AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

NANOPARTICLE ENABLED DRUG DELIVERY SYSTEMS FOR ALZHEIMER'S DISEASE ADVANCING BEYOND THE BLOOD-BRAIN BARRIER

K RAGHUNATH
Research Scholar
Dr. Naresh Partap
(Associate Professor)
Glocal School of Science

Abstract

This study examines nanoparticle-enabled Alzheimer's drug delivery methods that cross the blood-brain barrier. The research investigates drug-loaded nanoparticles' ability to transfer therapeutic agents to the brain, addressing Alzheimer's treatment problems caused by the BBB.The approach uses hydrophilic, charged, and fluorescent markers Thioflavin-T (ThT) and D-Penicillamine with nanoparticles. Emulsion polymerization creates ThT-loaded core-shell latex particles that are stereotaxically injected into mice brains for in vivo investigations. The biodistribution of 125I-CQ BCA and nanoparticles is examined over time to determine their blood circulation and accumulation in important organs such the brain, liver, and spleen. Microemulsion precursors are used to conjugate D-Penicillamine to nanoparticles for Alzheimer's disease chelation treatment. Under different settings, nanoparticle stability and biological characteristics are examined. The study examines how D-Penicillamine prevents metal-induced beta amyloid protein precipitation and maintains amyloid beta solubility in CuCl2.Nanoparticle biodistribution patterns show their brain-reaching efficacy. Dentate gyrus ThT-loaded core-shell latex particles may be useful for Alzheimer's pathology research. D-Penicillamine-conjugated nanoparticles are stable and

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

prospective metal-induced amyloid beta aggregation inhibitors. The undertaking looks to improve nanoparticle-based drug delivery techniques for Alzheimer's disease treatment by penetrating the blood-mind barrier. These discoveries recommend explicit treatment procedures for this neurodegenerative condition might be investigated.

Keywords: *Blood–brain barrier, Nanoparticles, Alzheimer's disease, Targeted drug delivery, Central nervous system*

1. INTRODUCTION

The most widely recognized sort of dementia is Alzheimer's disease (Promotion). Promotion patients' social and conduct capacities are enormously influenced by mental misfortune. Aside from its social effect, Promotion puts huge monetary costs on patients, families, and the general public. The NIH assesses that 4.5 million Americans have Promotion, costing $100 billion every year. Considerably more disturbing is the assumption that 13.2 million more seasoned Americans will foster Promotion by 2050 assuming latest things proceed and no deterrent treatment is accessible. Because of the absence of organic signs of Promotion, indisputable analyses are made at post-mortem and novel treatment adequacy can't be broadened. The blood–brain barrier (BBB) endothelial cells' tight associations impede helpful ways to deal with the CNS. Polymeric biocompatible drug transporters have been utilized in malignant growth exploration to cross the BBB; but nanoparticulate drug transporter innovation stays immature in Promotion research. Polymeric nanoparticles can open tight BBB intersections, load drugs, and focus on Alzheimer's harming proteins, making them interesting Promotion research possibilities. Nanoparticles are 10-1000 nanometers wide. They give bone concrete antimicrobial qualities, treat malignant growth, and recognize proteins. Drug delivery utilizing nanoparticles has likewise been used to treat a few problems. Drugs can't cross the BBB without nanoparticles because of tight associations delivered by endothelial cells and carrier proteins, in contrast to other body regions. Nanoparticle drug delivery strategies improve BBB drug assimilation, which is their principal benefit. Moreover, nanoparticle-based sluggish delivery drug delivery strategies might lessen fringe harmfulness.

2. LITERATURE REVIEW

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

Ouyang et al. (2022) said that Alzheimer's disease (Promotion) is the most incessant neurological sickness overall and is rising inferable from populace maturing. Promotion treatment is restricted by unfortunate blood-cerebrum barrier porousness, critical medicine askew, and immunological irregularities. This audit examines four Alzheimer's etiology thoughts and three drug delivery issues. Moreover, this paper audits mind focusing on nano-drug delivery systems (NDDSs) techniques from the previous 10 years. Adsorption-interceded (cationic, soluble polypeptide, cell-infiltrating peptides) and carrier intervened (P-gp, GLUT1) strategies are utilized. It uncovers remarkable Promotion strategies such exosomes, infection like particles, and cell layer covering particles. Consequently, this survey will help scientists fathom central nervous system NDDS improvement and distinguish novel Promotion treatment courses.

