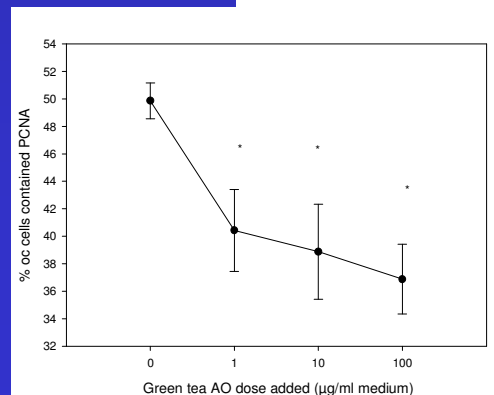
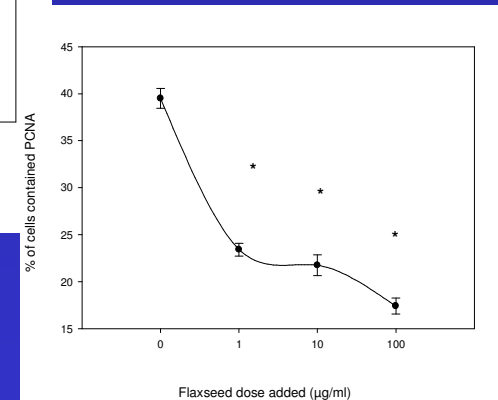
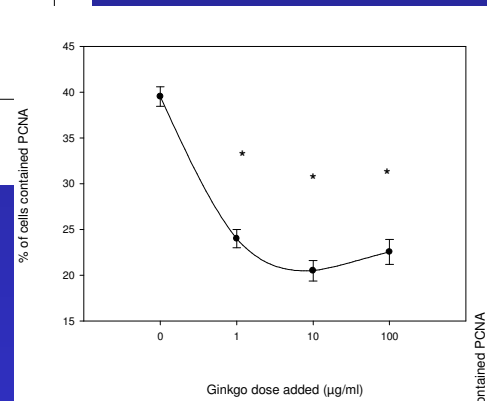
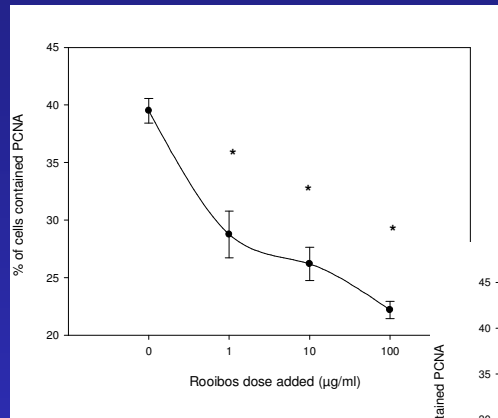
- testosterone



Ovarian cell proliferation (accumulation of PCNA)

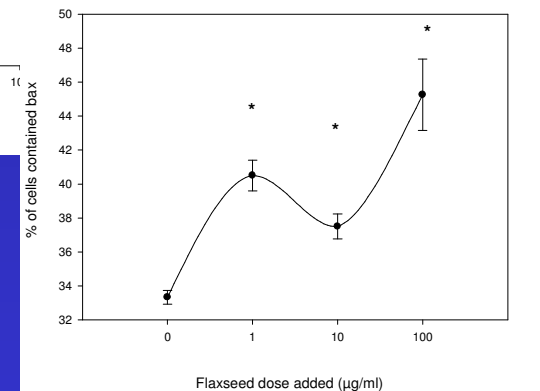
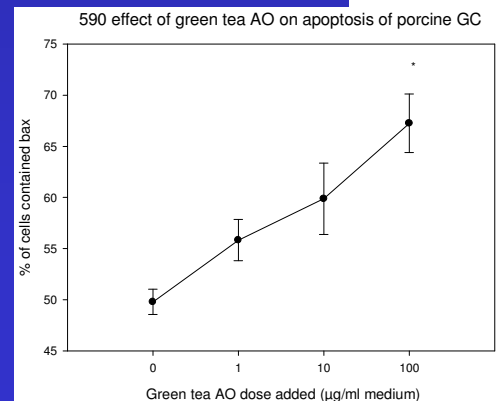
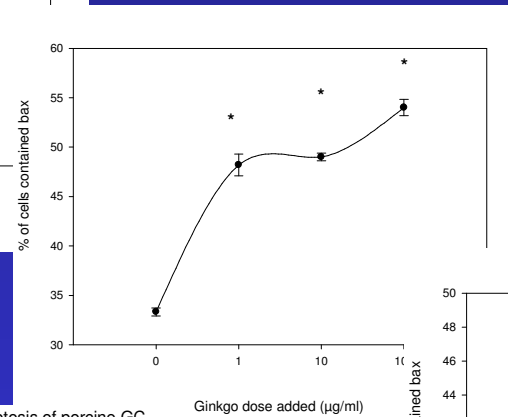
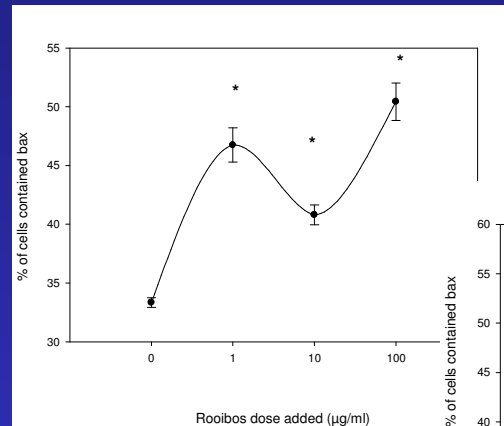
is inhibited with:

- rooibos
- ginkgo
- flaxseed
- green tea



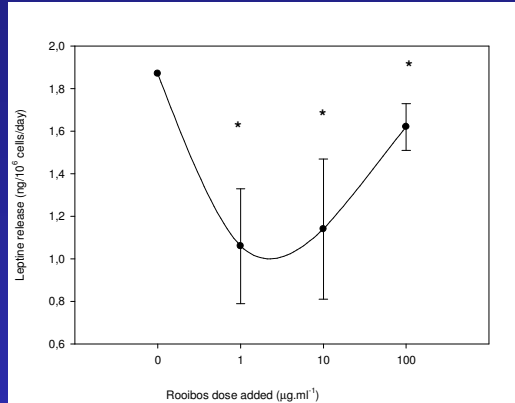
Ovarian cell apoptosis (accumulation of bax) is promoted with:

- rooibos
- ginkgo
- flaxseed
- green tea

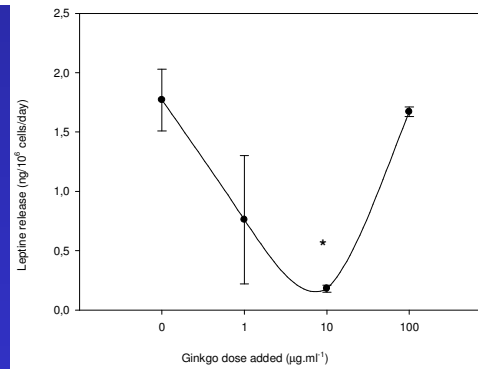


Ovarian cell leptin release is inhibited with:

