

INTRODUCTION

ALZHEIMERS DISEASE (AD)

DONEPEZIL HCL

INTRANASAL ROUTE

LIPOSOMAL FORMULATION

- Alzheimer's disease is a progressive neurodegenerative disease which can be diagnosed in elderly patients affected with memory loss.
- Donepezil hydrochloride is an acetylcholinesterase inhibitor and increases the acetylcholine concentration in the brain.

LIPOSOMES

LIPOSOME

- Liposomes are spherical vesicle structures composed of a uni or multilamellar lipid bilayer.
- Liposomes are useful drug delivery carriers due to biocompatible and nontoxic nature, can deliver both hydrophilic and lipophilic drug molecules and transport them across biological membranes and the blood brain barrier.

IN-SITU GEL

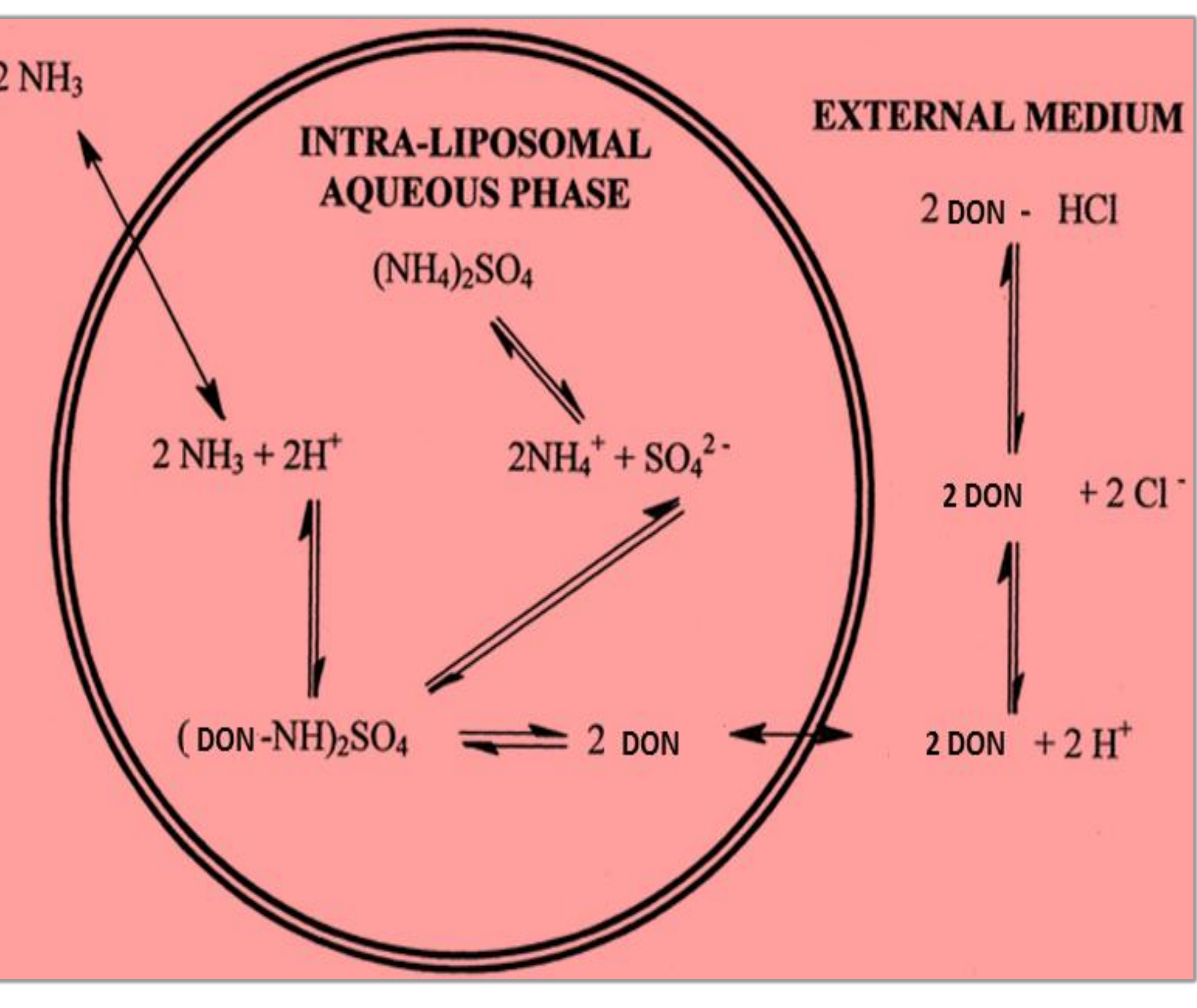
IN-SITU GEL

- In-situ gel is in a sol form before administration in the body and transform into a gel form after reaching to the target site
- Advantages include sustain drug action, reduce the dose and frequency of administration and improve a patient compliance