Pardridge (2020) found that two blood-cerebrum barrier issues are behind the huge shortfall of Promotion treatment improvement. Since 98% of little atom prescriptions and ~100% of biologic drugs can't cross the BBB, BBB drug delivery innovation is fundamental for Promotion treatment improvement. Second, the drug business has not made BBB drug delivery innovation to give novel Promotion medicines that infiltrate mind parenchyma from blood. Less than 1% of Promotion medicine research endeavors utilize BBB drug delivery in 2020. Promotion is brought about by determined neuro-aggravation, insoluble amyloid-beta or tau clusters, and neuronal degeneration. New prescriptions that focus on these numerous Promotion areas and use BBB drug delivery innovation might assist with treating this staggering condition.

Ding et al. (2020)stated that the blood–brain barrier (BBB), a unique CNS structure, protects the brain against bloodborne infections due to its remarkable barrier qualities. However, this barrier reduces therapeutic effectiveness and makes neurodegenerative illness and brain cancer therapy development difficult. Drug carriers using nanoparticles (NPs) to traverse the BBB have been developed due to nanotechnology advances. Advances in NP-mediated non-invasive medication delivery for neurological illnesses are reviewed here. The various ingredients and unique properties of BBB are fully explained here. Additionally, adaptable drug nanocarriers with their latest uses and paths on diverse drug delivery techniques to bypass the BBB impediment are briefly

ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

explored. This work explains how nanoparticle characteristics help BBB medication distribution and advances nanotechnology-based nanomaterials for brain illness therapeutics.

Thangudu et al. (2020) inspected that painless medicines to treat the cerebrum related messes have been giving more critical consideration and it is an arising subject. Notwithstanding, beating the blood brain barrier (BBB) is a critical snag to a large portion of the remedial drugs to go into the cerebrum tissue, which essentially brings about lower collection of helpful drugs in the mind. Consequently, managing the enormous amount/portions of drugs raises more worries of unfriendly aftereffects. Nanoparticle (NP)- interceded drug delivery systems are viewed as likely method for upgrading drug transport across the BBB and to targeted cerebrum tissue. These systems offer more collection of remedial drugs at the growth site and delay dissemination time in the blood. In this survey, we sum up the ebb and flow information and headways on different nanoplatforms (NF) and examine the utilization of nanoparticles for effective cross of BBB to treat the mind related problems like cerebrum cancers, Alzheimer's disease.

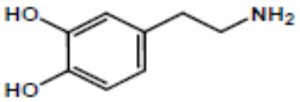
Wong et al. (2019) made sense of that "The blood–brain barrier (BBB), a novel CNS structure, safeguards the mind from bloodborne contaminations because of its wonderful barrier characteristics." This barrier diminishes remedial viability and frustrates neurodegenerative disease and cerebrum malignant growth treatment improvement. On account of nanotechnology, drug transporters that cross the BBB use nanoparticles (NPs). NP-intervened painless neurological drug delivery progresses are depicted here. The parts and particular highlights of BBB are itemized beneath. Moreover, versatile drug nanocarriers' ongoing applications and pathways to break the BBB are momentarily analyzed. Nanoparticle properties help BBB drug conveyance and improve nanotechnology-based nanomaterials for mind disease treatment.

3. ALZHEIMER'S DISEASE

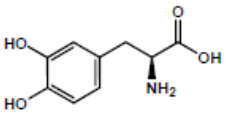
Alzheimer's disease (Promotion) is the main source of dementia, with more than 150 million victims assessed by mid-century. Promotion is a gradually advancing ND that blocks daily existence and social working. Numerous years pass before patients show memory hindrance over that run of the mill for their age bunch, a phase with a disturbing guess called mild cognitive

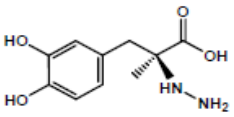
AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

impairment (MCI), and a lot more years before their mental capacities decline to a practically handicapping degree, with loss of spatial and worldly direction and verbal familiarity. Promotion is generally late-beginning and irregular; however some beginning stage familial structures have been depicted, for the most part connected to three causative qualities: Application, PSNE1, and PSEN2, which code for amyloid antecedent protein (Application), presenilin-1 (PSNE1), and presenilin-2 (PSNE2). Additionally noted are hereditary gamble factors such the "4 allele of apolipoprotein E (ApoE). There is no solution for Promotion, in this way the different medicines attempt to deal with the disease's side effects.

