In The Name of God

Department of Animal Biology
Faculty of Natural Sciences
University of Tabriz

M.Sc. thesis

Study of antioxidant effect of Lino-curcumin on spatial memory and oxidative stress parameters during Multiple sclerosis disease in male rats

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Advisor:
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Feb 2017

Main Titles of Presentation

1. Introduction
2. Materials & Methods
3. Results
4. Discussion

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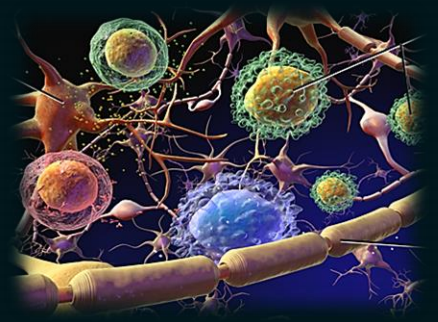
INTRODUCTION

Multiple Sclerosis Disease (MS)

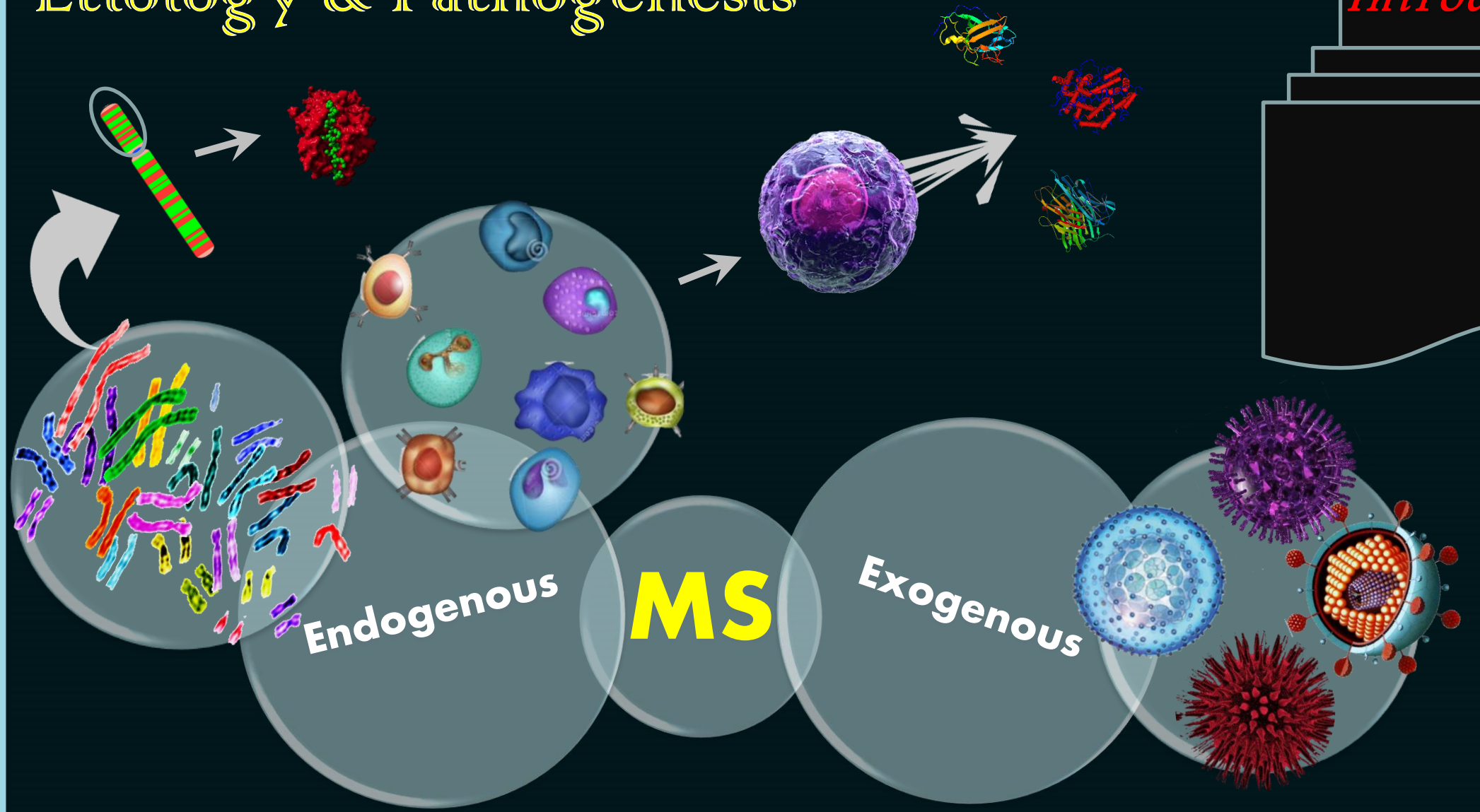
Introduction

- Neurodegenerative
- Autoimmune
- Inflammatory



- Demyelination
- Neuroinflammation

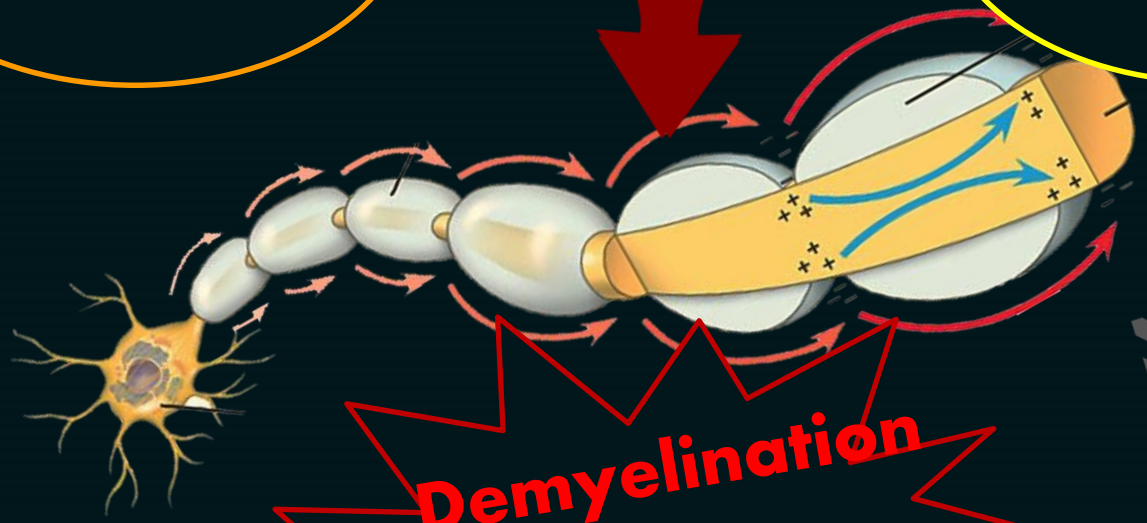
Etiology & Pathogenesis



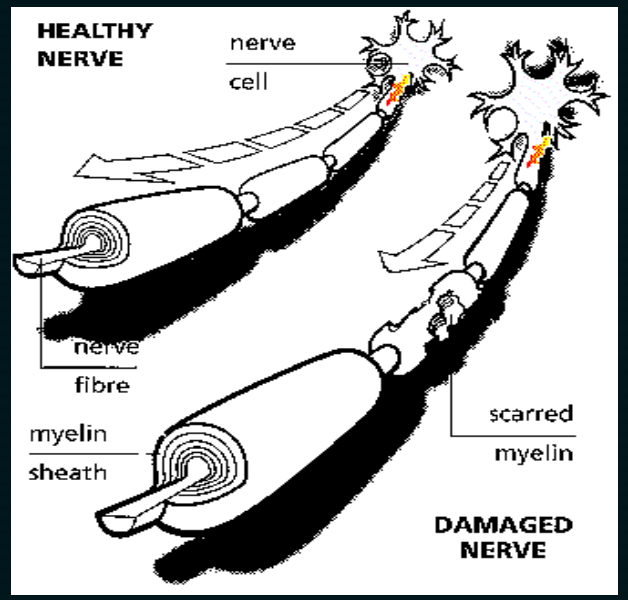
Pathophysiology

Inflammation

Oxidative Stress

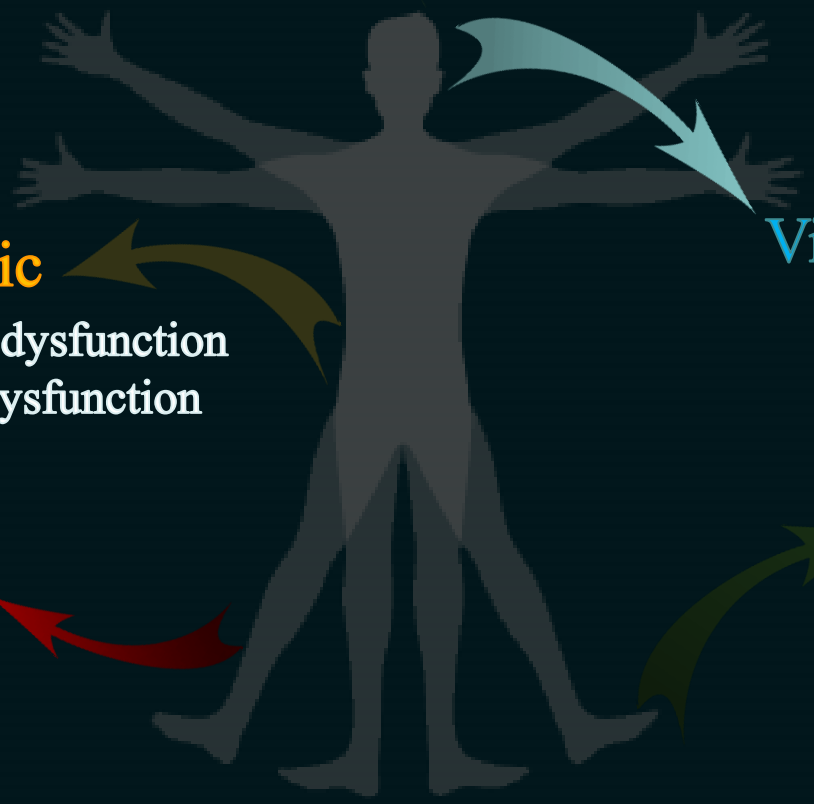


Demyelination



Symptoms

Central
- Depression
- Cognitive impairment
- Fatigue



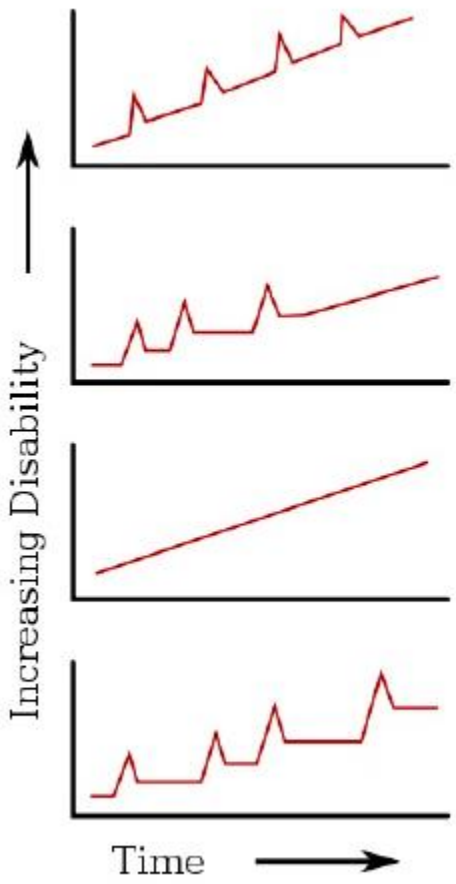
Visual
- Nystagmus
