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A review on raft forming drug delivery system - Mechanism and its significance

Ancy Andrew*

Department of Pharmaceutical Sciences, Marri Laxman Reddy Institute of Pharmacy, Hyderabad, Telangana, India

REVIEW

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Corresponding Author:
Ancy Andrew
Department of Pharmaceutical Sciences,
Marri Laxman Reddy Institute of Pharmacy,
Hyderabad, Telangana, India
ancyramani@gmail.com

ABSTRACT

The raft forming system is one of the most practical and favoured methods for generating a long-lasting and predictable medication delivery profile in the GI tract. To overcome the limits of existing oral drug delivery methods, a gastro retentive drug delivery system has been developed, which has the potential to revolutionise medication and provide a variety of therapeutic benefits. Many obstacles face the gastro-retentive drug delivery system, which can be overcome by a new approach called the raft forming system. This method is used to deliver antacids and medications for the treatment of gastrointestinal infections and diseases. The mechanism of this system entails the formation of a viscous cohesive gel in contact with stomach fluids, in which each particle of the liquid expands in contact with gastric fluids, forming a continuous layer known as "RAFT." Because of the low bulk density caused by the production of carbon dioxide, this raft floats in gastric juices.

This technique can release a pharmacological molecule continuously, resulting in usually constant plasma profiles. By localising the drug to the site of action, lowering the dose required, or delivering uniform drug administration, the goal of this system's design is to reduce dosing frequency or increase therapeutic effectiveness.

Key Words

Raft forming drug delivery system, Gastro retentive system, Sustained release, Gastric residence and emptying time

Introduction

Drugs that must be developed as gastro retentive systems function locally in the stomach and are quickly absorbed from the gastrointestinal tract. Various controlled release gastro retentive drug delivery systems, such as sinking systems, floating systems, mucoadhesive systems, and swellable systems, have all been attempted technologically. Because it is one of the most practical and favoured strategies for achieving a continuous and predictable drug delivery profile across the GI tract, the raft forming system has been the most commonly used of these systems. Alginates, Alginic acid, and Pectin are all employed in the production of rafts[1].

Raft Formation Based on Physical Mechanism

Swelling

When materials absorb water from the surrounding environment and expand to fill a desired space, this is known as in situ gel formation.

Diffusion

It involves the diffusion of a solvent from a polymer solution into the surrounding tissue, which causes the polymer matrix to precipitate or solidify. In this case, N-Methyl Pyrolidone is a polymer solution that can be used.

Raft Formation Based on Physiological Stimuli

pH dependent gelling

Gel formation in the system can also be caused by changes in the medium's pH. In order to create an in situ gel, the system employs a variety of pH-dependent polymers. With a change in pH, certain polymers, such as PAA and its derivatives, polyvinylacetaldiethylaminoacetate, and mixes of poly (methacrylic acid) (PMA) and poly (ethylene glycol) (PEG), shift from sol to gel. As the external pH rises, so does the swelling of the hydrogel[2].

Temperature dependent gelling

These hydrogels are liquid at room temperature (20°C-25°C) but gel when they come into contact with bodily fluids (35°C-37°C) due to a temperature increase. In comparison to polymer–polymer and water–water interactions, hydrogen bonding between the polymer and water becomes unfavourable at the LCST, and an abrupt transition

occurs as the solvated macromolecule rapidly dehydrates and transitions to a more hydrophobic structure.

Because of polymer–polymer interactions, some amphiphilic polymers that self-assemble in solution exhibit micelle packing and gel formation when the temperature is raised. For temperature sensitive hydrogel production, polymers such as pluronics (poly (ethylene oxide) – poly (propylene oxide)–poly (ethylene oxide) (PEO–PPOPEO Triblock) are utilised. In polymer networks of poly (acrylic acid) (PAA), polyacrylamide (PAAm), or poly (acrylamide-co-butyl methacrylate), swelling is temperature dependent[3,4].

Drugs Suitable for Raft Forming System

1. Drugs with a small absorption window in the gastrointestinal tract, such as riboflavin and levodopa.
2. Calcium supplements, chlordiazepoxide, and cinnarazine are examples of drugs that are absorbed largely from the stomach and upper part of the GIT.
3. Antacids and Misoprostol are examples of drugs that act locally in the stomach.

Advantages of Raft Forming System

1. Raft formation can easily achieve rapid and long-duration action.
2. It will not affect the pyloric sphincter's function.
3. It is possible to improve patient compliance. They're utilised to relieve the symptoms of heartburn and esophagitis. Backflow of stomach contents into the laryngeal and pharyngeal region is referred to as GERD, or Laryngopharyngeal Reflux.

Limitations of Raft Forming System

1. These systems are written in the form of a solution, which makes them more prone to stability issues. Microbial or chemical degradation causes these (oxidation, hydrolysis, etc.). As a result, they must be properly stored.
2. The exposure of particular polymers to radiations causes the gel to form within the package (e.g. UV, Visible, Electromagnetic, etc.).

Conclusion

As a result, it can be stated that raft-forming gastroretentive drug delivery has a number of potential benefits for drugs with low bioavailability since they can be given efficiently, maximising absorption and increasing absolute bioavailability. As a result, these dose forms can be said to be the most effective for treating GIT disorders and getting a longer action out of a medicine with a short half-life.

References

1. Yaswantrao PA, Khanderao J, Manasi N. A Raft Forming System: A novel approach for gastroretention. Int J Pure Appl Biosci. 2015;3(4):178-192.
2. Bhavsar DN. Advances in GRDDS: Raft forming system a review. J Drug Deliv Ther. 2012;2(5);123-128. doi: https://doi.org/10.22270/jddt.v2i5.228
3. Prajapati VD, Jani GK, Khutliwala TA, et al. Raft forming system - An upcoming approach of gastroretentive drug delivery system. J Control Release. 2013;168(2):151-65. doi: https://doi.org/10.1016/j.jconrel.2013.02.028
4. Prinderre P, Sauzet C, Fuxen C. Advances in gastro retentive drug-delivery systems. Expert Opin Drug Deliv. 2011;8(9):1189-203. doi: https://doi.org/10.1517/17425247.2011.592828

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