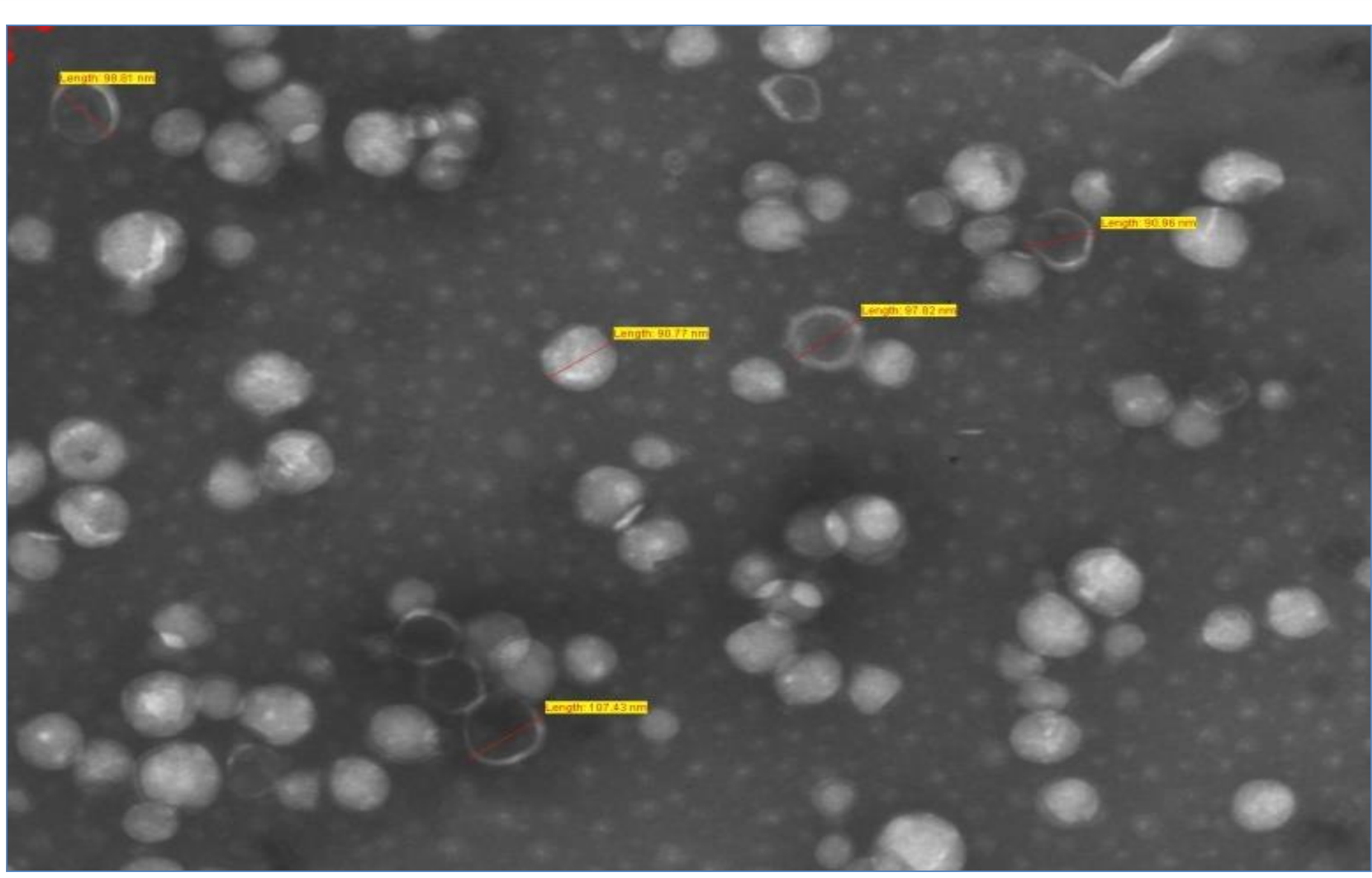
PREPARATION OF LIPOSOMES

- MLVs Formation by Ethanol Injection
- Particle size reduction by HPH
- Dialysis: Removal of Extra-liposomal Buffer
- Active drug loading