- Optic Neuritis
- Diplopia

splanchnic
- Bladder dysfunction
- Bowel dysfunction

Musculoskeletal
- Weakness
- Ataxia

Sensation
- Pain
- Numbness

Classification



PRMS Progressive Relapsing MS
Steady decline since onset with super-imposed attacks.

SPMS Secondary Progressive MS
Initial RRMS that suddenly begins to decline without periods of remission and relapses.

PPMS Primary Progressive MS
Gradual progression of the disease from its onset with no relapses or remissions

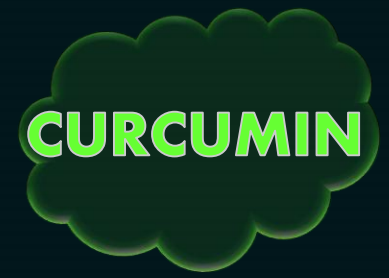
RRMS Relapsing/ Remitting MS
Unpredictable attacks which may or may not leave permanent deficits followed by periods of remission

Necessity of MS Models

- Common Reasons
- Biopsy Problems
- Complex Disease

MS Models

- ✓ Myelin Mutants
- ✓ Viral & Autoimmune Models
- ✓ Chemically- induced Lesions



Ethidium Bromide :

- Local Demyelination
- Oxidative Stress
- Neuroinflammation
- Astrocytes & Oligodendrocytes Damage

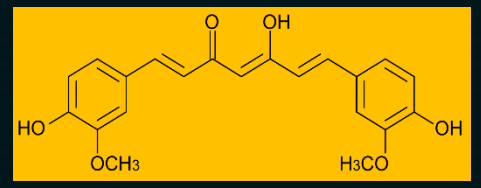
Curcumin Origion

Class : Liliopsida
Order : Zingiberales
Family : Zingiberaceae
Genus : Curcuma
Species : C. longa (Turmeric)

