

**DETERMINATION OF ANTI-CANCER  
MECHANISMS OF GOSSYPETIN AND LUTEOLIN  
IN COMBINATION WITH CHEMOTHERAPEUTIC  
CYCLOPHOSPHOAMIDE ON MCF-7 HUMAN  
BREAST CANCER CELL LINES**

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## ➤ **FLAVONOIDS**

- **LUTEOLIN**

- **GOSSYPETIN**

## ➤ **CHEMOTHERAPY**

- **CYCLOPHOSPHAMIDE**

## ➤ **METHODS**

## ➤ **RESULTS**

## ➤ **REFERENCES**

# FLAVONOIDS

- Flavonoids, also called vitamin P, are phytochemicals or a sub-class of polyphenols that are found to be beneficial to human health.
- Flavonoids are ubiquitous in photosynthesising cells and are commonly found in;
  - fruits,
  - vegetables,
  - nuts,
  - seeds,
  - Stems, flowers, tea, wine, propolis and honey (*Batra et al., 2013*).

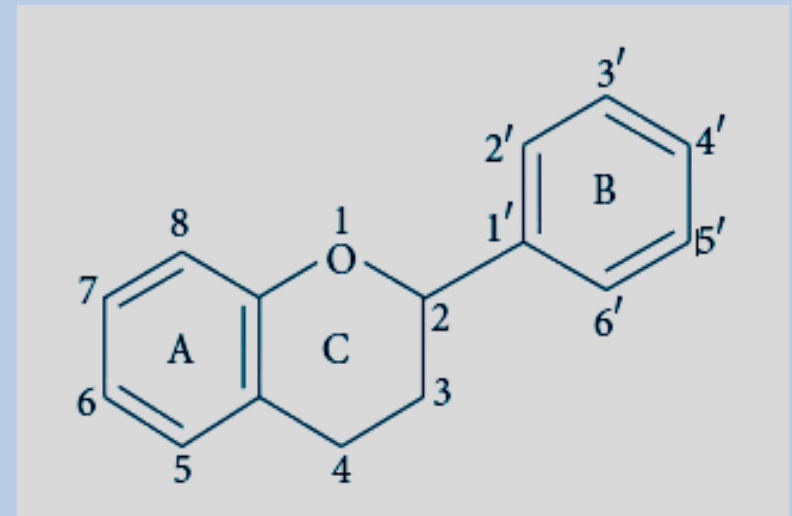
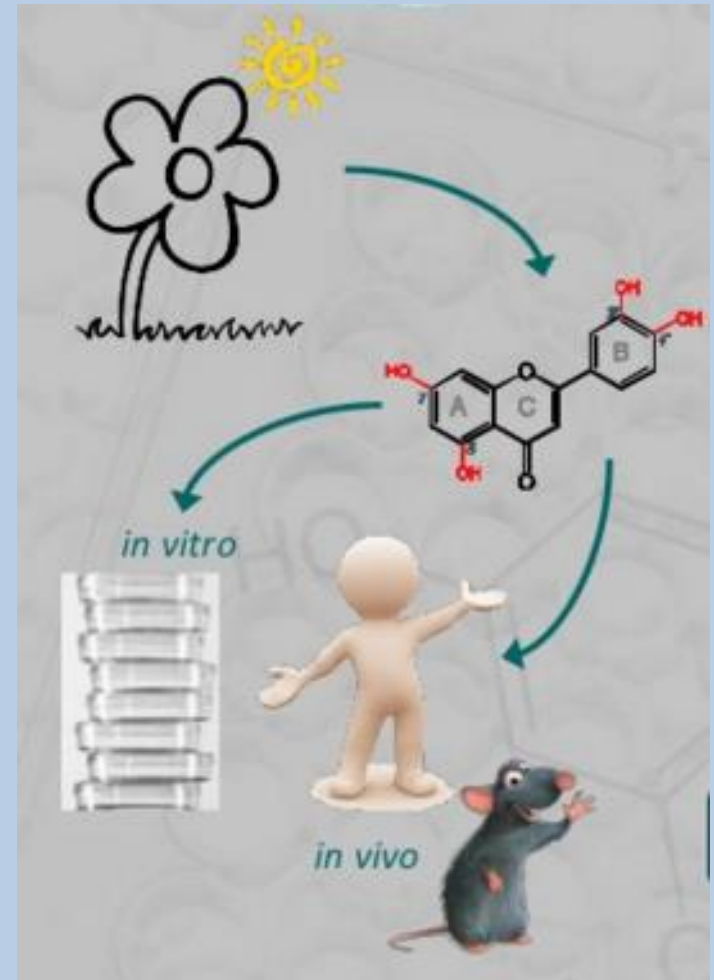