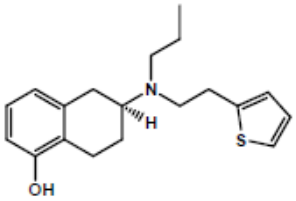


Dopamine Levodopa

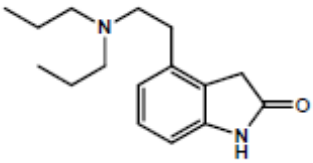




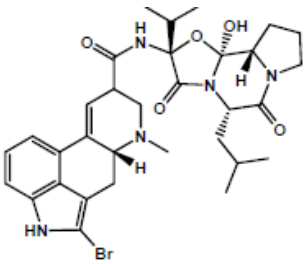
Carbidopa



Rotigotine



Ropinirole



Bromocriptine

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

As shown by naturally visible investigations, inconsistent Promotion frequently causes a mind weight reduction. Beginning stage and familial Promotion have more awful decay. Frequently, diffuse gyral decay and ventricular dilatation influence the worldly cortex, amygdala, hippocampus, and entorhinal cortex without hurting the occipital curve. During posthumous cerebrum assessment, intracellular neurofibrillary tangles (NFTs) and extracellular plaques of -amyloid peptide (A_) are found, which are connected to neuronal passing and debilitated synaptic associations. At solid levels, microtubule-related tau protein invigorates neuronal turn of events, while hyperphosphorylation causes NFTs, which are deadly. Tau total actuates neurodegeneration in neuronal axons, influencing Promotion advancement and movement. The A_ overflow speculation expresses that Application, a transmembrane glycoprotein with 770 amino acids, is catalyzed by _-secretase and afterward - secretase at the protein's N-and C-ends to frame A_ plaques. In vitro and in vivo, the strong self-accumulating _-amyloid peptide A_1-42 is neurotoxic after Application cleavage. Dimers, oligomers, protofibrils, and develop fibrils make A_ totals from A_ monomers. A_1-42 gathering causes synaptic interruption, neuronal injury, and decreased cholinergic synapse discharge. The cholinergic system is significant to learning; consequently cholinergic dysfunctions are the significant reason for memory shortages in Promotion patients. Numerous Promotion medicines plan to reestablish cholinergic neurotransmission.

3.1.Genomics and proteomics of AD

The amyloid antecedent protein (Application) creates the amyloid beta peptide ordinarily. The amyloid antecedent protein quality is on chromosome 21, as delineated. Transformations in the quality creating Application happen at these cleavage destinations, causing deviant intramembranous handling of Application and extracellular Ah statement. These transformations influence Ah self-collection into amyloid fibrils. The presenilin proteins (PS1 and PS2, on chromosomes 14 and 1, separately) likewise influence Application digestion through g-secretase. In hereditarily adjusted mice, the E4 is form of apolipoprotein E (chromosome 19) produces Aß fibrils, as per Fagan et al. These components improve amyloid beta peptide part (1-42) union and aggregation. Ok (1-42) oligomerizes and frames boundless plaques in the synaptic locale. Oxidative pressure, neuronal misfortune, and dementia follow microglial enactment and synaptic harm.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

3.2.The metallochemistry of AD/oxidative stress

The psyche contains film bound, added up to (Ah 1-42), and dissolvable Ah peptides. Diseased people have added up to and dissolvable peptide, while strong people have film bound Ah. In Advancement, a couple of metals are accessible at phenomenally certain levels in the neocortex. Common brain metallation increases with age. Alright neurotoxicity is associated with progress metals like copper, iron, and zinc. Dyshomostasis, not topological receptiveness to these particles, may cause Advancement. Copper could agglomerate Ah under acidic circumstances considering the way that Ah is physiologically connected with Cu2+. AhCu2+ diminishes Cu2+ and Fe3+ with oxygen and endogenous diminishing artificial materials to make H2O2. H2O2 enters cell movies and designs staggeringly open hydroxyl progressives (Fenton reaction) that hurt DNA and adjust proteins and lipids in case not catalyzed. Apoptosis is moreover achieved by H2O2 entrance through the cell layer. The Ah (1-42) has a more noticeable copper limiting preferring than the Ah (1-40), which could get a handle on its leaned toward combination. Alright's neurochemistry with iron is like copper's. Zinc speeds up beta amyloid declaration on account of pH change. Zinc's redox-lethargy hinders H2O2 age, another critical qualification from various metals. Thus, zinc is a malignant growth counteraction specialist in Ah physiology. Zinc rivals copper for Ah limiting objections, frustrating H2O2 age. Zinc isn't moved adequate there of psyche to annihilate Ah neurotoxicity.