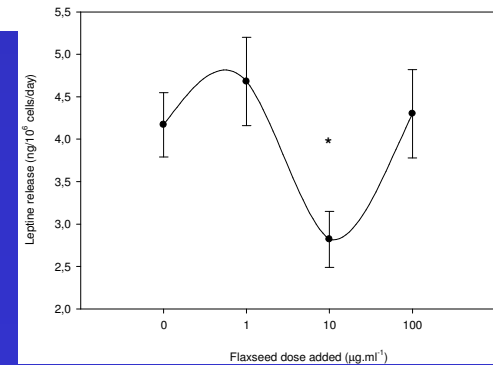
- rooibos



- ginkgo



- flaxseed

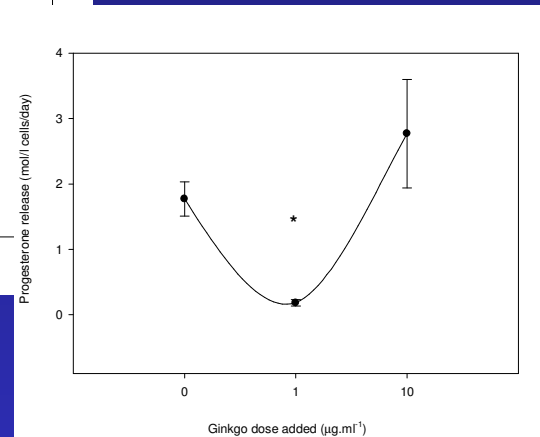
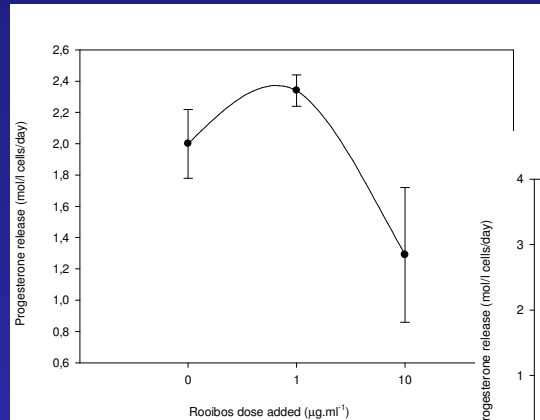


Ovarian cell progesterone release

is inhibited with:

- rooibos

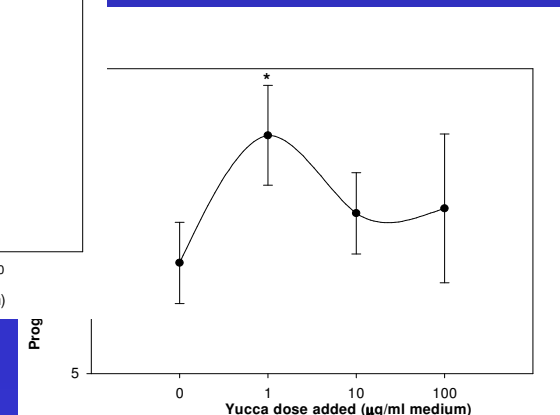
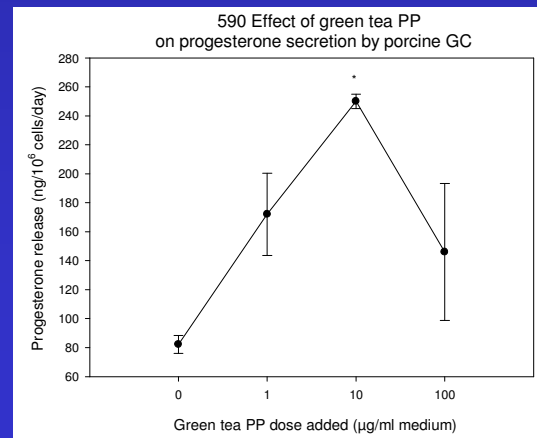
- ginkgo

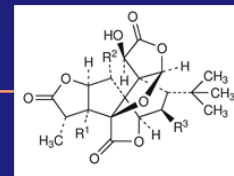


is stimulated with:

- green tea

- yucca





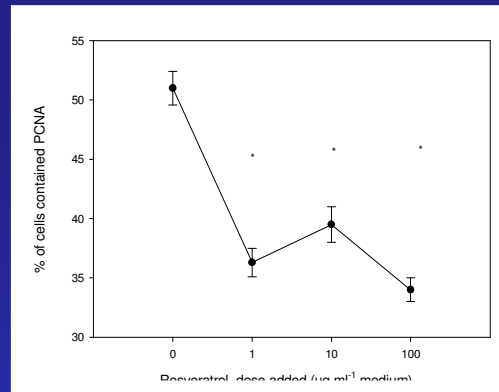
FOOD PLANTS CONTAIN PHYTOESTROGENS AND ANTIOXIDANTS - resveratrol, quercetin, diosgenin, daidzein.

CAN THE PLANT ACTION BE EXPLAINED BY THE PRESENCE OF THESE MOLECULES?

DO PLANT EXTRACTS AND PLANT MOLECULES HAVE SIMILAR ACTION?

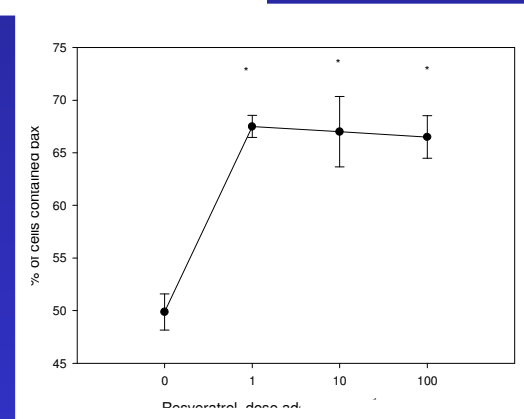
Resveratrol

- inhibits proliferation
(accumulation of PCNA)

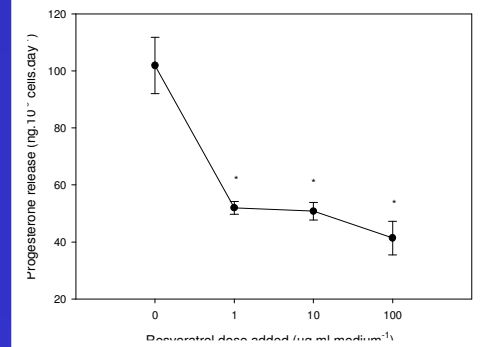


0ng/ml 100ng/ml 1000ng/ml

- promotes apoptosis
(accumulation of bax)

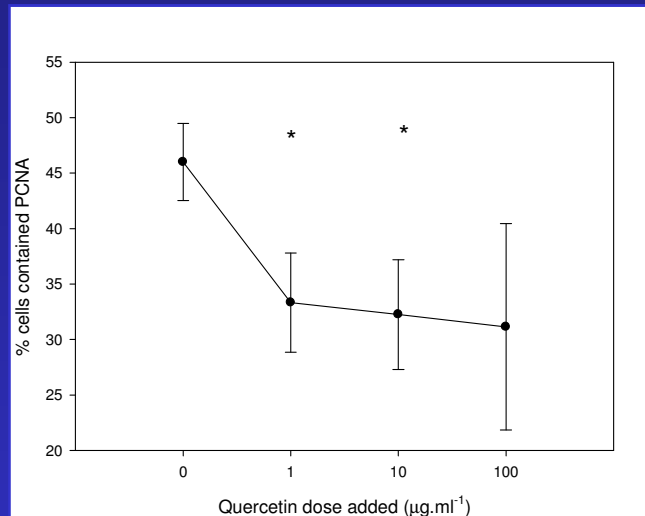


- Inhibits release
of progesterone

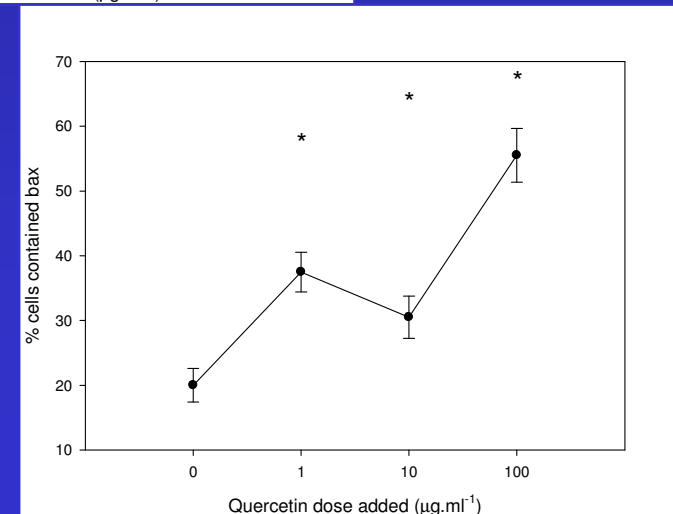


Quercetin

- inhibits proliferation
(accumulation of PCNA)