Figure 1: Basic structure of flavonoids (*Liu, 2004*)

# PHARMACOLOGY OF FLAVONOIDS

•Flavonoids have been reported to exert a wide range of biological activities. These include:

- Anti-oxidant activity
- Cardio-protective effects
- Anti-carcinogenic effects
- Gastro-protective effects
- Treatment of inflammation
- Anti-microbial effects,  
and many more.



## **TOXICOLOGICAL PROFILE OF FLAVONOIDS**

- **With the exception of green tea, research on flavonoids in general shows no known toxic effects.**
- **High doses do not appear to cause serious side effects, even for amounts as high as 100 grams a day. Excess intake is simply excreted in urine.**
- **The main symptom of flavonoid overdose is diarrhea. As for green tea, highly concentrated doses of it might contain too much caffeine for cancer and hepatitis patients, and for those people sensitive to caffeine. (Health Supplements Nutritional Guide, 2009)**

# THE FLAVONOID LUTEOLIN

- 3',4',5,7-tetrahydroxyflavone
- Polyphenol
  - Flavonoid
  - Flavone
- Hydroxylated
- Botanical compound



Figure 3: anatomy of *Taraxacum officinale*

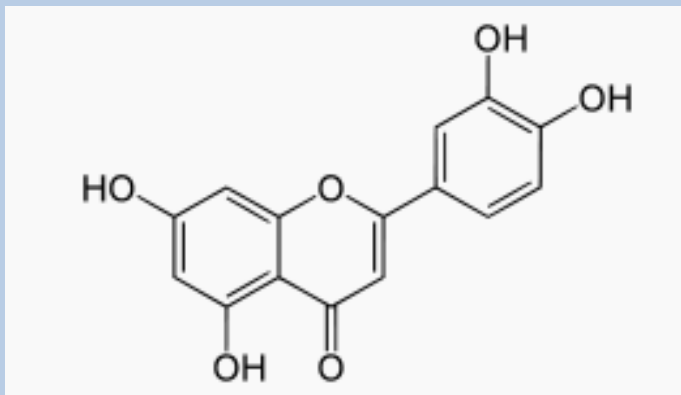


Figure 2: structure of Luteolin

- Common (vegetables, herbs,...)
  - *Taraxacum officinale*
  - Medicinal plants
- Physiological role in plants
  - Defense

# THE FLAVONOID GOSSYPETIN

- 3, 5, 7, 3', 4'-pentahydroxy-8-methoxyflavone
- Polyphenol
  - Flavonoid
    - Flavone
- Botanical compound
- Just found *Hibiscus*
  - *Hibiscus sabdarrifa*
  - Medicinal plants
- Physiological role in plant
  - color

- Anti-microbial
- Anti-oxidant
- Anti-inflammatory
- Anticarcinogenic



Figure 4: anatomy of *H. sabdarrifa*

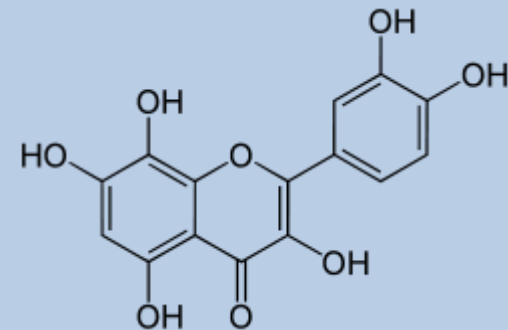


Figure 5: structure of Gossypetin

# CYCLOPHOSPHAMIDE

- Also called cytoxan
- Nitrogen mustard alkylating agent
  - 2-[bis(2-chloroethyl)amino]tetrahydro-2H-1,3,2-oxazaphosphorine 2-oxide
- Used to treat some cancers; breast, leukemia, cervix etc.
- High toxicity

