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dosimetry

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Appendix

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.....Abstract

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^ CO₂

..... S. Cerevisiae : ()

D₁₀ : ()

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:(I)

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:(4)

19

دراسة الأثر الواقي الإشعاعي لحاصرات الكالسيوم (دلتيازيم) على خلايا
خميرة الخبز المشعة بأشعة غاما

- :

) Deltiazem

Ca²⁺ channel blockers

Hypertension

(Coronary vasodilators

Saccharomyces Cerevisiae

.256 Gy (D₁₀ value) 10%

)

(/

S. Cerevisia

Radio protective effects of Calcium Channel Blockers (Deltiazem) on survival of *Saccharomyces Cerevisiae* cells irradiated with different doses of Gamma rays.

Abstract:

Investigations of radioprotective effects of Deltiazem (as one of the commonly used calcium channel blockers, which is used in the treatment of acute and chronic angina and spasm angina, in addition to the treatment of different types of essential hypertension) has been carried on *Saccharomyces Cerevisiae* cells.

Cells cultures of the most famous yeast *Saccharomyces Cerevisiae* (bakers yeast) were irradiated with different doses of gamma rays. Results revealed that the necessary dose of gamma rays that leads to 10% of survived cellular population (D_{10} value) was about 256 Gy. This irradiation dose was used then in all irradiation experiments on culture of *S. Cerevisiae* cells in which different concentrations of Deltiazem (55, 110, 165 mg/Kg medium) were added before and after irradiation in order to study the radio protective effect of Deltiazem.

Results showed that Deltiazem enhances survival percentage of irradiated *S. Cerevisiae* cultures in a concentration dependent manner.

This study confirmed our previous works, which had demonstrated that Deltiazem protects lethally and supralethally irradiated rats, and enhances survival of pre-irradiated Deltiazem treated animals.

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Saccharomyces Cerevisiae

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(Sherman, 1997)

.(Jia and Wheals, 2000)

fungi

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Biological processes

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Hepatocytes

Lymphocytes

S. Cerevisiae

recombination

replication

cell division

backers yeast

S. Cerevisiae

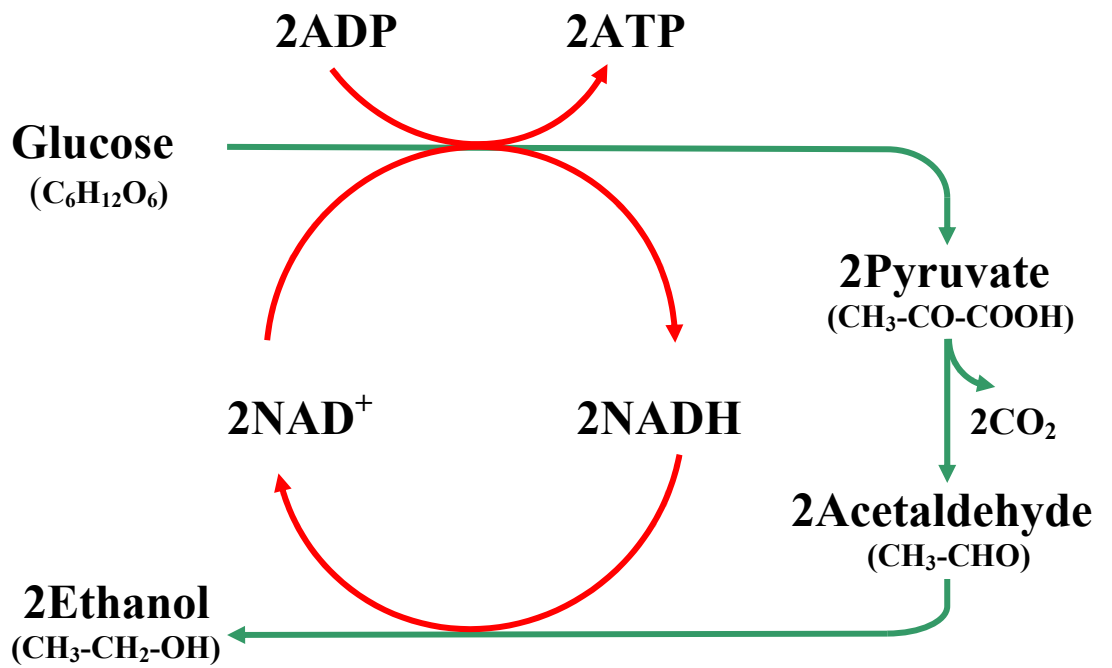
brewers yeast

(ethanol) CO₂

CO₂

fermentation

()



.CO₂

()

:()

:ATP

:ADP

:NADH

:NAD

S. Cerevisiae

CO₂

()

%

Niacine

Folic acid

B

Pyridine nucleotides

NAD

in vivo

Nicotinamide Adenine Dinucleotide

soluble electron carrier

Budding

()