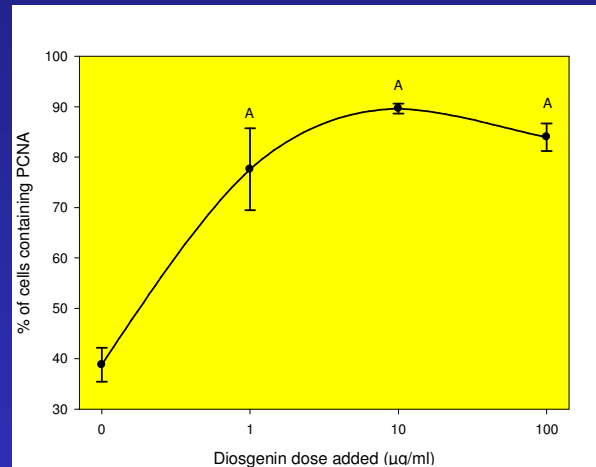


- promotes apoptosis
(accumulation of bax)

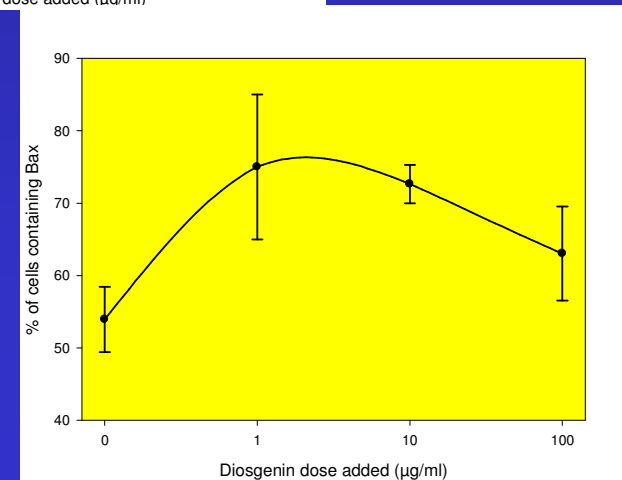


Diosgenin :

- promotes proliferation
(accumulation of PCNA)

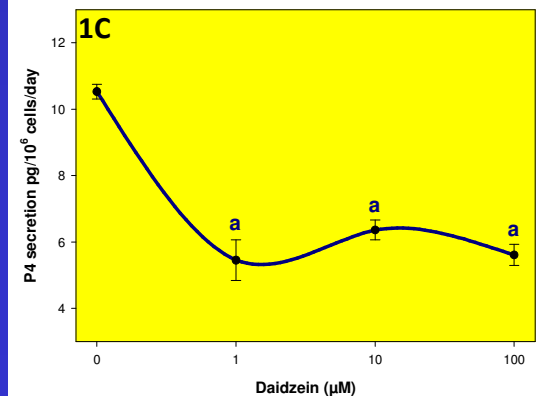
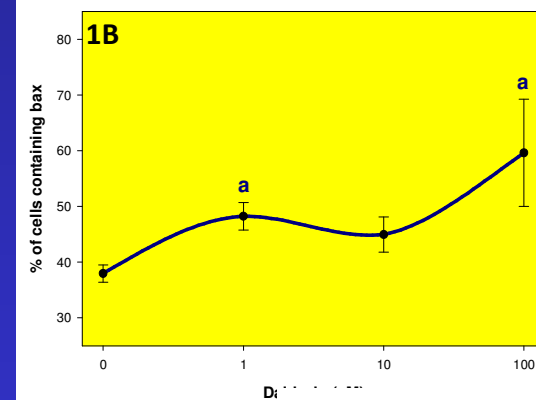
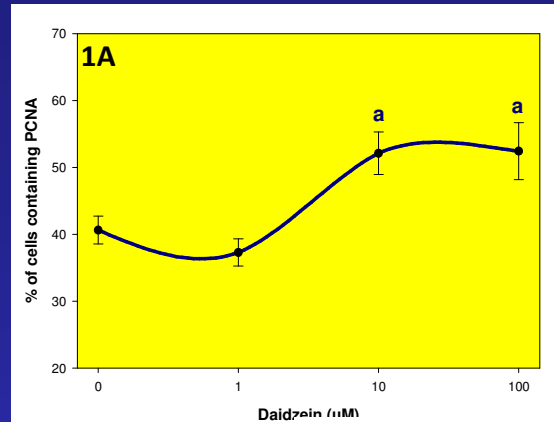


- promotes apoptosis
(accumulation of bax)



Daidzein :

- promotes proliferation
(accumulation of PCNA)
- promotes apoptosis
(accumulation of bax)
- Inhibits release
of progesterone





**CAN PLANTS AND PLANT MOLECULES AFFECT
OVARIAN RESPONSE TO HORMONAL
STIMULATORS?**

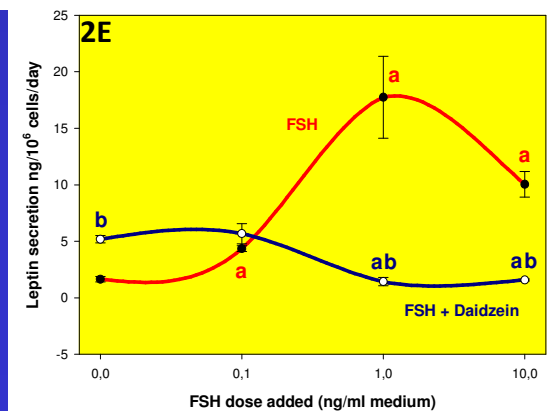
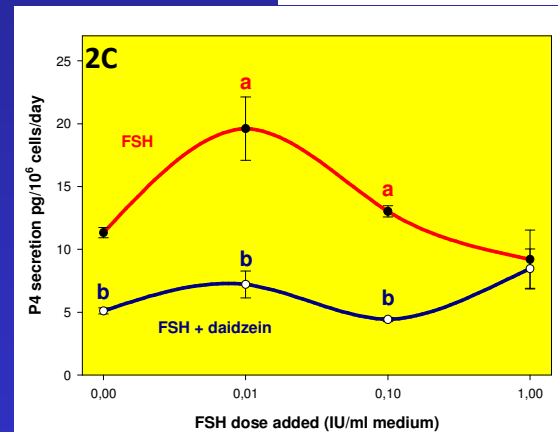
Daidzein blocks the stimulatory effect of FSH on :

- proliferation
(accumulation of PCNA)
- release of progesterone
- release of leptin