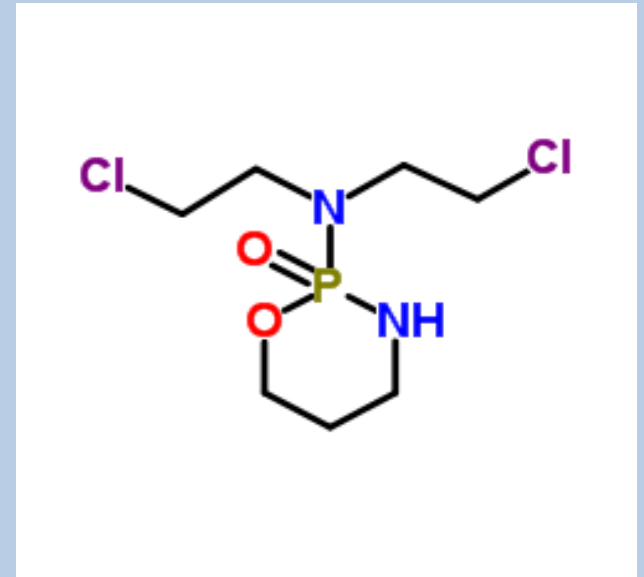


Figure 5: Structure of cytoxan



## **AIM OF STUDY**

**The aim of this study is to assess the cytotoxic effects and the effect mechanism of Gos, Lut and Cytosan and to examine the effect of combination treatment of these drugs on breast cancer cell line, MCF-7.**