4. BLOOD–BRAIN BARRIER

The mind's homeostatic protection against diseases and toxic substances is the blood-brain barrier (BBB). BBB is perplexing and profoundly controlled, screening biochemical, physicochemical, and underlying qualities of solutes at its outskirts to give particles access to the cerebrum parenchyma specifically. Early BBB discoveries in mice uncovered its organic nature and offered bits of knowledge into its working. Electron microscopy of detached cerebral cortices after intravenous horseradish peroxidase (HRP) infusion uncovered exogenous HRP in the vascular space and endothelial cell pinocytotic vacuoles. A blood-mind barrier was recommended by the shortfall of peroxidase outside the vascular endothelium and the compound's nonappearance from pinocytotic vacuoles.

4.1.Biology of the BBB

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

Angiogenesis — the formation of blood vessels from edifices — makes cerebral vessels. Fig. 1 portrays mind vessels, while Fig. 2 delineates BBB qualities. Endothelial cells (EC) infiltrate the ECM and obliterate the storm cellar film to lay out a microvascular network and multiply during angiogenesis. Endothelial cell multiplication is neurally impacted. These give the BBB its physiological elements, recognizing cerebral EC from fringe EC. For example, mind EC contains less endocytotic vessels than fringe EC, restricting BBB transcellular stream.

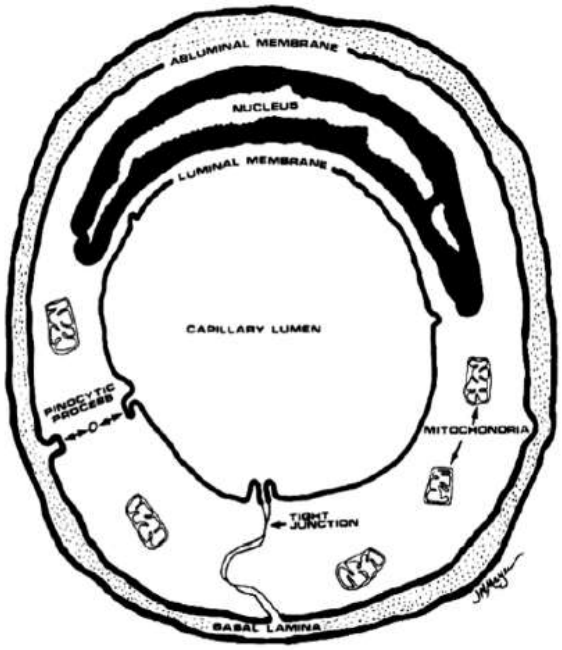


Figure 1: The BBB's strong connections and absence of pinocytic vacuoles are seen in this schematic of the cerebral capillaries. Observe that the mitochondria are denser in cerebral EC compared to peripheral EC. Additional metabolic effort might be needed to maintain BBB ionic gradients.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

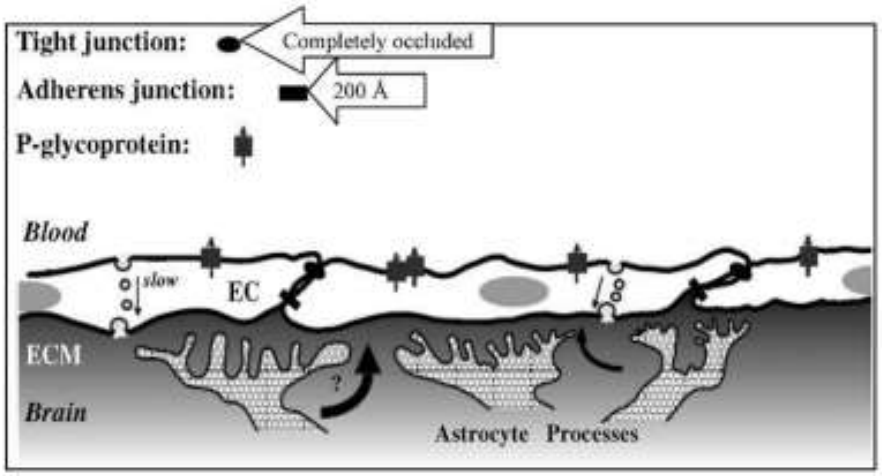


Figure 2: Features of BBB. At 200 A˚, BBB ECs use completely blocked and adherent tight junctions. More TJ electrical resistance slows paracellular brain material transport. TJ and adhesion proteins help cells stick. Astrocytes around capillaries alter EC migration. Some asked if BBB had astrocytes. Astrocytes are 20 nm apart, disproving it. Apical EC membrane P-glycoproteins release brain neurotransmitters.