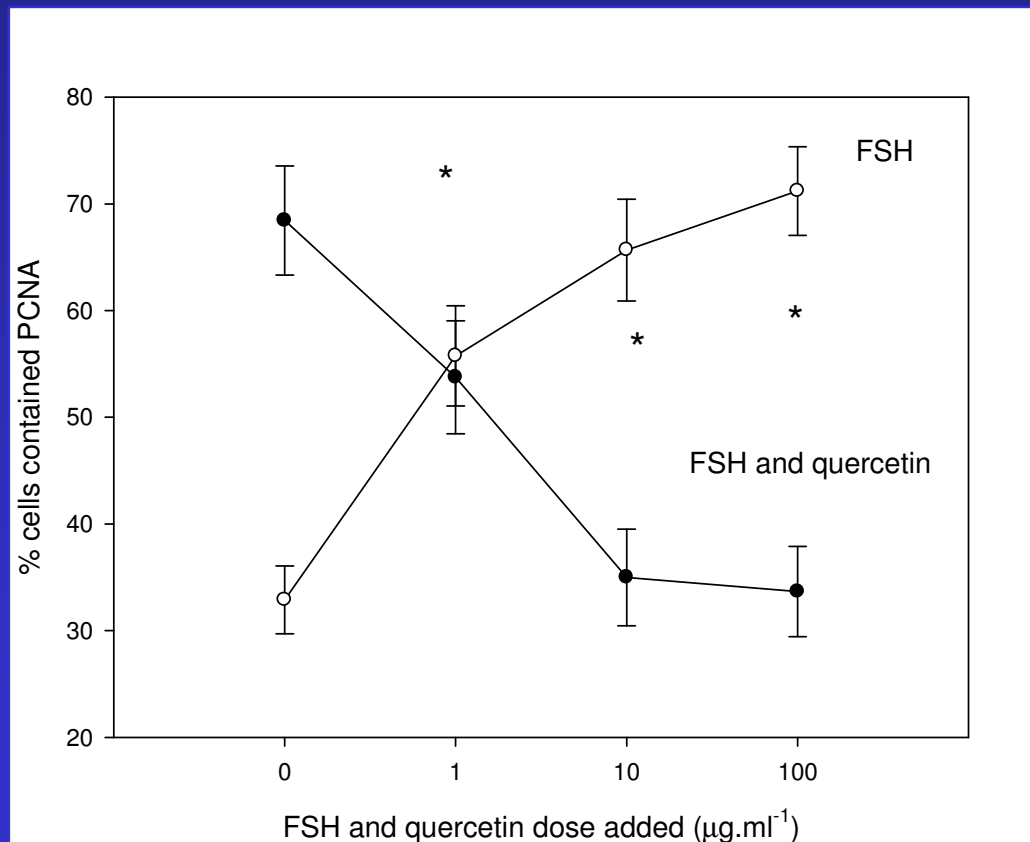
PCNA
36 kDa



0 0,01 0,1 1 0 0,01 0,1 1
FSH dose added (IU/ml) FSH dose added (IU/ml)
+ daidzein (50 μM)

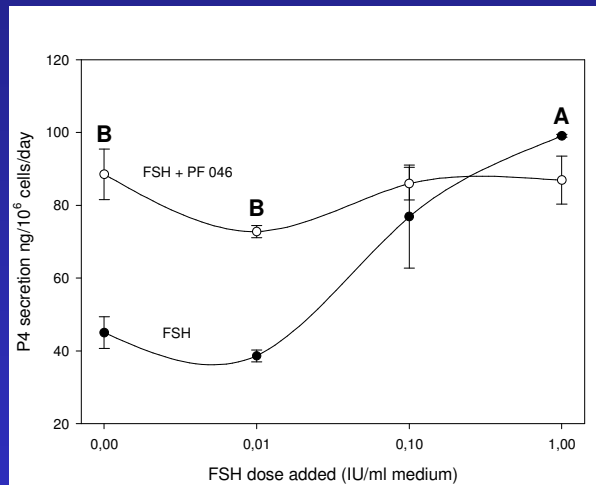


Quercetin blocks the stimulatory action of FSH on ovarian cell proliferation (accumulation of PCNA)

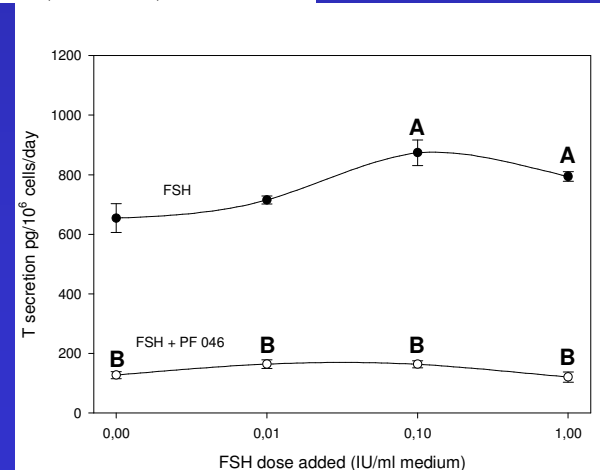


Resveratrol blocks the stimulatory effect of FSH on the release of:

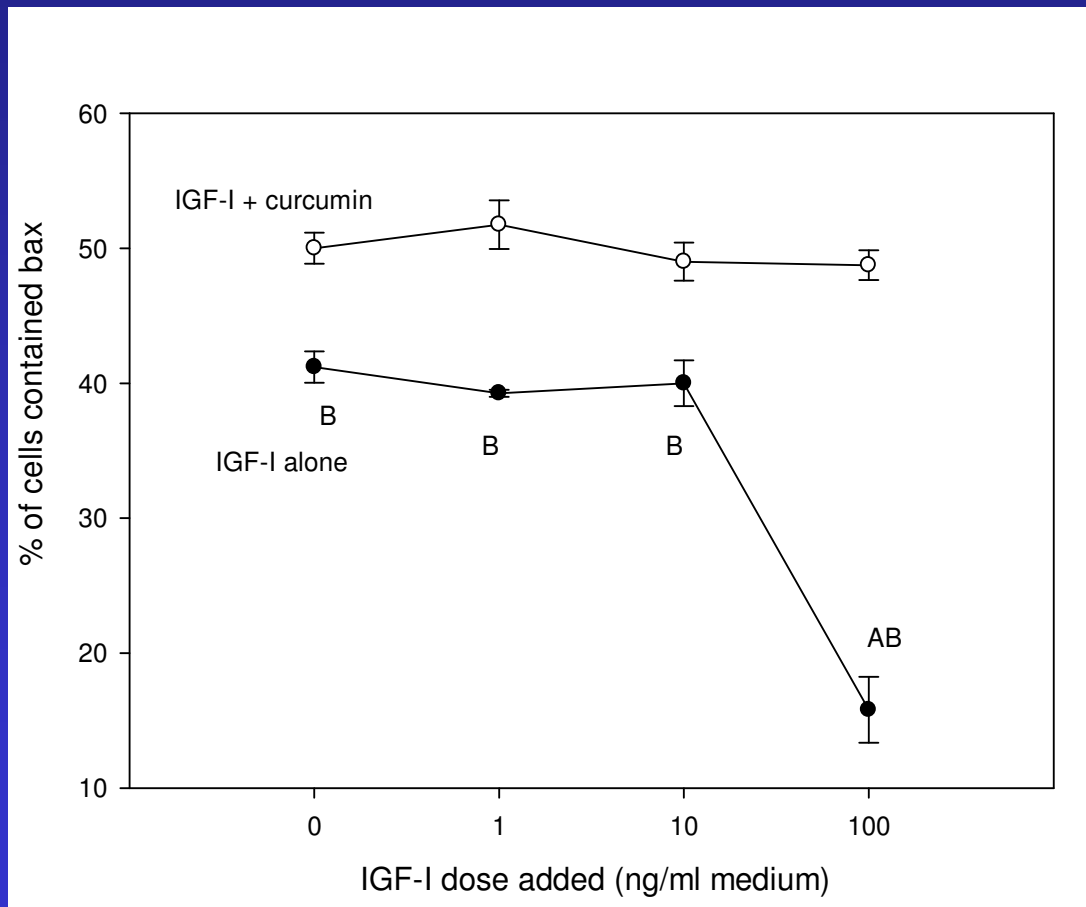
- progesterone



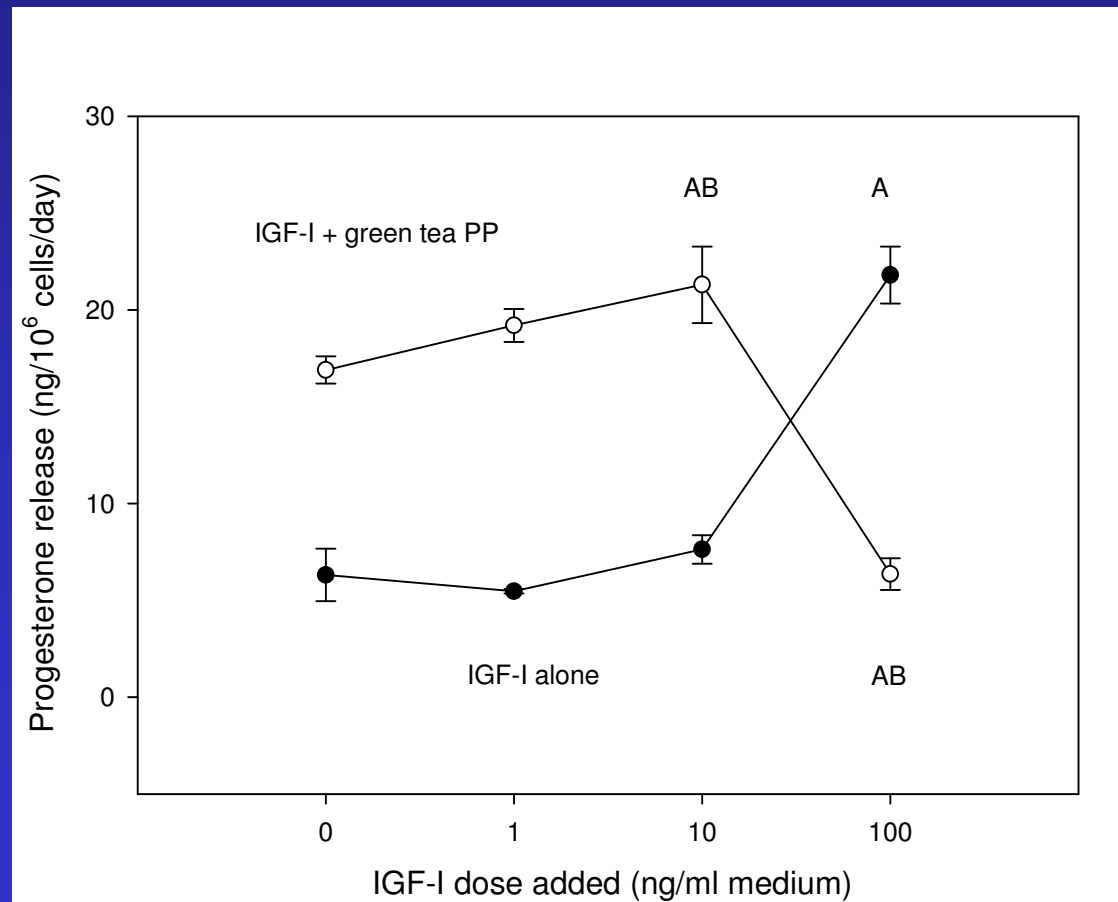
- testosterone



Curcumin blocks the anti-apoptotic effect of IGF-I



Green tea blocks the stimulatory effect of IGF-I on progesterone release



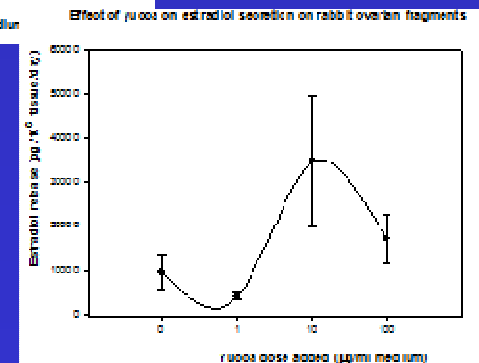
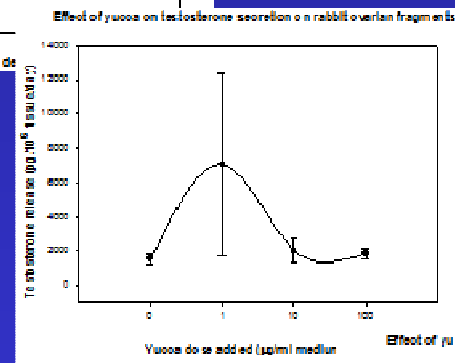
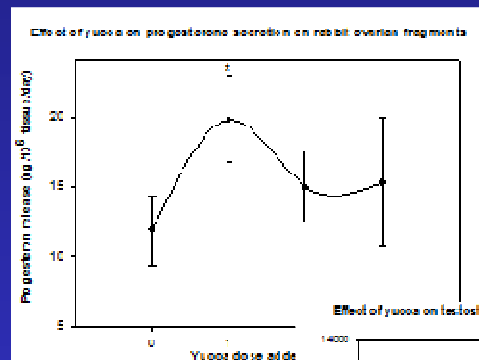
**CAN PLANT PRODUCTS BE USED FOR
IMPROVEMENT HORMONAL AND REPRODUCTIVE
STATE?**

Addition of yucca can promote hormones release by cultured rabbit ovarian tissue:

- progesterone

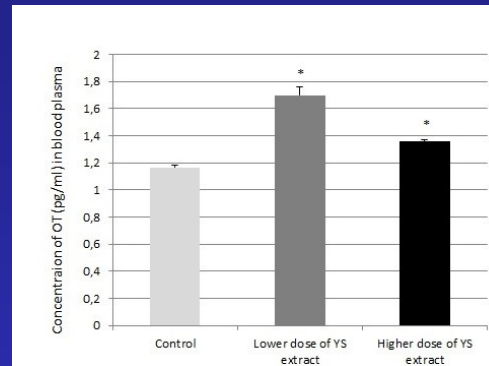
- testosterone

- estradiol

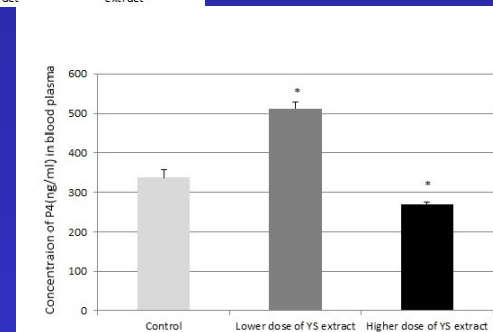


Feeding with yucca increases rabbit plasma level of

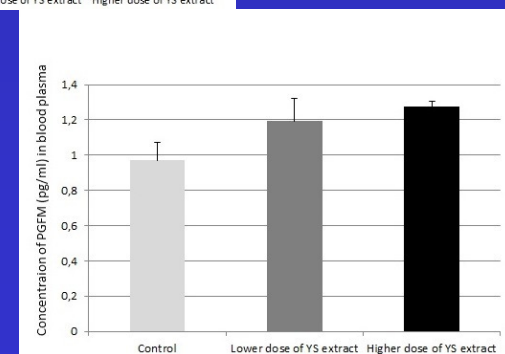
- oxytocin



- prostaglandin F

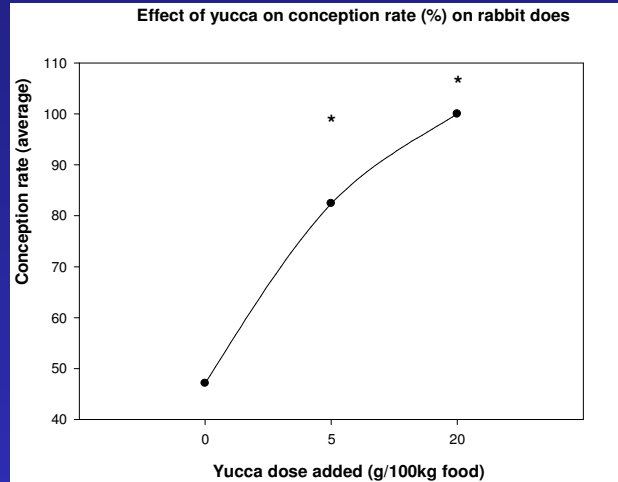


- prostaglandin E

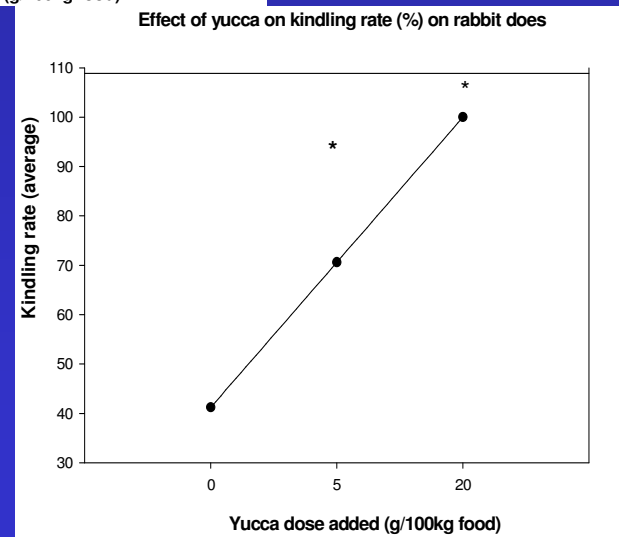


Feeding with yucca increases rabbit

- conception rate



- kindling rate



CONCLUSIONS:



1. Food plants curcuma/turmeric, green tea, rooibos, ginkgo, flaxseed can directly suppress ovarian cell functions via

- inhibition of proliferation,**
- promotion of apoptosis,**
- change in steroid and peptide hormone release**
- blockage of response to upstream hormonal stimulators (FSH, IGF-I).**

CONCLUSIONS:



2. Phytoestrogens and antioxidants resveratrol and quercetin act similar to curcuma, green tea, rooibos, ginkgo and flaxseed.

Can be active component of food plants?

CONCLUSIONS:



3. Phytoestrogens and antioxidants daidzein and diosgenin have both stimulatory and inhibitory effect on ovarian cell functions:

- promote proliferation**
- promote apoptosis**
- suppress progesterone release**
- suppress the response to FSH**

Not responsible for the main food plant effect?

CONCLUSIONS:



4. Yucca promotes

- steroid and peptide hormones release both *in vivo* and *in vitro*
- fertility (conception and kindling rate).

Can be useful for improvement reproduction?

COLLABORATION

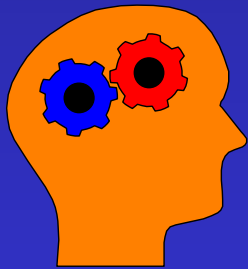
**A.Kadasi, A. Stochmalova, A. Alexa, M. Foldesiova,
A. Balazi, P. Chrenek (Slovakia)**

R. Grossmann (Germany)

J. Kotwica (Poland)



THANK YOU!



Some effects of nutrition on physiological state

Low calories diet

- delays puberty
- prolongs duration of life
- activates immune system
- prevents and inhibits

infectious diseases

depressions

metabolic disorders

reproductive disorders and infertility

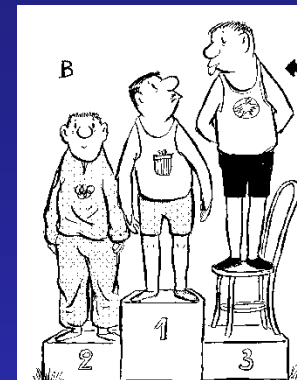
cancer



Some effects of nutrition on physiological state

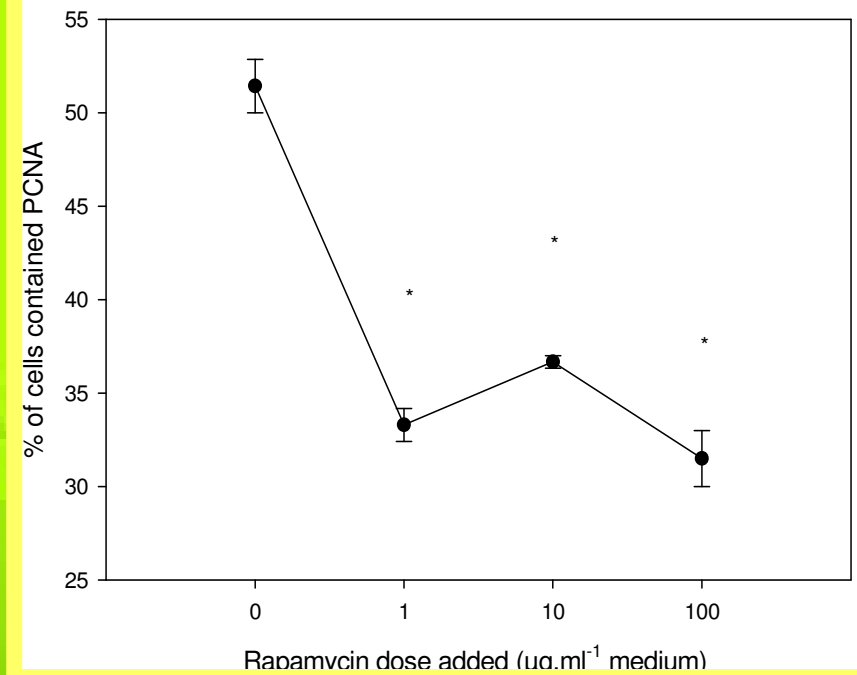
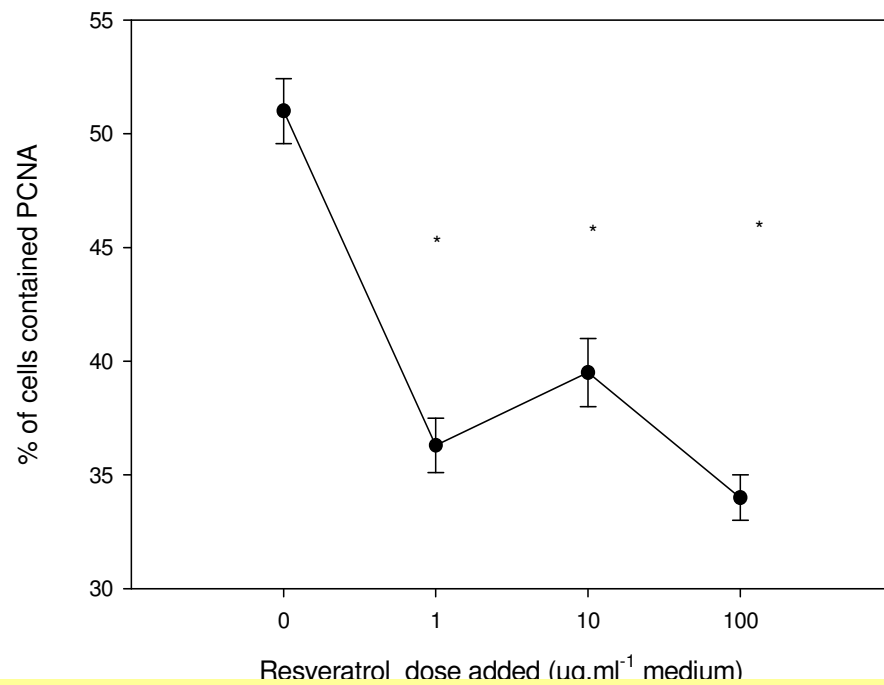
Phytoestrogens