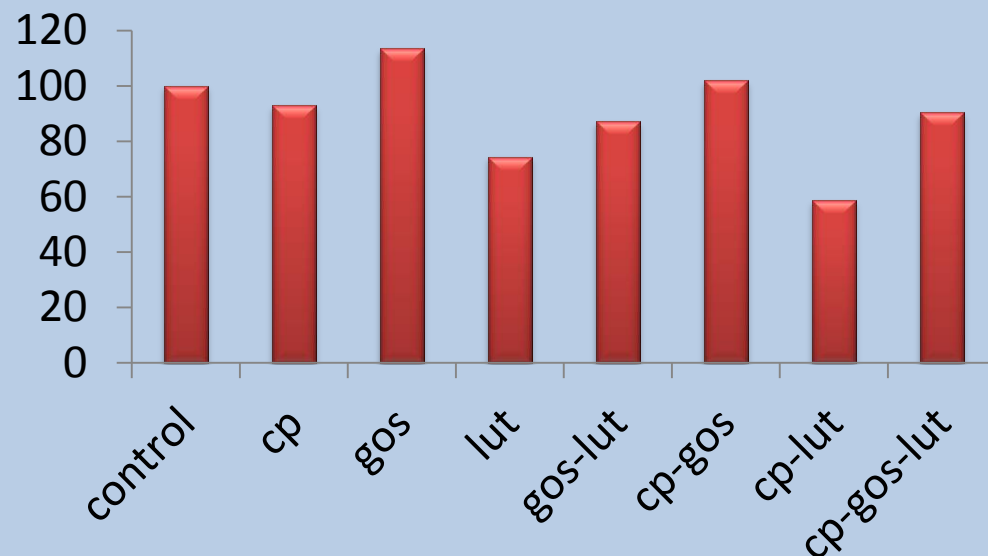
# **METHODOLOGY**

**Cells; MCF-7 cell line**

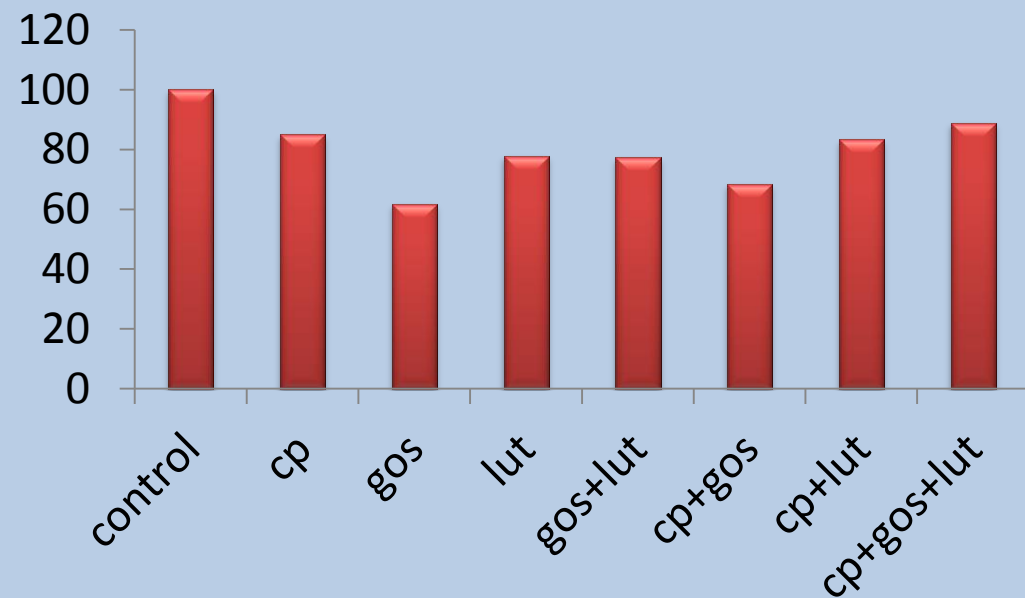
- **RTCA (Real Time Cell Analysis)**
- **MTT**
- **qPCR**
- **Annexin V-Cy3**