Perennial plant

Used as home remedy

for various diseases

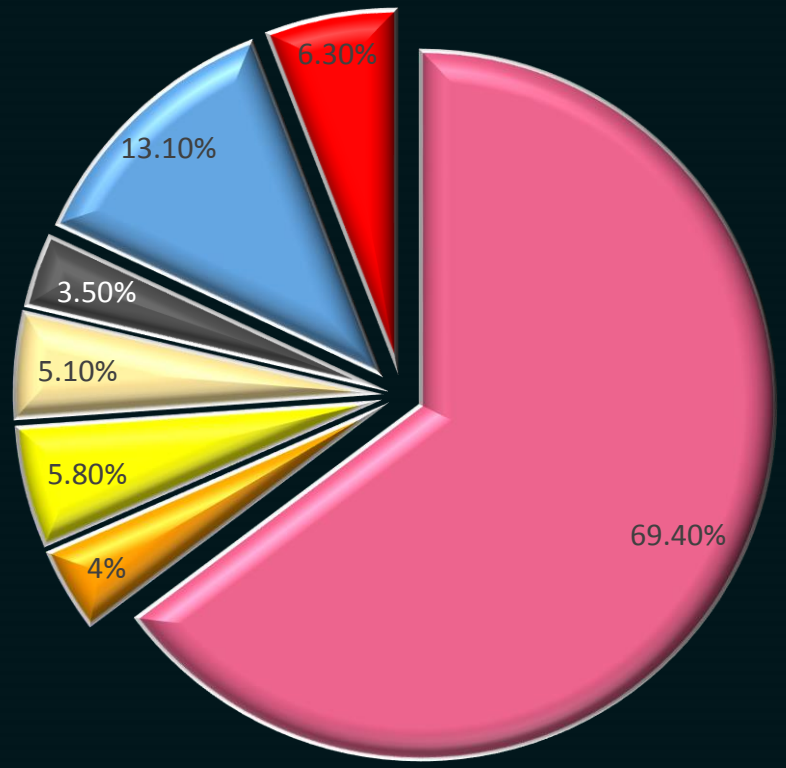


Curcumin is derived from

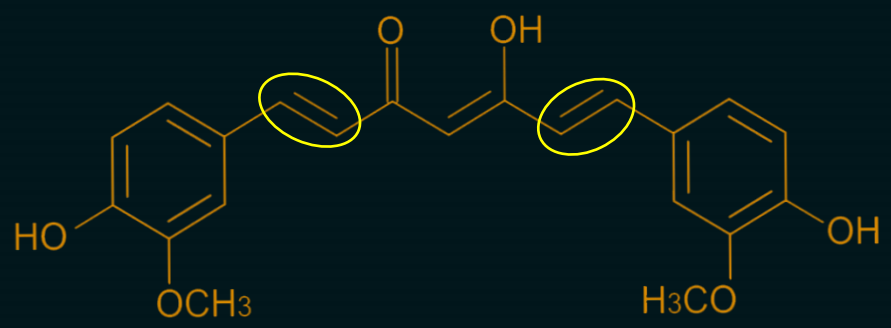
"*Curcuma longa*"

Curcumin

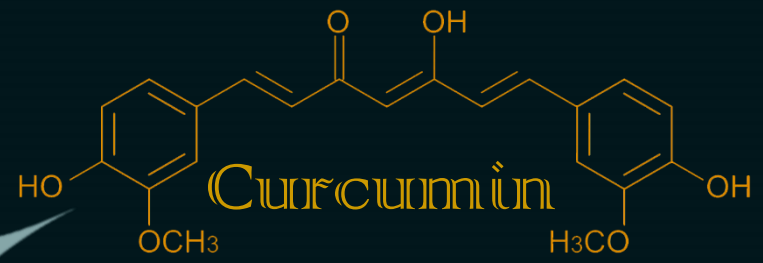
- carbohydrates
- curcumin
- essential oil
- fat
- minerals
- moisture
- protein



- **Chemical composition of turmeric**

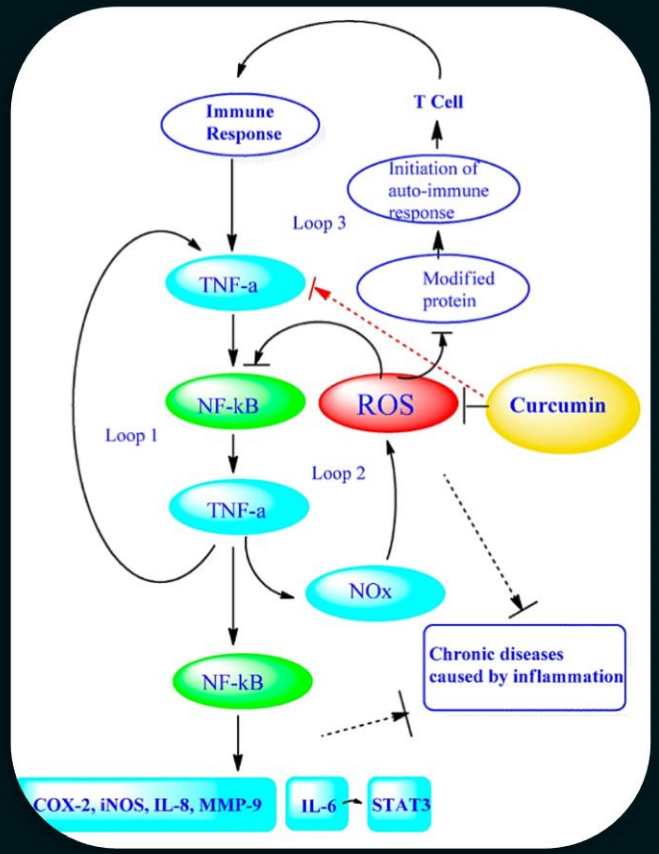


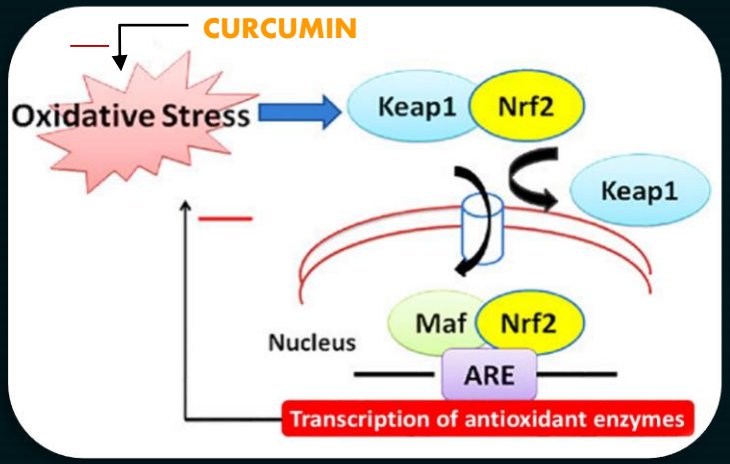
Introduction



Curcumin

Antioxidant
anti-inflammatory





Curcumin

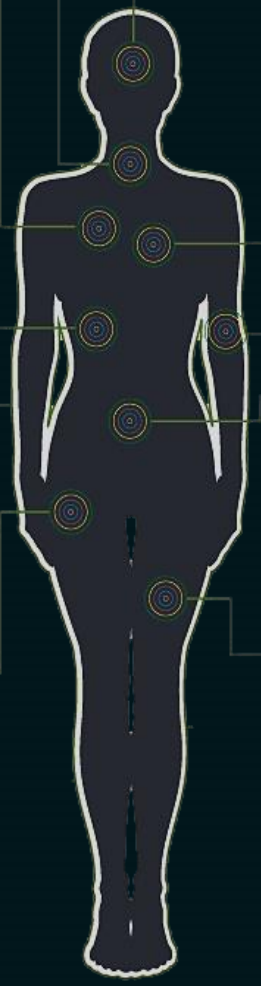
Endocrine system
Diabetes, Hypothyroidism