S. Cerevisiae

5

10

asymmetric

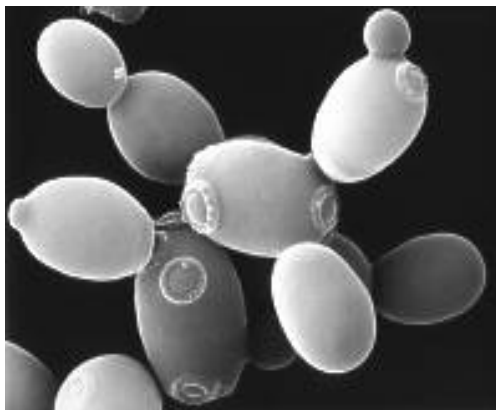
()

preferentially

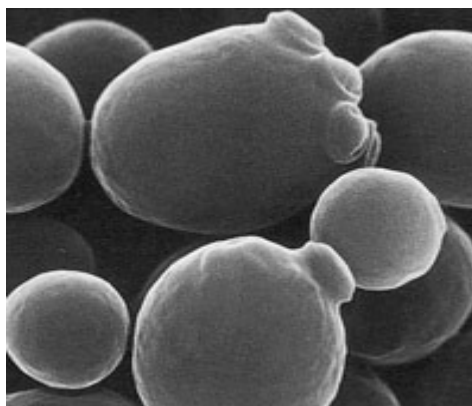
microtubules

actin bundles

vesicles



A



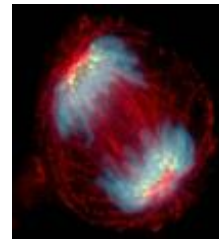
B



C



D



E

S. cerevisiae : ()

(D)

(A, B, C) budding

(E)

()

(2C)

cytoskeletal elements

polarized actin
fibroblasts

.(Putnam, 1998)

Ca²⁺

(Ashcroft, 2000; ()

.Dedman and Keatzel, 1998)

(. . .)

radiotherapy

) WR

(Walter Reed army hospital

WR2721 .(Turrisi *et al*, 1983; Cairin, 1983)

cystamine Cysteine Aminothiols radioprotectors

(Floershiem and Florershiem, 1983; Bhanumathi and Devi, 1993, Floreshiem and Bieri, 1990; Floreshiem *et al*, 1988).

Planned radiation exposure

.(Aherne and O'brien, 2000; Nair *et al*, 2001; Coleman *et al*, 2003)

(Arora *et al*, 2005)

:

- .Anti-inflammatory activity -
- .Antimicrobial activity -
- .Antioxidant activity -
- .Hematopoietic stimulation -
- .Immune stimulant activity -
- .Metal chelation activity -
- .Wound healing activity -

Ca²⁺

Ca²⁺ influx

(Ca²⁺ channels) Floershiem
mices

(Floershiem, 1992-1993)

Ca²⁺ channel blockers

Lipid peroxidation

(Reactive Oxygen and Nitrogen Species) ROS and RNS

ionic leakage .

[Ca²⁺]_i

.Ca²⁺ overload

$([Ca]_i \approx 0.1 \mu M) 10^{-7} M$

1-2mM $[Ca^{2+}]_0$

apoptosis

$[Ca^{2+}]_i$ overload

Wyllie

Endonucleases

Mg^{2+}

Ca^{2+}

DNA fragmentation

.(Zui *et al*, 2000; Wyllie, 1980; Wyllie *et al*, 1984)

()

$[Ca^{2+}]_i$

.(Alya, 1996) Myogenic contractions frequency

$[Ca^{2+}]_i$

(Deiltiazem, Nifidine)

(Alya, 2002)

)

.(S. Cerevisiae

S. Cerevisiae

٣- المواد :

	:	- -
	:	
Saccharomyces cerevisiae		-
	.	
AMRIT	Diltiazem Retard	-
.	/	
	/	MEDICAL COMPANY
	.Potato Dextrose Agar	-
	.	-
	:	- -
	:	
	(/GANAT) incubator	-
	.(/Jouan) autoclave	-
	.(/ Trio filter) sterile tent	-
	.(/Sartorius)	-
	.(- Heidolph)	-
	.(/) microwave	-
	petri dishes	-
	10 ml test tubes	-
	.	-

. -
.

.3 ml

: -
: - -
: - - -

()

3

.inactive cells

)

serial dilution

10^{-1}

$\cdot(10^{-7}$

-

: - - -

capsule 20

powder

72 (3600)

()

/Sartorius-0.45μ/

/ 50

(+ 4 C°)

: - - -

(Issledo-vatel) ⁶⁰CO -

(3.994 Kci)

.(2.257 KGy.h⁻¹)

: - -

(N) (N0)

(N/N0) surviving

D₁₀ value

fraction

$$Y = m X$$

(N/No) :Y

() :X

:

$$X = Y/m$$

: Y 10 %

$$X = 1/m$$

D₁₀

(R - squared value) R²

.(R²)

: -

D₁₀ value ()