Impeded tight intersections, which block paracellular stream, interface mind endothelial cells. As talked about previously, cerebral EC structure decides BBB particularity. Cerebral EC have more mitochondria than fringe EC, expanding metabolic weight to support BBB ionic slopes. Contractile pericytes line cerebral vessels' external hub. Since pericytes screen blood stream, their adherence to the microvasculature in a roundabout way balances EC action and BBB dealing. Pericytes can diminish cell multiplication to control endothelial development. Oddly, by advancing angiogenesis. Astrocytes encompass around the vast majority of the basal narrow layer and prompt significant paracellular electrical opposition in the BBB. Astrocytes are 20 nm from the EC and pericytes. Solute transportation is additionally helped by the three cells' communication. Atomic pathway into mind from blood includes going past astrocytic cycles, into prompt perivascular locales, and onto slim pericytes. Consequently, astrocyte and pericyte plasma film carriers, receptors, and catalysts control solute destinies before they arrive at the EC.

5. NANOPARTICLES AND ALZHEIMER'S DISEASE

5.1.Quinoline derivatives

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

Quinolines, utilized as anti-infection agents, battle jungle fever. Clioquinol (5-chloro-7-iodo-8-hydroxyquinoline, CQ) is a Cu/Zn chelator

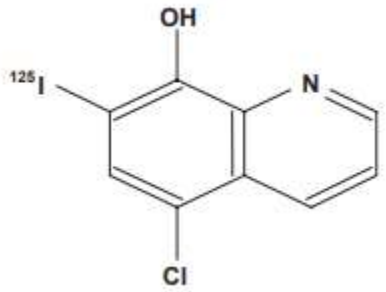


Figure 3: Structure of 125I-Clioquinol.

disintegrate Ah plaques in vitro and forestall Ah development in Promotion transgenic mice. Cherny et associates. Affirmed comparative impacts in their Promotion CQ studies. In vitro, CQ broke up Ah (1-40) totals brought about by Zn2+ or Cu2+ yet couldn't resolubilize the peptide at pH 5.5, which animates hsheet arrangement. CQ-Ah restricting was inspected by NMR spectroscopy. The histidine-containing metal-restricting Ah portion (1-28) was picked for spectroscopic examination. NMR showed CQ wiped out Ah-bound Cu2+ (1-28). NMR showed that CQ ties histidine buildups yet not peptide. Furthermore, CQ was treated with after death human Promotion cerebrum homogenates to identify peptide solubilization. Cherny et al. seen that CQ delivered Ah40 and Ah42 in the solvent stage. CQ was orally managed to matured APP2576 transgenic (Tg) mice with cutting edge Ah statement for quite a long time. After CQ treatment, Ah affidavit in the APP2576 Tg mouse diminished. Serum Ah levels were extensively lower in CQ-treated rodents than controls, and serum Ah associated with mind Ah. Ultracentrifugation (45 K rpm, 1 h) and 0.2 Am separating cleansed this arrangement. 1% Tween-80 water was utilized to wash and redisperse the pellet. Before in vivo delivery, PBCA nanoparticles were blended for 30 min in PBS with 1% Tween-80 to cover them. A Zetasizer 3000 HS (Malvern, UK) estimated the molecule size of 1 mg of nanoparticles infused intravenously. Void PBCA nanoparticles have 20 nm Rh. Rh= 36.7 nm in the wake of stacking with Congo Red (CR); Rh= 23.5 nm in the wake of stacking with Thioflavin-S (ThS); Rh= 39.3 nm in the wake of stacking with ThT. Drug stacking of PBCA nanoparticles with amyloid colors didn't fundamentally impact NP sizes. PBCA NPs

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

loaded down with radiolabelled quinoline subordinates 125I-CQ were intravenously given to mice. Drug transport across the BBB was accomplished through NPs.

5.2.Thioflavin-T

Thioflavin-T (ThT), a hydrophilic, charged, fluorescent marker, has been utilized to recognize Ah in feeble plaques. Hartig et al. straightforwardly infused butylcyanoacrylate polymer-typified ThT NPs into mouse minds intrahippocampally and checked photoconversion of ThT in fixed tissues. Emulsion polymerization created center shell plastic particles.