Respiratory system
Pneumonia

Digestive & hepato-bilary system
Hepatitis

Urinary system
Inflammatory Kidney diseases

Skeletal system
Osteoporosis



Nervous system
AD, PD, MS

Cardiovascular system
Cardiac hypertrophy

Skin
Psoriasis, Skin wound

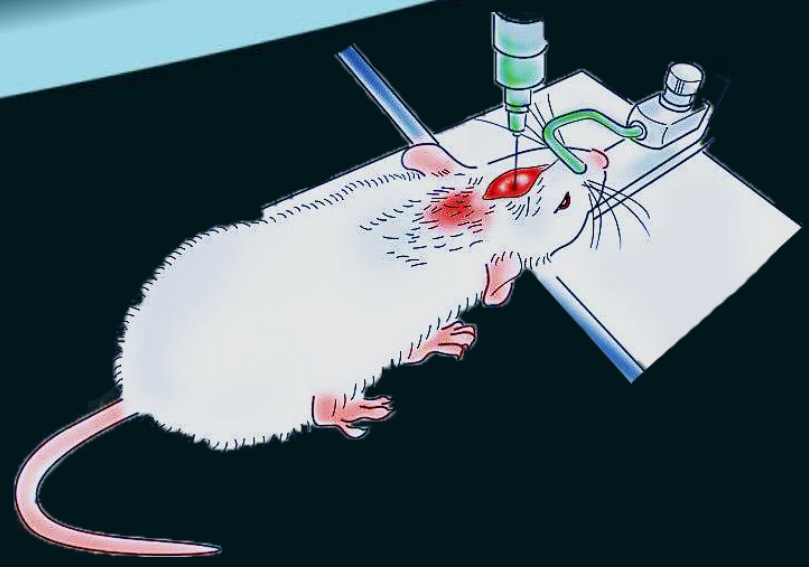
Reproductive system
Dysmenorrhea

Muscular system
Oxidative damage

Aim of This Study

- ✓ Investigating memory improvement and antioxidant effect of curcumin and Lino-curcumin on EB-induced MS model.
- ✓ Compare Lino-curcumin efficacy with curcumin.

MATERIALS & METHODS



Animals

Materials & Methods

- Rats were purchased from Pastor institute.

- **Situation:** temperature: 22±2°C
  lights on 07:00–19:00 h
  ad libitum access to food and water

- **Subjects:** 56 Male Wistar rats
  weighing 250±20 gr
  divided in 7 groups (n=8)

Groups

1. Control
2. Sham (DMSO/PBS 1%v/v)
3. EB (4 μg/rat)
4. EB+ 5 μg/rat Cur.
5. EB+ 10 μg/rat Cur.
6. EB+ 5 μg/rat Lino-cur.
7. EB+ 5 μg/rat Lino-cur.

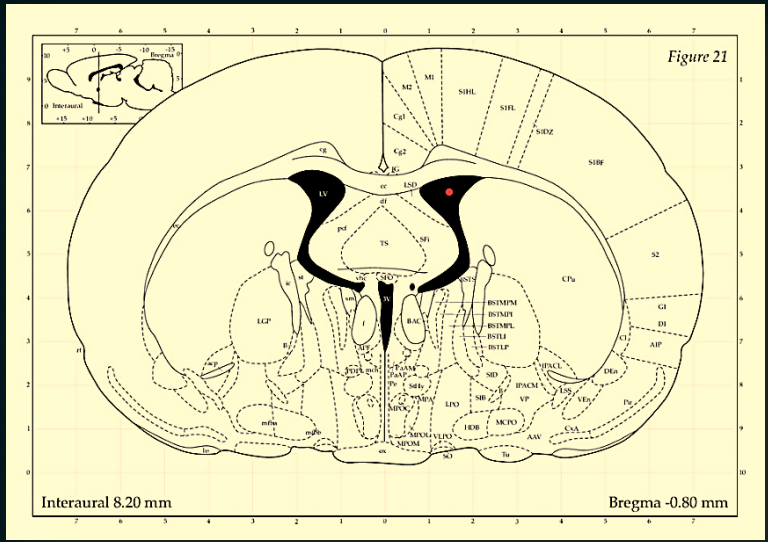
Stereotaxic Operation

Materials & Methods

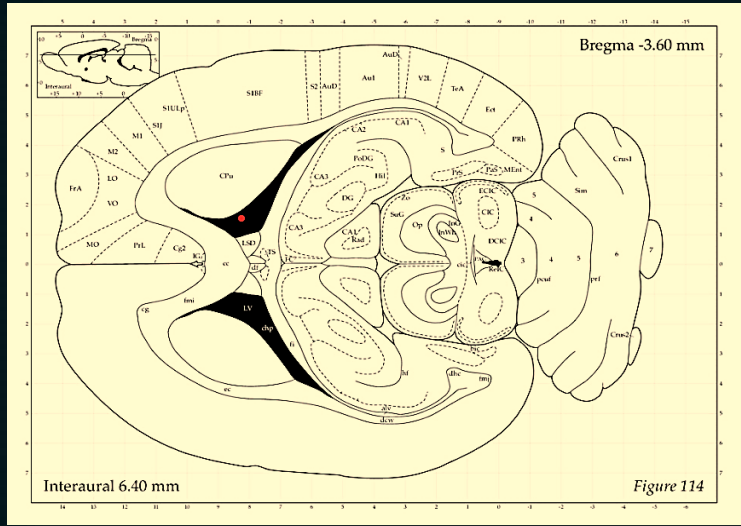
ICV co-ordination:

- **AP:** - 0.6 mm
- **ML:** ± 1.6 mm
- **DV:** 4.0 mm

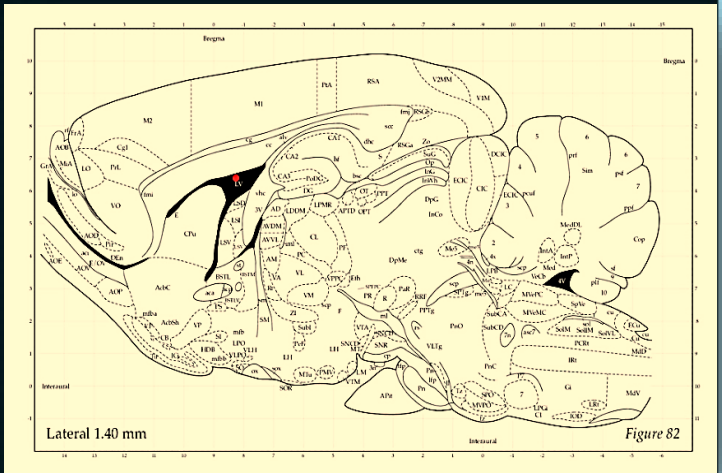
Coronal



Horizontal

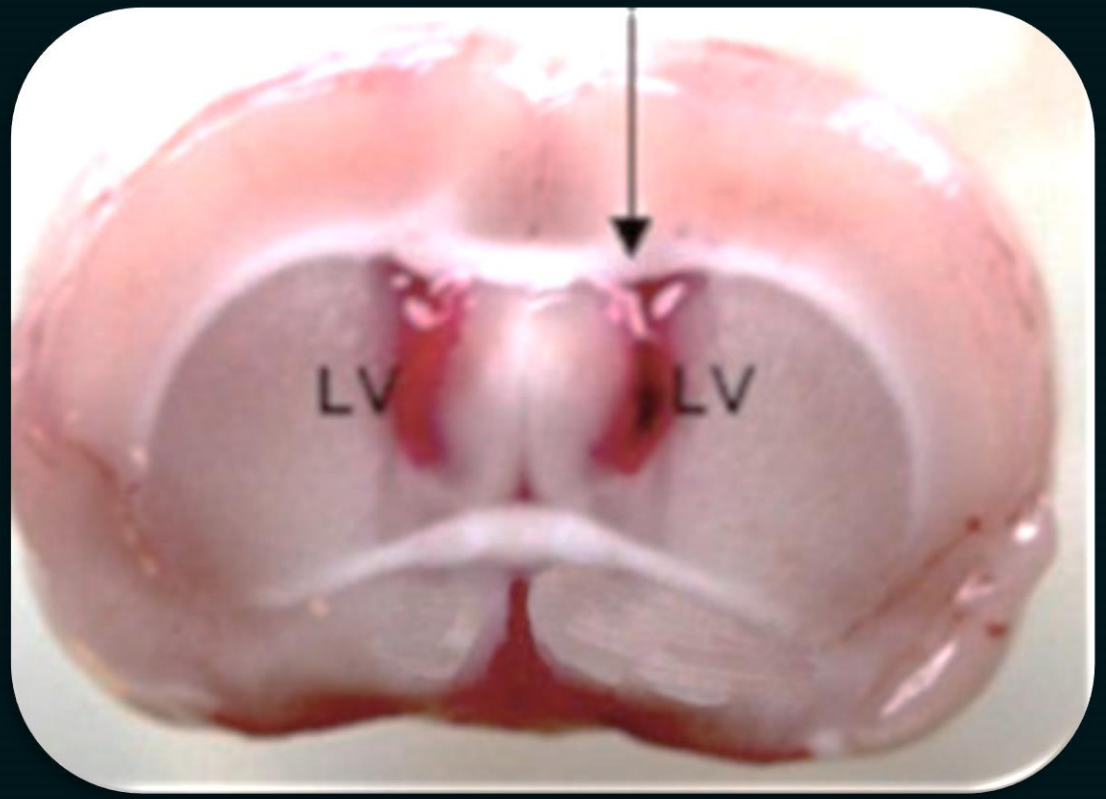


Sagittal

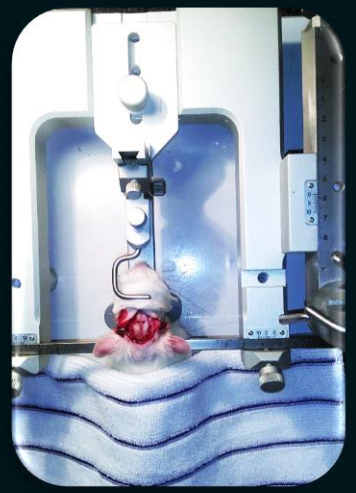


Histological confirmation of Stereotaxic

& Materials Methods



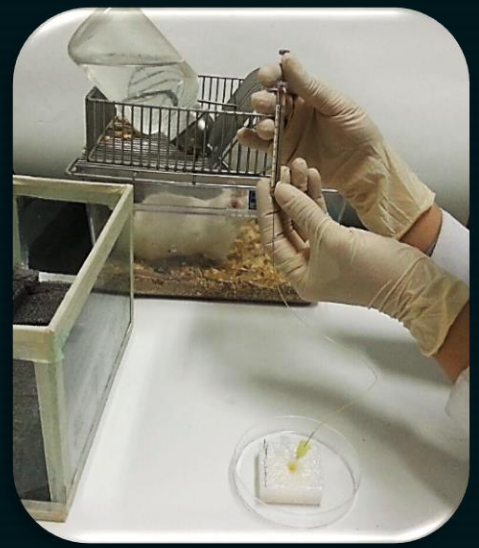
Stereotaxic Operation



Materials & Methods

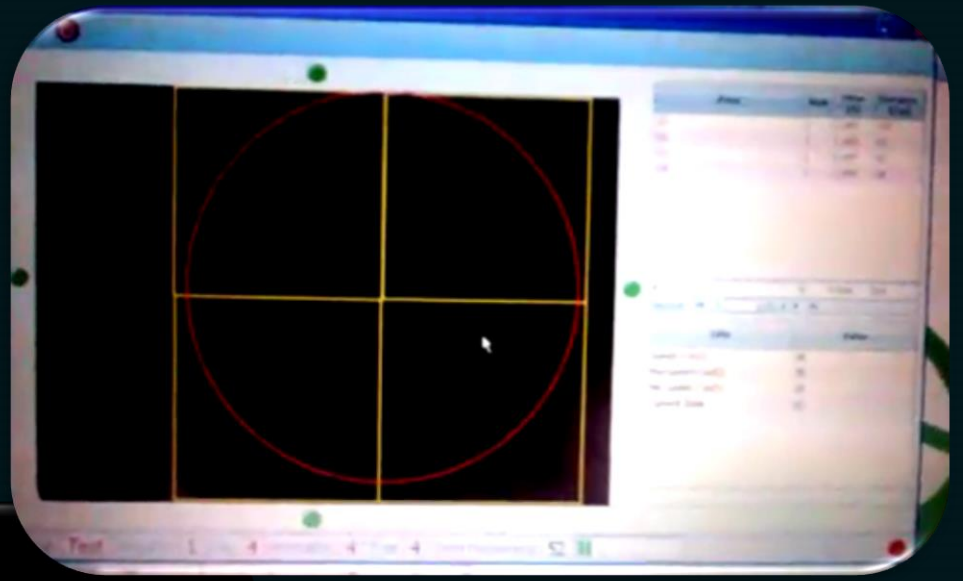
MS model induction & Injections

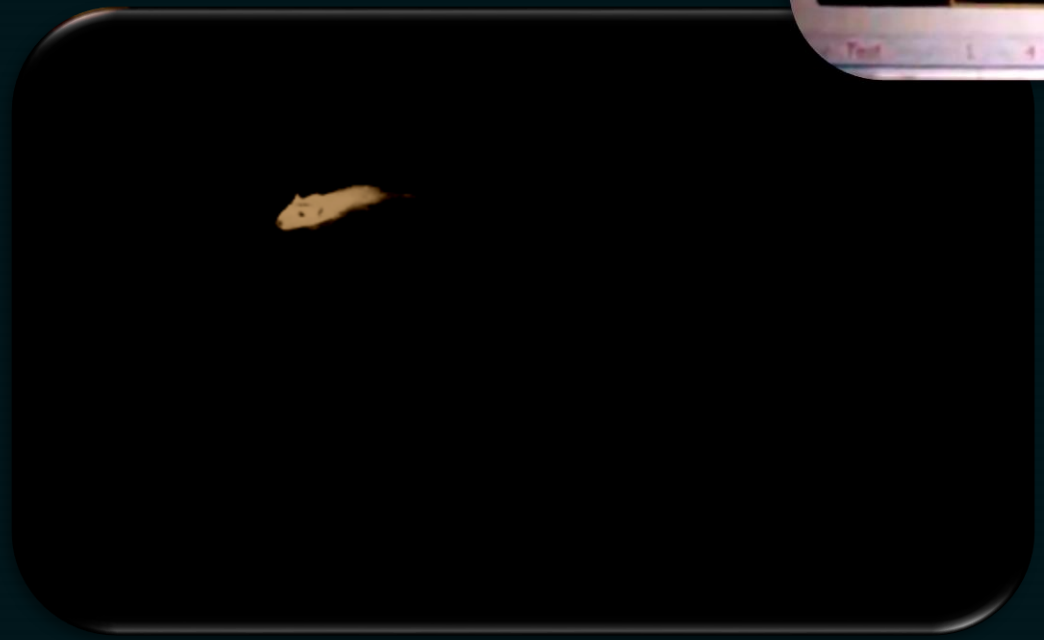
Materials & Methods