ACTIVE LOADING OF DONEPEZIL HCL



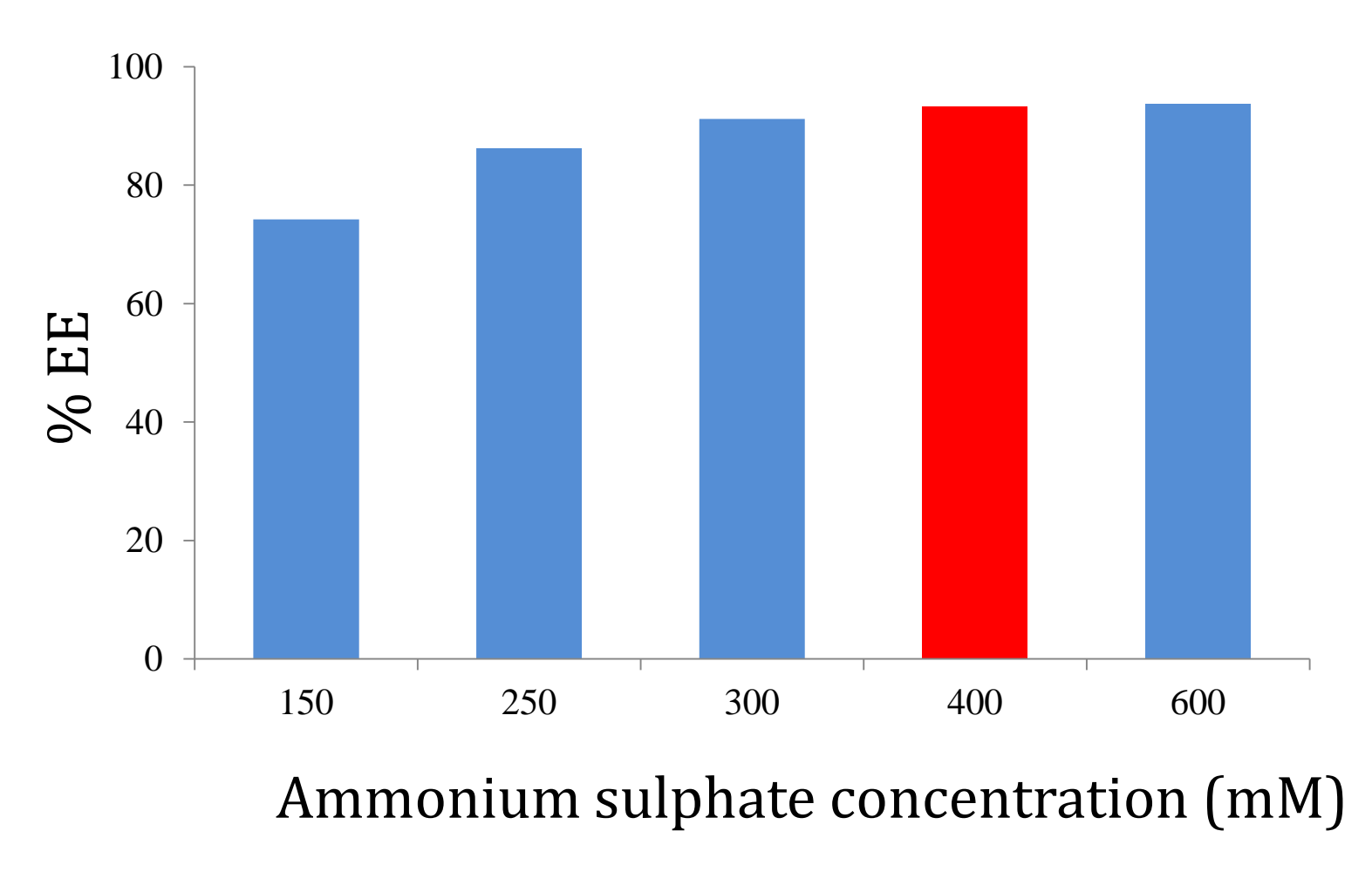
TEM OF DONEPEZIL LIPOSOME



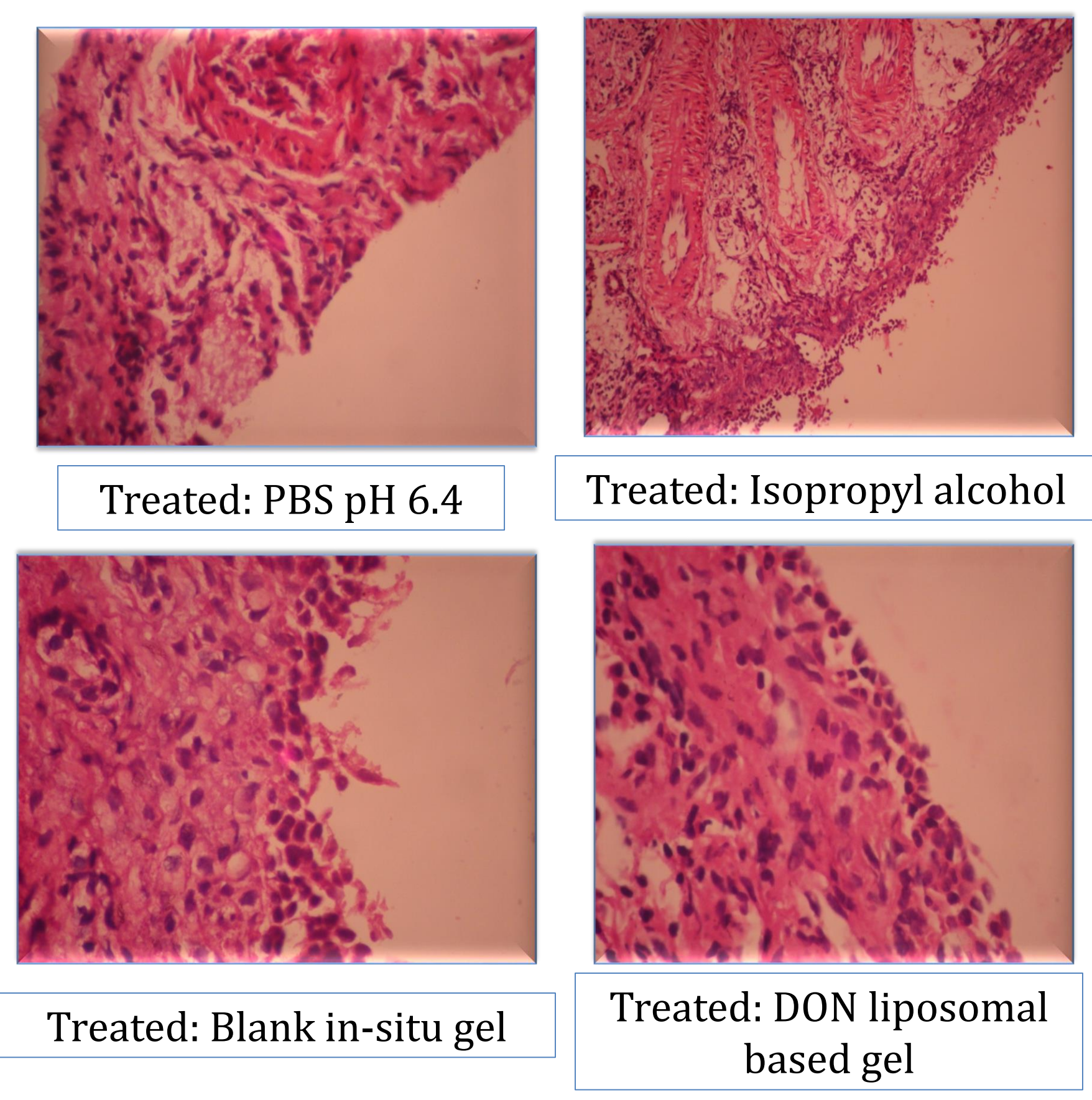
LOADING METHODS STUDY

Parameter	Active Loading	Passive Loading
Particle size (nm)	96.82	100.8
Entrapment efficiency (%)	86.25	31.25
PDI	0.123	0.192