Table 1:125I-CQ BCA nanoparticles' biodistribution in mice

%ID/g	3min	16min	2h
Blood	10.96± 2.36	6.25 ± 1.55	2.36 ± 1.36
Brain	3.63 ± 0.36	0.256 ±0.36	0.36 ± 0.36
Liver	15.36 ± 1.36	7.25 ± 2.36	3.25 ± 1.36
Spleen	2.36 ± 0.56	2.13 ± 0.36	1.25 ± 0.55

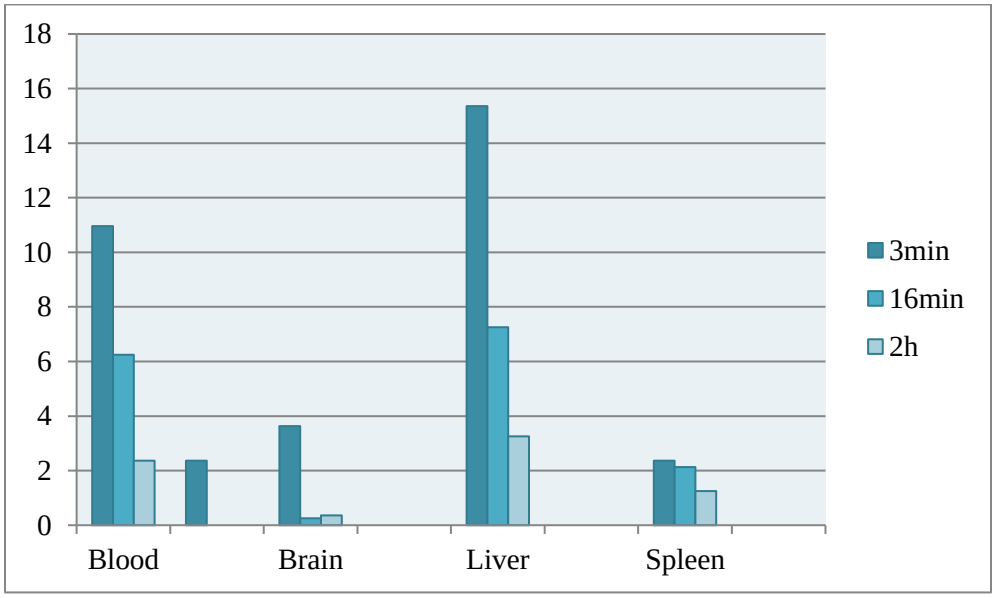


Figure 4:125I-CQ BCA nanoparticles' biodistribution in mice

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

Table 2:125I-CQ's biodistribution in mice

%ID/g	3min	16min	2h
Blood	8.56± 2.56	5.25 ± 1.55	4.36 ± 1.86
Brain	3.53 ± 0.26	1.256 ±2.36	1.56 ± 0.36
Liver	13.36 ± 1.56	7.25 ± 2.56	3.25 ± 1.66
Spleen	2.66 ± 0.46	5.13 ± 0.56	1.95 ± 0.55

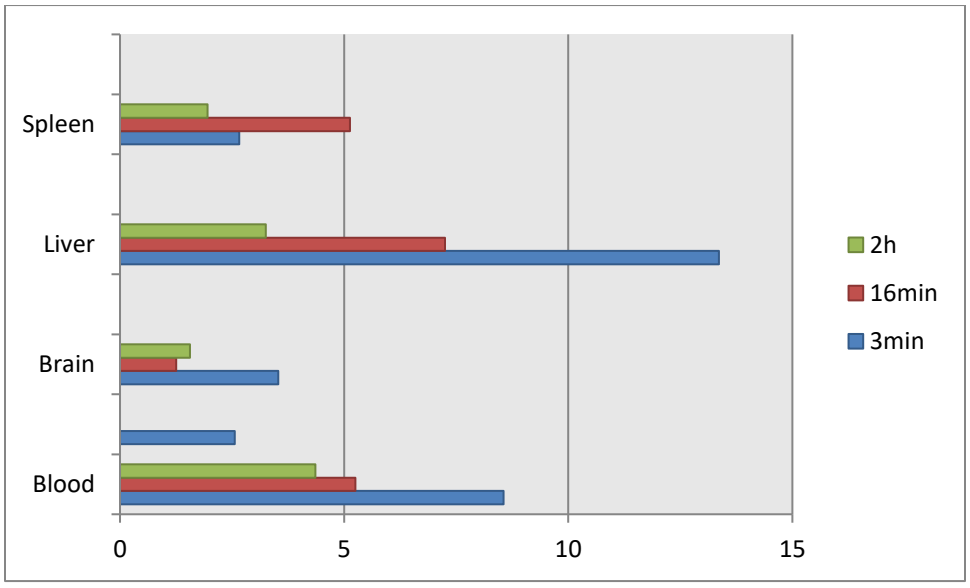


Figure 5: 125I-CQ's biodistribution in mice.