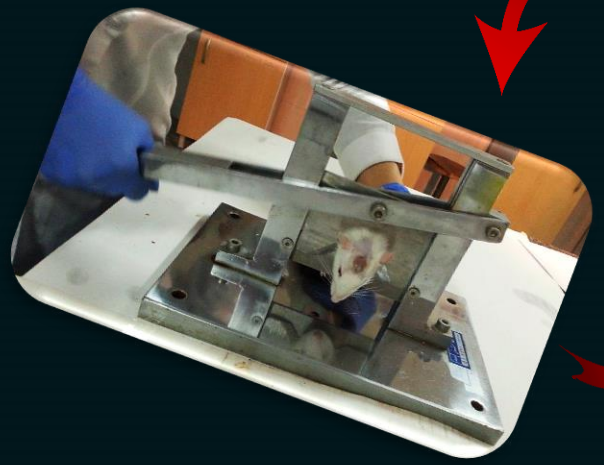
Morris Water Maze test

Materials & Methods





dissection & Sampling

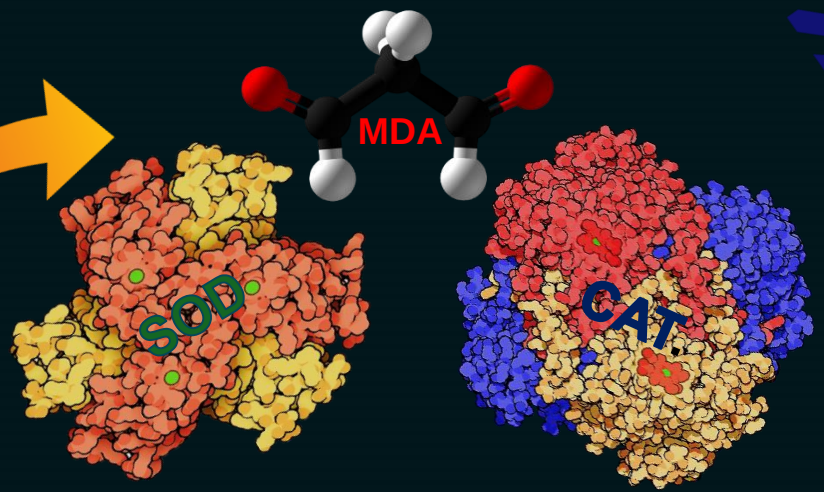


Materials & Methods

Homogenization

Enzymes Assay

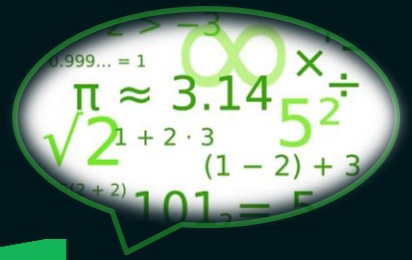
Materials & Methods



Statistical Analysis

Primary Analysis

Complementary Analysis

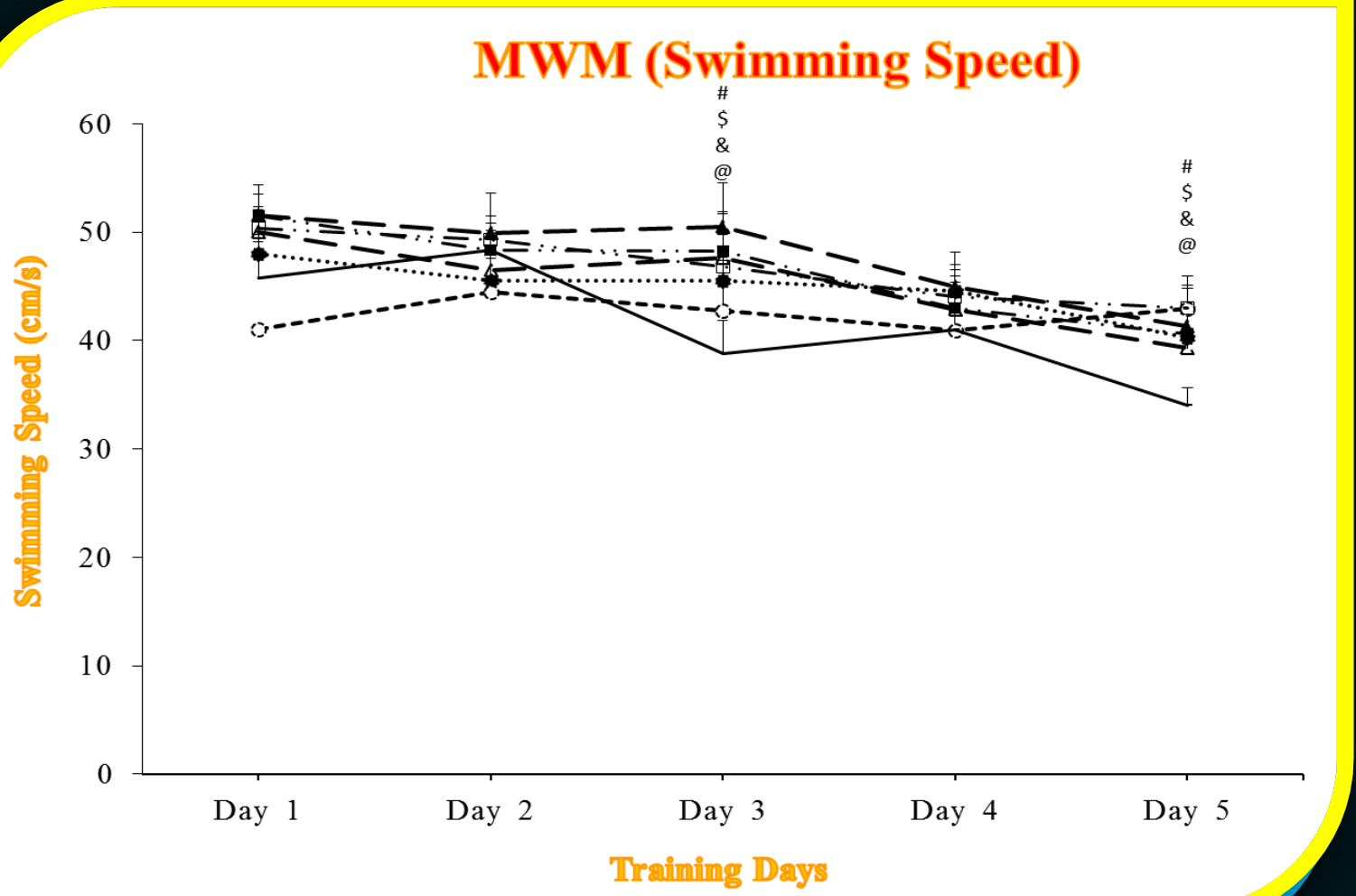


- The data were expressed as means ± SEM.
- One-way analysis of variance (ANOVA), followed by Tukey post-test
- Differences were considered significant if $P < 0.05$