- stimulate puberty
- Inhibit some metabolic (*osteoporosis*) and psychic (*depression, aggression*) diseases
- promote inflammation
- promote or suppress reproductive disorders (*meno- and andropause, infertility, ovulatory cycles*)
- promote or suppress cancer



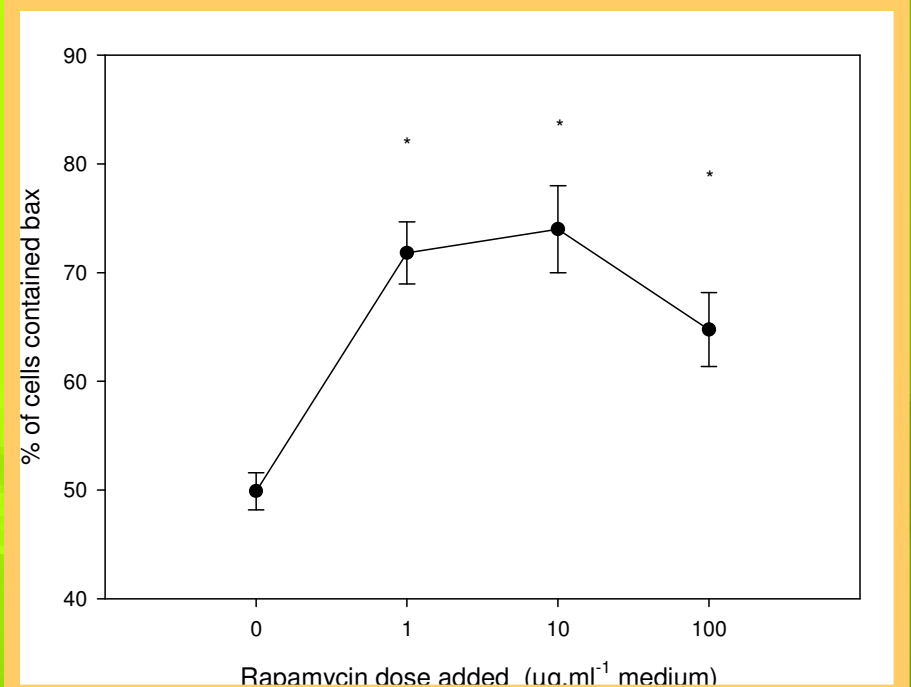
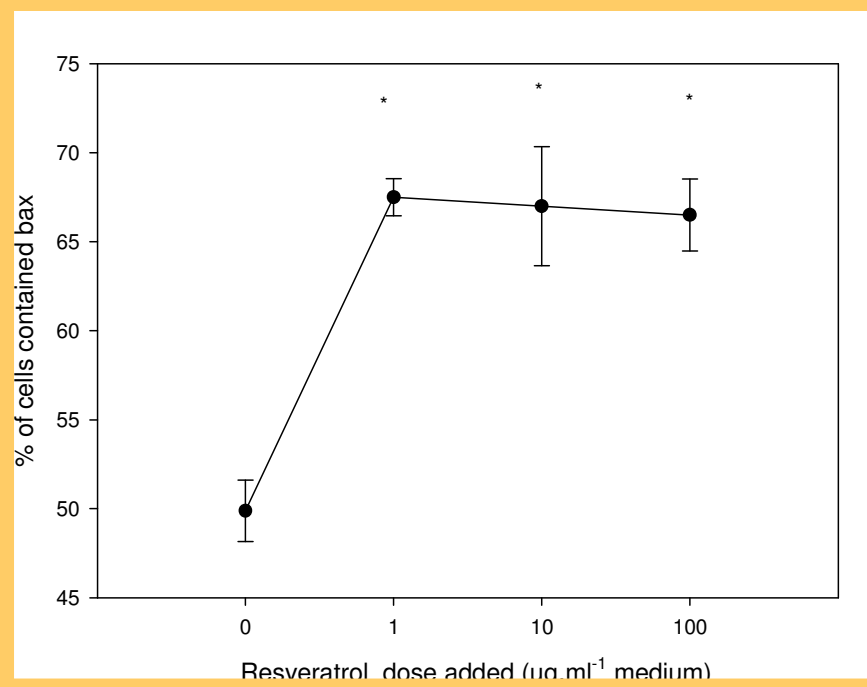
RESULTS

Inhibited effect of resveratrol and rapamycin on the expression of PCNA.



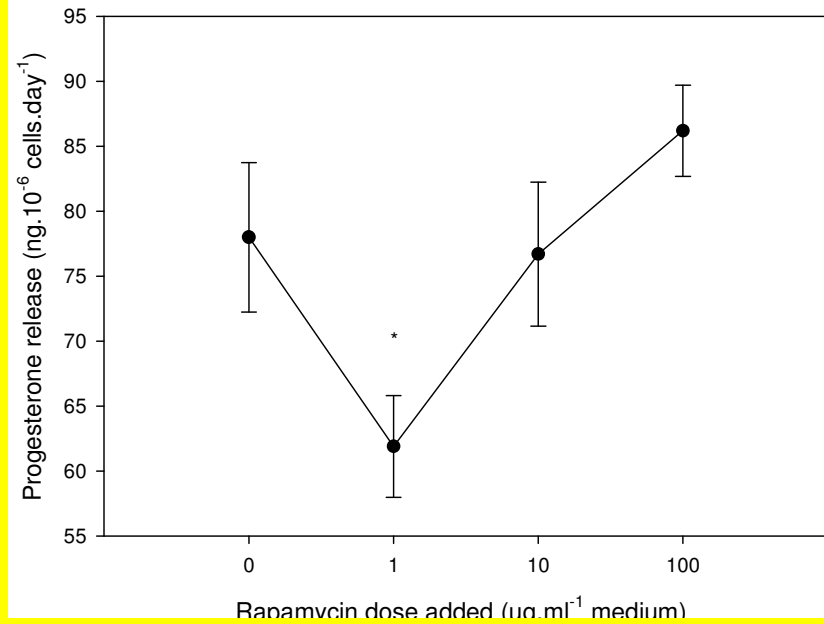
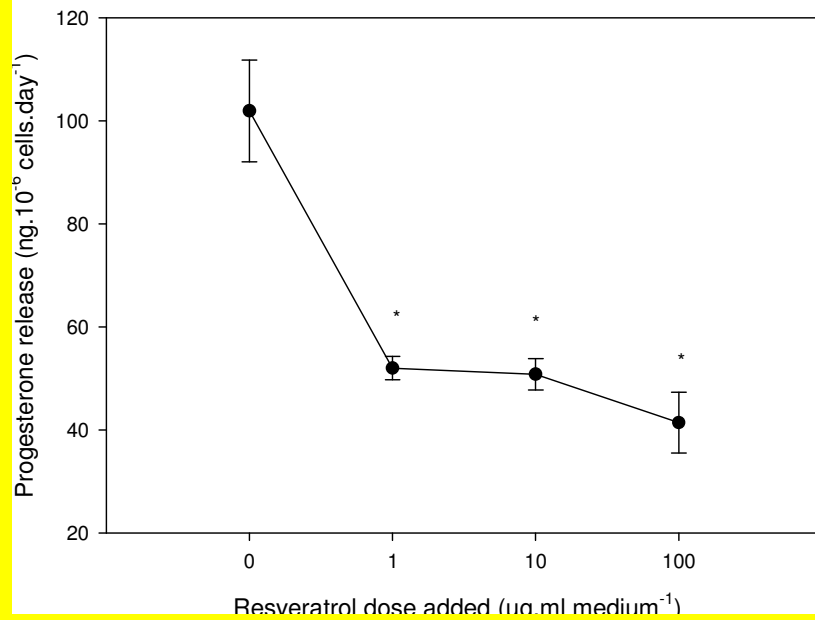
RESULTS

Stimulated effect of resveratrol and rapamycin on the expression of bax.