styrene in ThT-containing water-ethanol. These particles were utilized in cultivated, watery butylcyanoacrylate (BCA) polymerization with ThT. Mice were stereotaxically infused with center shell NPs into the hippocampus. The minds were fixed 3 days after infusion, and the NPs were restricted by photoconversion of ThT in an oxygen-rich climate. Photoconverted NPs were distinguished in the dentate gyrus by light microscopy, and vacuoles were found in the cytoplasm encompassing plastic nanoparticles. TEM showed NPs in microglia and neurons. Also, the powerful TEM showed ThT delivery from NPs. The writers exhort utilizing ThT center filled plastic particles to concentrate on Ah's intracellular and extracellular creation and affidavit. These

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

NPs have not been controlled to the mind through the systemic course, yet their substance likeness to butylcyanoacrylates, which cross the BBB after intravenous treatment, proposes this procedure might identify Ah.

5.3.D-Penicillamine

Age increments cerebrum metal particle focus, which kills Promotion minds. Copper focuses cause oxidative pressure, which produces deadly hydroxyl revolutionaries that harm DNA, proteins, and lipids. GPC estimated formation. GPC-purged d-penicillamine formed PDP-nanoparticles were tried for steadiness at 48 and 25 8C and in salt and serum answers for evaluate their organic properties. After CuCl2 caused Ah (1-42) to total, examples were hatched with control (no chelator), EDTA, d-penicillamine connected PDP-NPs, or PDP-NPs. Centrifuged tests were registered to decide the percent Ah in the dissolvable supernatant (% resolubilized). Polymerized MPB-PE or PDP-PE nanoparticles combined with d-penicillamine were portrayed for collection, stockpiling, and pH responsiveness. The thioether and sulfhydryl bunches associated d-penicillamine to MPBPE or PDP-PE. The - SH moiety, which is less steady than MPB-PE's thioether bond, was tried for cleavage with diminishing specialists on PDP-NP. GPC segment co-elution of d-penicillamine with NPs affirmed formation, and NPs were steady under testing conditions. While holding NPs at b100 nm, MPB-PE and PDP-PE stacking was restricted to 10% (w/w).

6. CONCLUSION

This exhaustive review analyzes the complicated connection between nanoparticle medication delivery and the blood-brain barrier (BBB) in Alzheimer's disease (Promotion). The examination goes from BBB science to the use of nanoparticles like D-Penicillamine, Thioflavin-T (ThT), and quinoline subsidiaries to track down powerful medicines. Research on the BBB has shown that it safeguards the mind parenchyma by permitting explicit synthetic compounds to enter while intently restricting solute consumption. Blockages tight intersections and cell collaborations influence the BBB's selectivity and cerebrum material vehicle control. The examination on the biodistribution of 125I-CQ BCA nanoparticles and 125I-CQ in mice enlightens their flow elements and amassing in significant organs, prompting nanoparticle applications. Intrahippocampal

ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

infusions of center shell plastic particles stacked with ThT show guarantee for concentrating on Alzheimer's disease pathophysiology. The review uncovers that Clioquinol (CQ) can break up Ah plaques in vitro and in transgenic mice. D-Penicillamine and nanoparticle chelation treatment may likewise restrain metal-instigated beta amyloid protein precipitation. This multipronged study works on how we might interpret the BBB and proposes utilizing nanoparticle-empowered drug delivery techniques to treat Alzheimer's disease. The discoveries demonstrate the way that nanotechnology can further develop neurodegenerative disease treatment and recommend future examination and custom fitted medicines. This study improves how we might interpret Alzheimer's disease and the requirement for creative medicine delivery components to sidestep the blood-mind barrier and distinguish successful medicines.

REFERENCES

1. *Birks, J.S.; Chong, L.Y.; Grimley Evans, J. Rivastigmine for Alzheimer's disease. Cochrane Database Syst. Rev. 2015, CD001191.*
2. *Daulatzai, M.A. Pharmacotherpy and Alzheimer's disease: The M-drugs (melatonin, minocycline, modafinil, and memantine) approach. Curr. Pharm. Des. 2016, 22, 2411–2430.*
3. *Ding, S., Khan, A. I., Cai, X., Song, Y., Lyu, Z., Du, D. ... & Lin, Y. (2020). Overcoming blood–brain barrier transport: Advances in nanoparticle-based drug delivery strategies. Materials today, 37, 112-125.*
4. *Dugger, B.N.; Dickson, D.W. Pathology of neurodegenerative diseases. Cold Spring Harb. Perspect. Biol. 2017, 9, a028035.*
5. *Haake, A.; Nguyen, K.; Friedman, L.; Chakkamparambil, B.; Grossberg, G.T. An update on the utility and safety of cholinesterase inhibitors for the treatment of Alzheimer's disease. Expert Opin. Drug Saf. 2020, 19, 147–157.*
6. *Hayes, M.W.; Fung, V.S.C.; Kimber, T.E.; O'Sullivan, J.D. Updates and advances in the treatment of Parkinson disease. Med. J. Aust. 2019, 211, 277–283.*

ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

7. *Matsunaga, S.; Kishi, T.; Nomura, I.; Sakuma, K.; Okuya, M.; Ikuta, T.; Iwata, N. The efficacy and safety of memantine for the treatment of Alzheimer's disease. Expert Opin. Drug Saf. 2018, 17, 1053–1061.*
8. *Naseer, M.I.; Ullah, I.; Narasimhan, M.L.; Lee, H.Y.; Bressan, R.A.; Yoon, G.H.; Yun, D.J.; Kim, M.O. Neuroprotective effect of osmotin against ethanol-induced apoptotic neurodegeneration in the developing rat brain. Cell Death Dis. 2014, 5, e1150.*
9. *Ouyang, Q., Meng, Y., Zhou, W., Tong, J., Cheng, Z., & Zhu, Q. (2022). New advances in brain-targeting nano-drug delivery systems for Alzheimer's disease. Journal of Drug Targeting, 30(1), 61-81.*
10. *Pardridge, W. M. (2020). Treatment of Alzheimer's disease and blood–brain barrier drug delivery. Pharmaceuticals, 13(11), 394.*
11. *Pinheiro, L.; Faustino, C. Therapeutic strategies targeting amyloid-_ in Alzheimer's disease. Curr. Alzheimer Res. 2019, 16, 418–452.*
12. *Poovaiah, N.; Davoudi, Z.; Peng, H.; Schlichtmann, B.; Mallapragada, S.; Narasimhan, B.; Wang, Q. Treatment of neurodegenerative disorders through the blood-brain barrier using nanocarriers. Nanoscale 2018, 10, 16962–16983.*
13. *Soria Lopez, J.A.; González, H.M.; Léger, G.C. Alzheimer's disease. Handb. Clin. Neurol. 2019, 167, 231–255.*
14. *Thangudu, S., Cheng, F. Y., & Su, C. H. (2020). Advancements in the blood–brain barrier penetrating nanoplatforms for brain related disease diagnostics and therapeutic applications. Polymers, 12(12), 3055.*
15. *Wong, K. H., Riaz, M. K., Xie, Y., Zhang, X., Liu, Q., Chen, H., ... & Yang, Z. (2019). Review of current strategies for delivering Alzheimer's disease drugs across the blood-brain barrier. International journal of molecular sciences, 20(2), 381.*

Author's Declaration

I as an author of the above research paper/article, hereby, declare that the content of this paper is prepared by me and if any person having copyright issue or patentor anything otherwise related to the content, I shall always be legally responsible for any issue. For the reason of invisibility ofmy research paperon the website/amendments/updates, I have resubmitted my paper for publication on the same date. If any data or information given by me is not correct, I shall always be legally responsible. With my whole

ISSN: 2320-3714
Volume: 4 Issue:3
December 2023
Impact Factor: 10.2
Subject: Chemistry

responsibility legally and formally I have intimated the publisher (Publisher) that my paper has been checked by my guide (if any) or expert to make it sure that paper is technically right and there is no unaccepted plagiarism and hentriacontane is genuinely mine. If any issue arises related to Plagiarism /Guide Name /Educational Qualification / Designation /Address of my university/college/institution/Structure or Formatting/ Resubmission / Submission /Copyright / Patent/Submission for any higher degree or Job/Primary Data/Secondary Data Issues. I will be solely/entirely responsible for any legal issues. I have been informed that the most of the data from the website is invisible or shuffled or vanished from the data base due to some technical fault or hacking and therefore the process of resubmission is there for the scholars/students who finds trouble in getting their paper on the website. At the time of resubmission of my paper I take all the legal and formal responsibilities, If Ihide or do not submit the copy of my original documents (Aadhar/Driving License/Any Identity Proof and Photo) in spite of demand from the publisher then my paper may be rejected or removed from the website anytime and may not be consider for verification. I accept the fact that as the content of this paper and the resubmission legal responsibilities and reasons are only mine then the Publisher (Airo International Journal/Airo National Research Journal) is never responsible. I also declare that if publisher finds any complication or error or anything hidden or implemented otherwise, my paper maybe removed from the website or the watermark of remark/actuality maybe mentioned on my paper. Even if anything is found illegal publisher may also take legal action against me

K RAGHUNATH
Dr. Naresh Partap

******