RESULTS

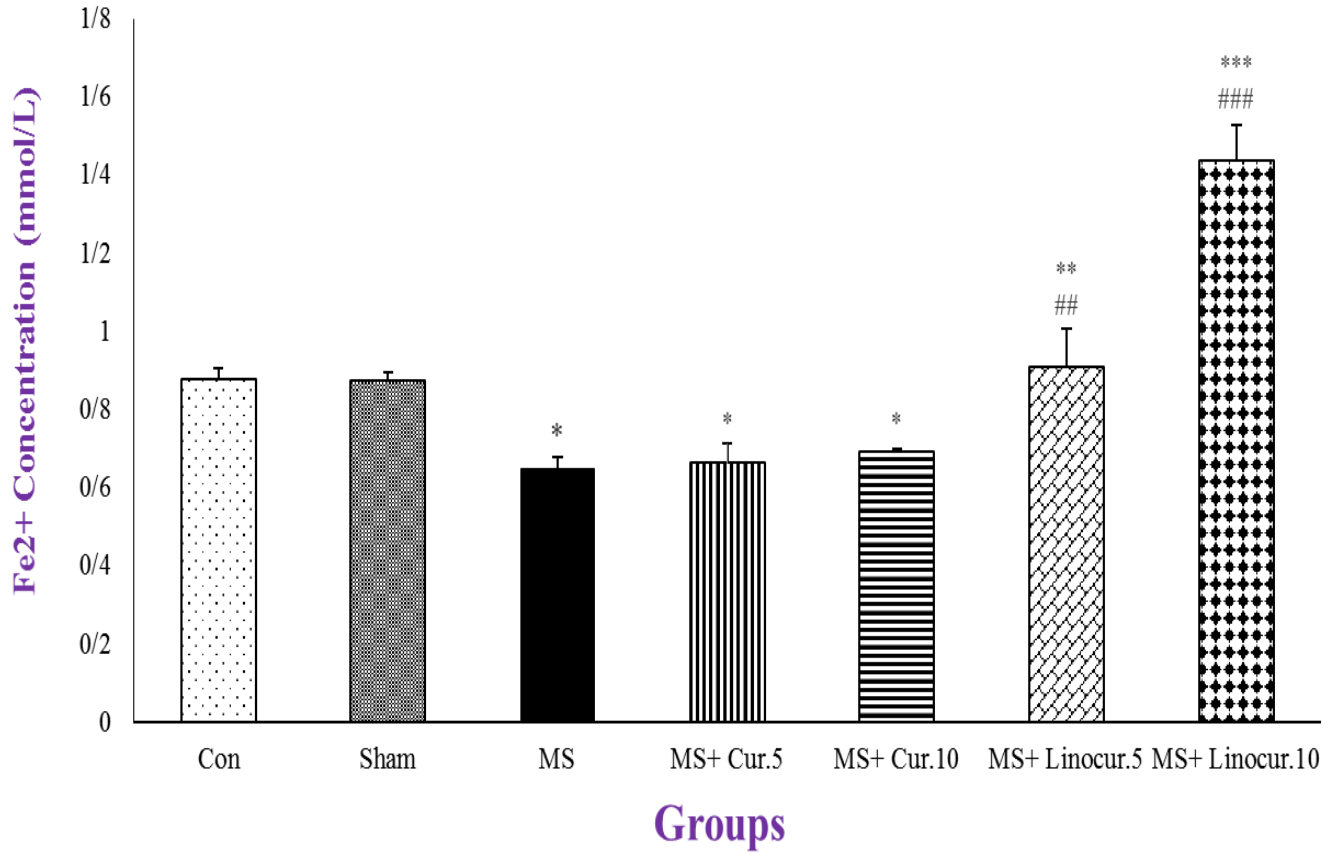
Spatial Memory

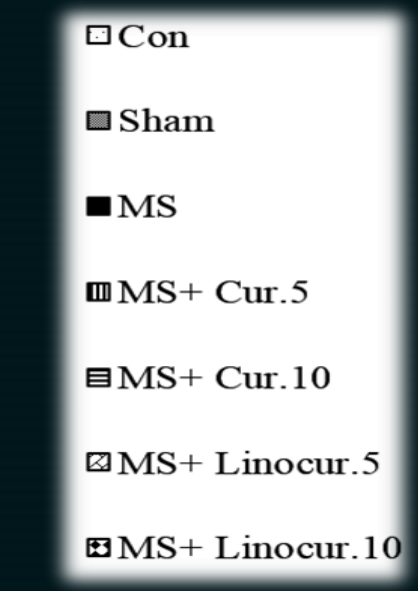
Results



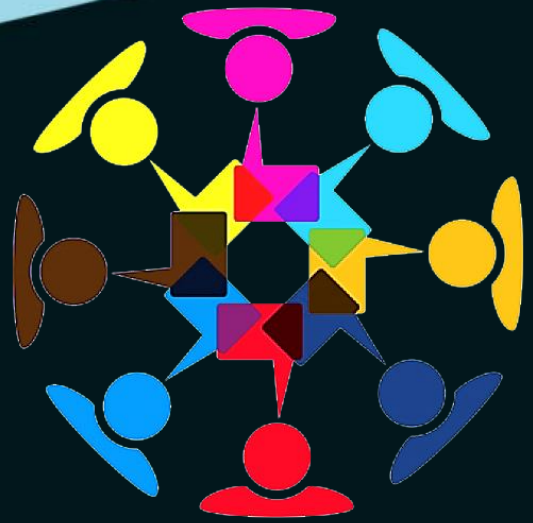
Oxidative Stress

Results





DISCUSSION



Spatial memory (current study)

EB injection

- Swimming speed
↑ Time Latency
↑ Travelled Distance

VS **Control**

Discussion

Spatial memory impairment

Spatial memory improvement

Cur. & Lino-cur. treats

- Swimming speed
↓ Time Latency
↓ Travelled Distance

VS **EB**

Lino-cur > Cur.

Spatial memory (Previous Studies)

Discussion

EB injection

- Swimming speed
- ↑ Time Latency
- ↑ Travelled Distance

=

Ziehn. et al, 2010

Kim. et al, 2012

Ghaffary. et al, 2013

Cur. & Lino-cur. treats

- Swimming speed
- ↓ Time Latency
- ↓ Travelled Distance

=

Sethi. et al , 2009

Kuhad. et al, 2007

Belviranlı. et al, 2013

Tang. et al, 2009

Xu. et al, 2009

Oxidative Stress Parameters (current study)

EB injection

- ↓ FRAP
- ↑ MDA
- ↑ SOD
- ↑ CAT.

VS **Control**

Discussion

Oxidative Stress

Suppress OS

Cur. & Lino-cur. treats

- ↑ FRAP
- ↓ MDA
- ↓ SOD
- ↓ CAT.

VS **EB**

Lino-cur > Cur.

Lino-cur10 vs Cur.5

Oxidative Stress Parameters (Previous studies)

Discussion

Cur. & Lino-cur. treats

- ↑ FRAP
- ↓ MDA
- ↓ SOD
- ↓ CAT.