# Cytotoxicity assay (MTT)

## MCF-7 24h



## MCF-7 48h



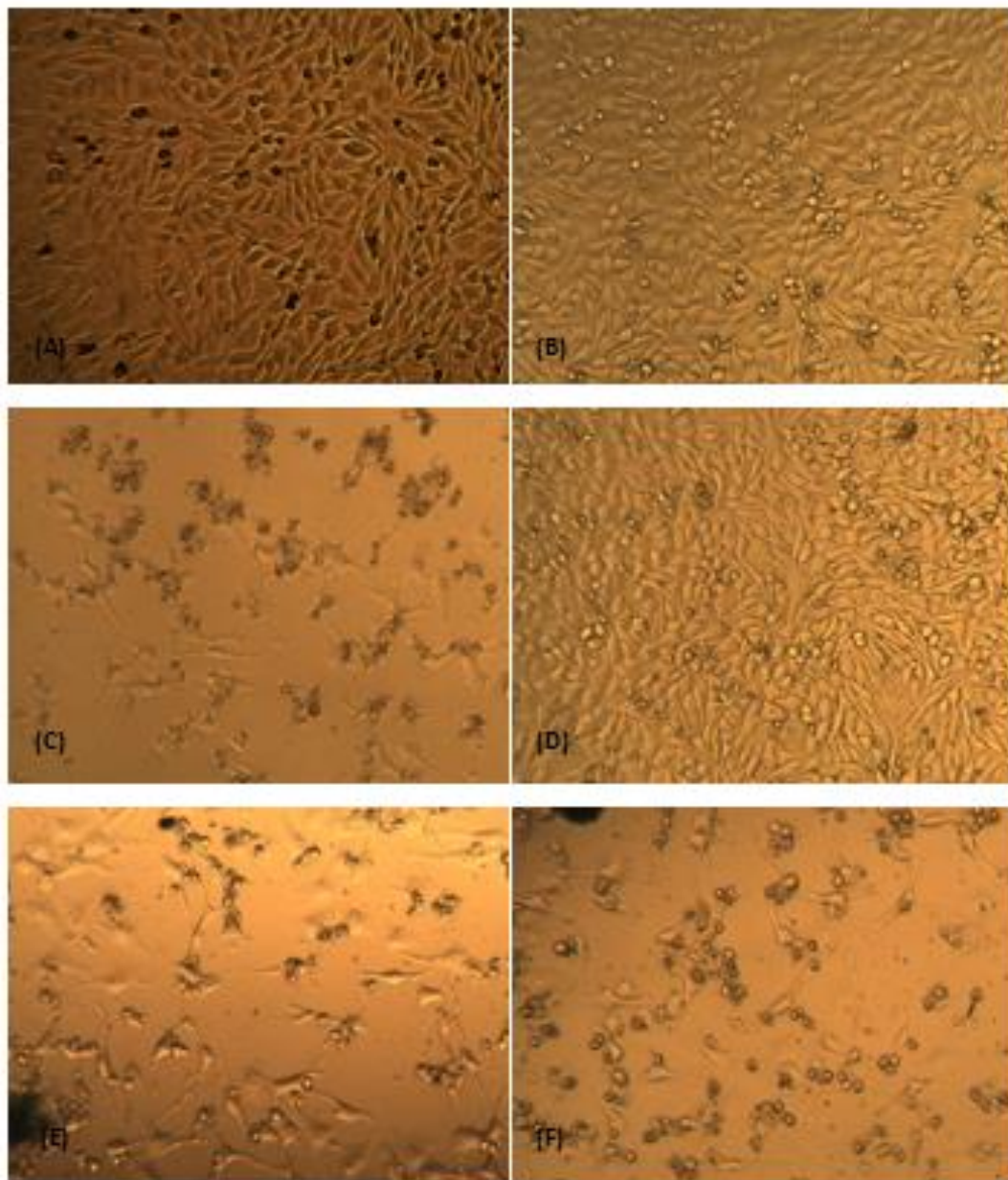
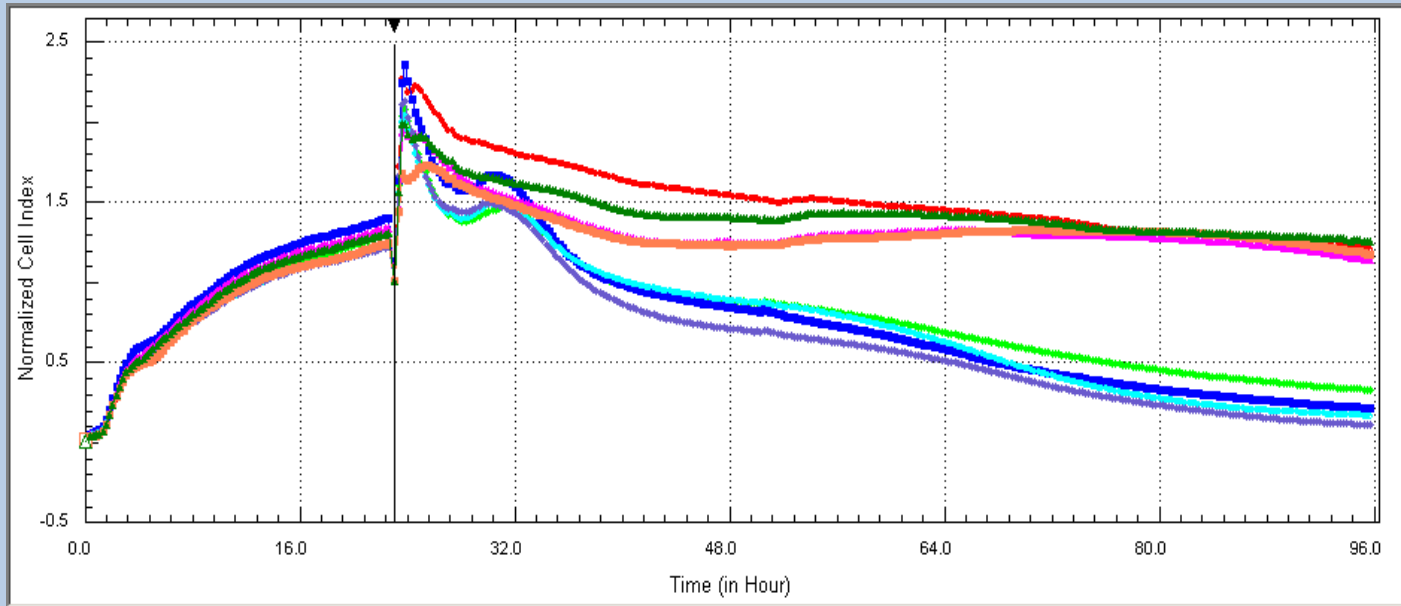







Figure 2: Morphological changes of MCF-7 breast cancer cells following treatment with CP alone and various combinations with luteolin and gossypetin (C+Gas, CP+Lut, CP+Gas+Lut). Microscopic images were captured using an inverted microscope. (A) control, (B) CP (1 mM), (C) CP+Lut, (D) CP+Gas, (E-F) CP+Gas+Lut for 48 h.