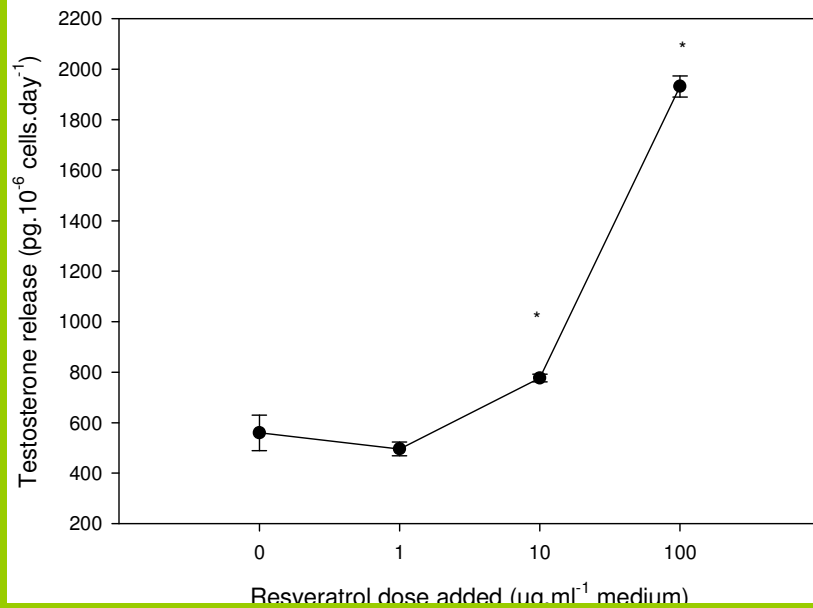
RESULTS

Inhibited effect of resveratrol and rapamycin on progesterone release.

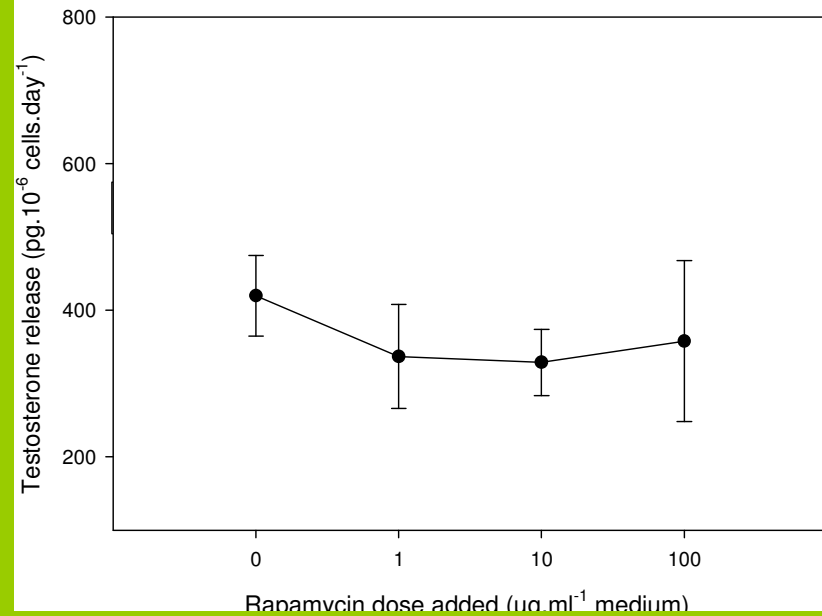


RESULTS

Stimulated effect of resveratrol on testosterone release.

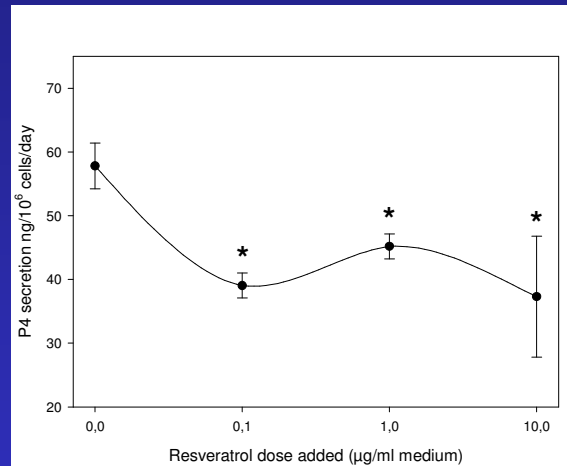


Effect of rapamycin on testosterone release was not found.

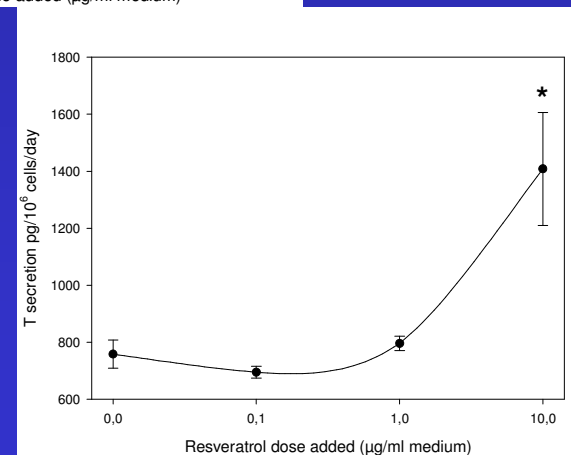


Resveratrol :

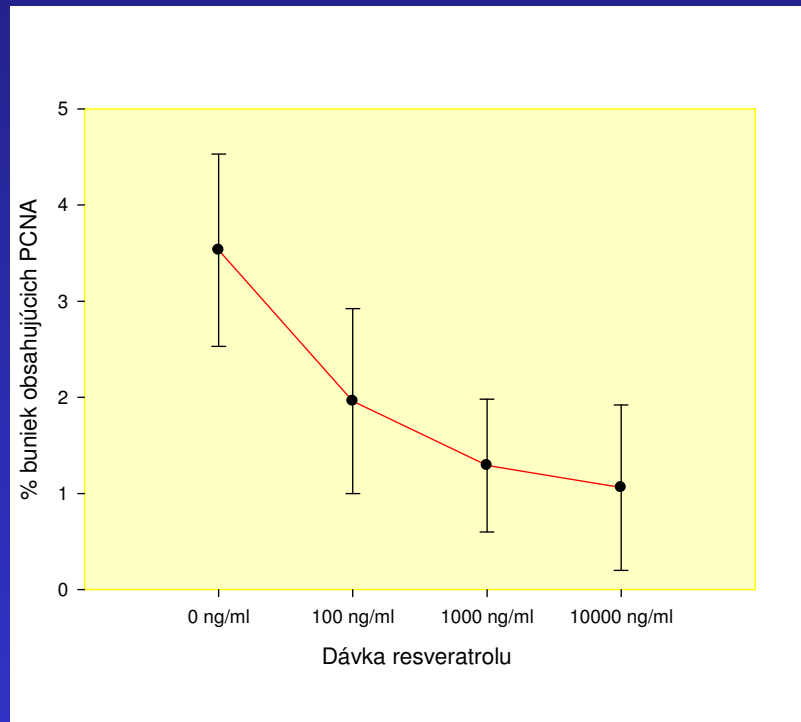
- inhibits the release of progesterone



- promotes the release of testosterone



Resveratrol inhibits proliferation (accumulation of PCNA) of ovarian cells



- 36 K

0ng/ml

100ng/ml

1000ng/ml