≠ **Abdel-salam. et al, 2012**

Spanevello. et al, 2009

= **Sethi. et al , 2009**

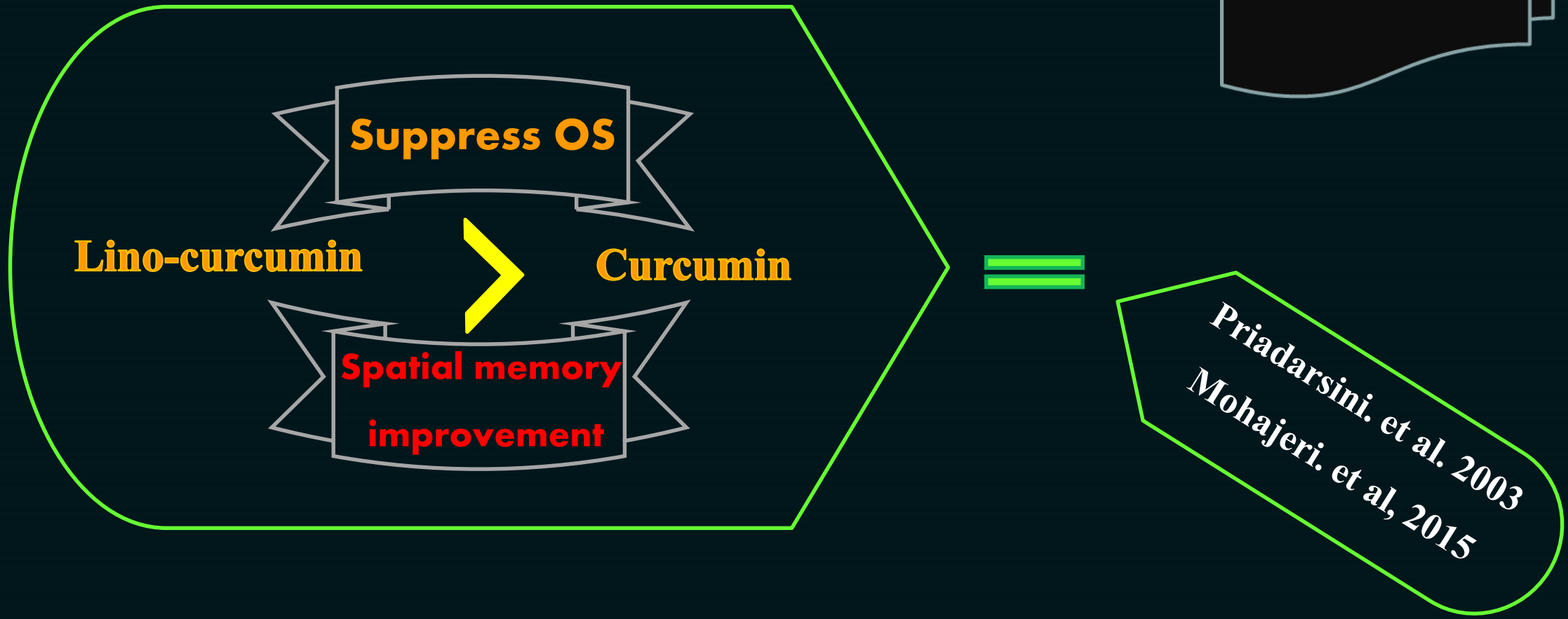
Kuhad. et al, 2007

Belviranlı. et al, 2013

Mohajeri. Et al, 2015

Spatial memory & Oxidative stress

Discussion



Conclusion

Discussion

EB Model of MS

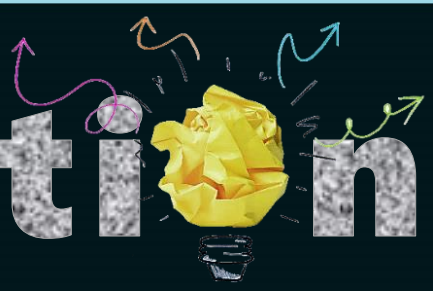
- Oxidative stress
- Spatial memory impairment

Lino-cur. & Cur. treatment

- Oxidative parameters decreased
- Spatial memory improved

Using Lino-curcumin was more effective on normalizing oxidative stress parameters and improvement of spatial memory in compare with curcumin during MS model in male rats.

Suggestions



Discussion

- Investigating the long term of this treatment
- Test this treatment on the other models of MS, e.g. EAE
- Analyzing the results of this method on spinal cord tissue
- Analyzing gene expression of MBP during MS + Lino-cur.
- Investigating the brain histological study during MS + Lino-cur.

بسم الله الرحمن الرحیم

اولین کنگره بین‌المللی
فیزیولوژی و فارماکولوژی
و بیست و دومین کنگره
فیزیولوژی و فارماکولوژی ایران
۱۶ – ۲۰ شهریور ماه ۱۳۹۴
دانشگاه علوم پزشکی کاشان

1st International and
22nd Iranian Congress of
Physiology and Pharmacology
7-11 Sept 2015
Kashan University
of Medical Sciences

دانشگاه علوم پزشکی کاشان
Kashan University
of Medical Sciences

CERTIFICATE OF ATTENDANCE

Poster Presentation

This is to certify that

Behnaz Barzegarzadeh

attended the

1st International and 22nd Iranian Congress of Physiology and Pharmacology

held in Kashan University of Medical Sciences, 7-11 September, 2015

Dr. Mohammad Hossein Aarabi
The President
Aarabi

Dr. Mahmoud Salami
The Secretary General
Msala Mi

شماره:

تاریخ:

دانشگاه تبریز

انجمن زیست شناسی ایران

بنام خدا

گواهی می شود آقای /خانم بهناز برزگرزاده، حمیرا حاتمی، غلامرضا دهقان

در نوزدهمین کنگره ملی و هفتمین کنگره بین المللی زیست شناسی ایران

که در تاریخ ۱۱-۹ شهریور ۱۳۹۵ در دانشگاه تبریز برگزار گردید، با ارائه **سخنرانی** با عنوان زیر شرکت نمودند:

اثر ریزتزریق کورکومین بر بهبود حافظه فضایی طی بیماری مالتیپل اسکلروزیس در رت‌های نر

This is to certify that Behnaz Barzegarzadeh, Homeira Hatami, Golam-Reza Dehgan

Have attended the 19th National and 7th International Biology Congress,

University of Tabriz, Iran and presented the following paper:

The effect of curcumin microinjection on spatial memory improvement during multiple sclerosis in male rats

Dr M. Sharifi
Head of Iranian Biology Society

Dr R. Hajiboland
Secretary of Congress

نوزدهمین و هفتمین
کنگره ملی و بین المللی
زیست شناسی ایران
19th National & 7th International
Congress of Biology, Iran

IUMS CMRC INSS

5th Basic and Clinical NEUROSCIENCE Congress 2016

December 7-9, 2016 Razi Hall, Tehran, Iran

This is to certify that

Behnaz Barzegarzadeh

Had a Poster Presentation Entitled:

"Investigating the Microinjection Effect of Curcumin-Linoleic Acid on Spatial Memory in Multiple Sclerosis Model of Male Rats"

Participated at the 5th Basic and Clinical Neuroscience Congress

7 - 9 Dec. 2016 Tehran, Iran

Prof. Mohammad Taghi Joghataie
Chairman

Dr. Ali Yoonessi
Basic Scientific Secretary

Dr. Mohammad Ghadiri
Clinical Scientific Secretary

Submission Confirmation

Print

Thank you for your submission

Submitted to	Archives Of Physiology And Biochemistry
Manuscript ID	NAPB-2017-0016
Title	Lino-Curcumin Attenuates Ethidium Bromide Neurotoxicity in Both Biochemical and Behavioral Levels in Rat Brain
Authors	barzegarzadeh, behnaz Hatami, homira
Date Submitted	31-Jan-2017

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Dr. G. Dehghan

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Dr. S.M. Banan

Dr. M. Khoobi

❖ My Professors:

Dr. G. Zarrini

Dr. F. Sheikhzadeh

Dr. R. Khakpay

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Miss. S. Moghimiazar

Miss. S.N. Fotuhi

Mr. Y. Alipour

Dr. M.A. Doctorzadeh

Thanks for Your Consideration

Any Question