AMMONIUM SULPAHTE CONCENTRATION STUDY



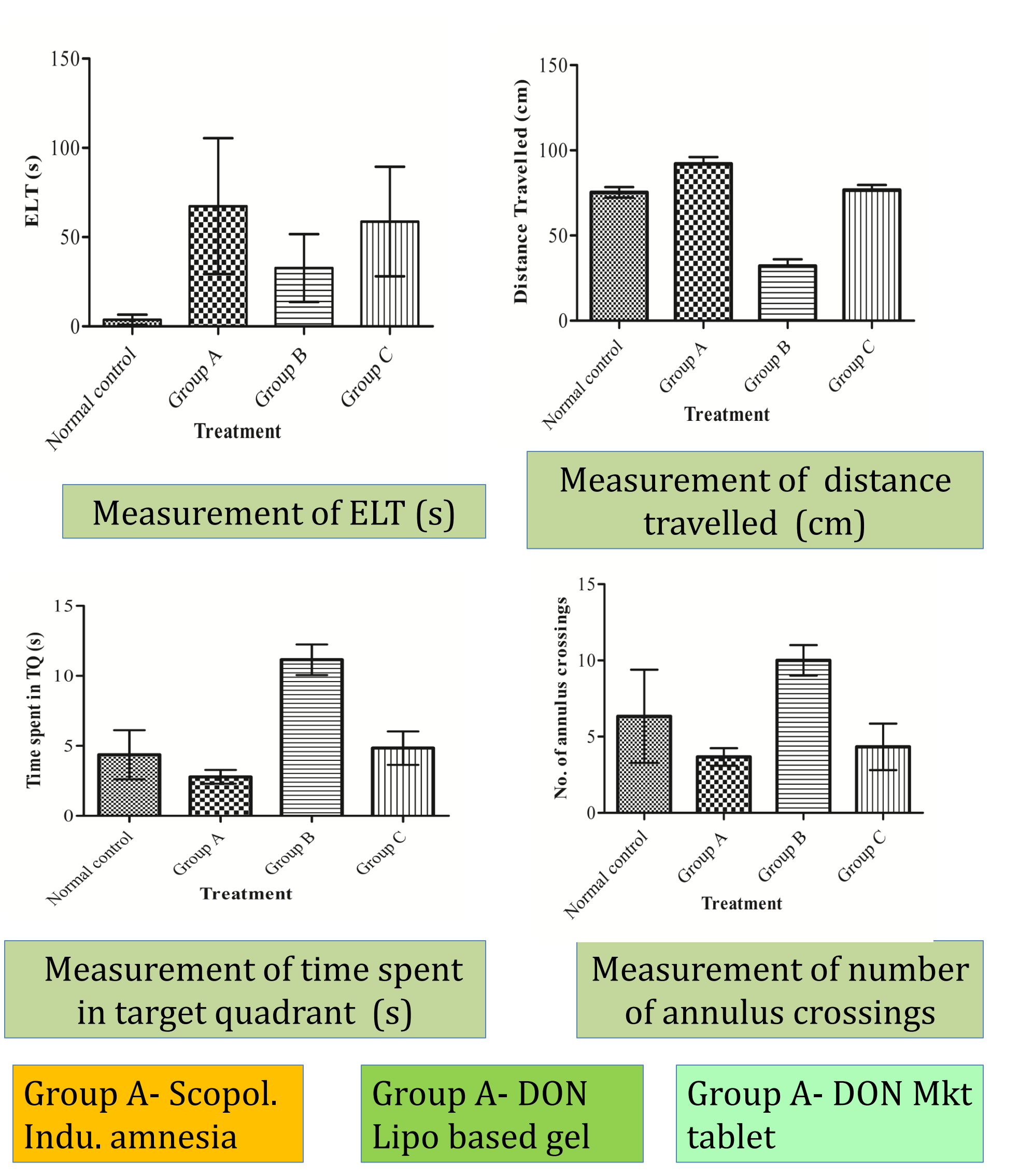
NASAL CILIOTOXICITY STUDY



REFERENCES

- Akbarzadeh A et al. Nanoscale Research Letters 2013, 8:102.
- Abdulrahman KA et al. Drug Design, Development and Therapy. 2016; 10:205-15.

PHARMACODYNAMIC STUDY



CONCLUSION

- To develop a brain-specific Donepezil liposomes, we designed novel liposomes with cholesterol and hydrogenated soya phosphotidylcholine (HSPC) for brain delivery.
- The liposomal system is having particles of a size 110 nm with entrapment efficiency of 90 %.
- The Donepezil liposomes was shown to be promising carriers due to the ability to load the compound, thus protecting the compound from degradation and in delivering the compound to the brain.
- DON liposome based in-situ gel showed 5.5 fold higher nasal permeation as compared to DON solution based gel.
- DON liposome based gel did not show toxicity and nasal mucosa was remained intact indicating its safety for intranasal administration
- In-vivo* efficacy tested in scopolamine induced amnesia model indicated significant improvement in cognitive function in rats treated with developed liposomal based formulation as compared to the marketed tablet