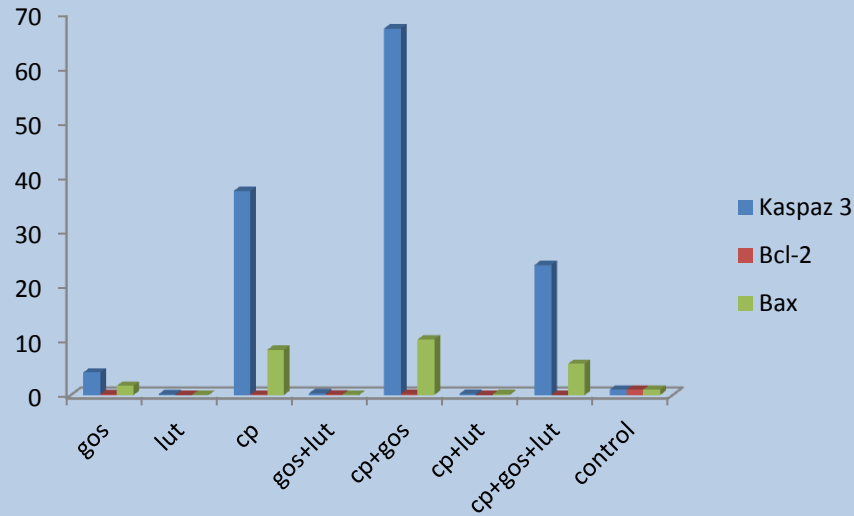
# Real Time Cell Analysis (RTCA)



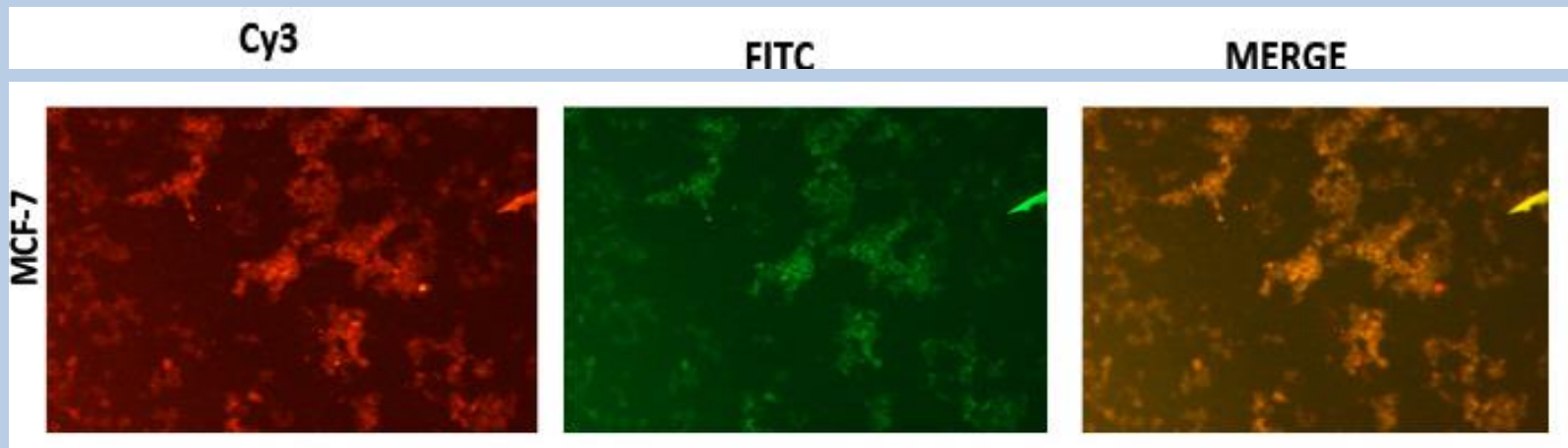
	Gos+Lut	CP+Lut	
	CP+Gos	Lut	
	Gos	Kontrol	
	CP	CP+Gos+Lut	

Gruplar	Konsantrasyonlar
CP	1 mM
Gos	100 $\mu$ l
Lut	50 $\mu$ l
Lut + Gos	100 $\mu$ l + 50 $\mu$ l
CP + Gos	1 mM + 100 $\mu$ l
CP + Lut	1 mM + 50 $\mu$ l
CP + Gos + Lut	1 mM + 100 $\mu$ l + 50 $\mu$ l

# qPCR



# ANNEXIN V-Cy3



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