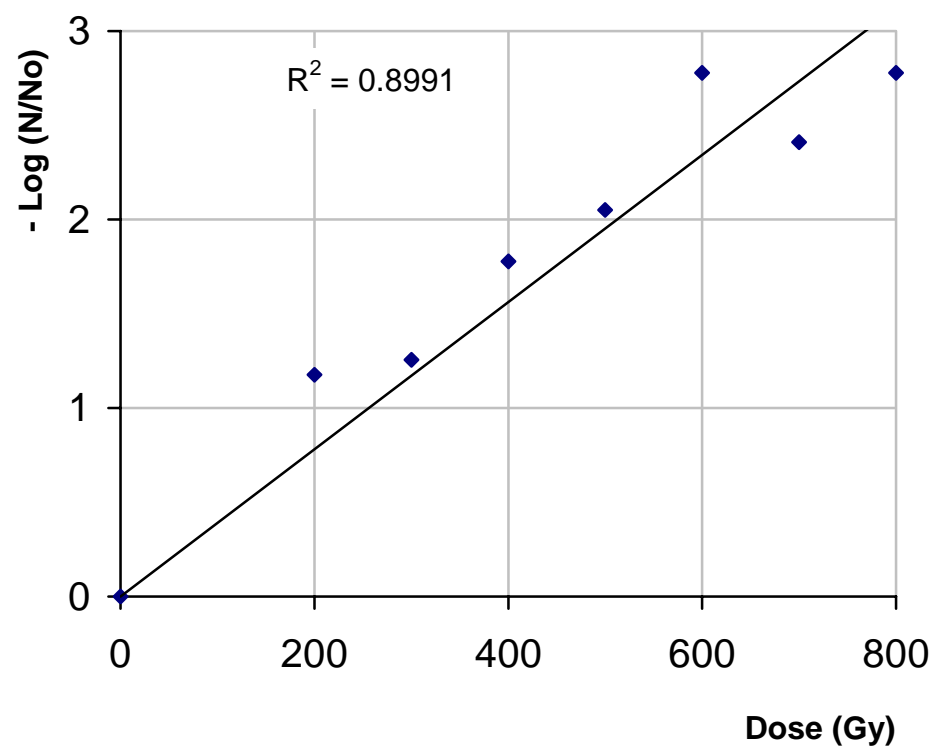
cellular population

(Thayer *et al*, 1995) 90 %

(Miyako *et al*, 2002) 10 %

) .()

.(



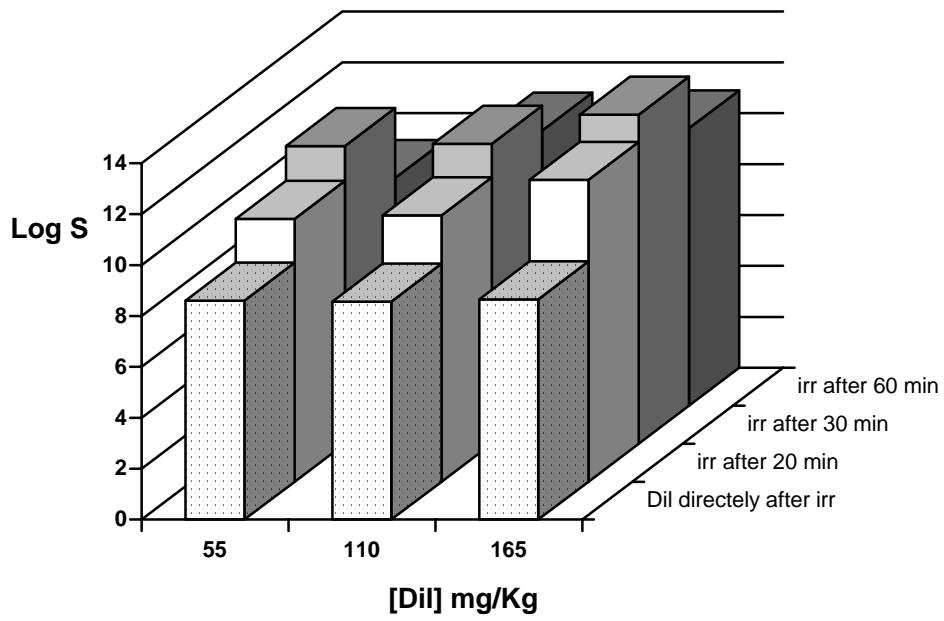
D₁₀ :()

.() (I) .

						/
7.3×10^{11}	2.9×10^{10}	2.1×10^{10}	4.5×10^8	3.75×10^8	4×10^8	
,	,	,	,	,	,	
						/
8×10^{10}	6.5×10^{10}	9×10^8	8.5×10^{12}	6×10^{11}	5×10^{11}	
,	,	,	,	,	11.7	

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(Alya, 2002)

(Deltiazem Nifidine)

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.(150 mg/Kg)

(Floershiem and Bieri, 1990)

Aminothiols

.Thiols

disulfides

S. Cerevisiae

/

256 Gy

(D₁₀ value) 10%

"

actin

microtubules

neutralization

[Ca²⁺]_i

(DNA fragmentation) DNA

"

S.Cerevisiae

Ca²⁺

apoptosis

overload

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**Report on Scientific Laboratory Study
Department of Molecular Biology and Biotechnology**

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survival of Saccharomyces Cerevisiae cells irradiated with different
doses of Gamma rays.**

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Motassim Shamma
Najem Deen Sharabi**

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March 2007