LAPORAN PRE CONFERENCE WORKSHOP NANOMEDICINE AND PHARMACEUTICAL NANOTECHNOLOGY

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UNIVERSITAS ESA UNGGUL
OKTOBER 2018

LAPORAN PRE CONFERENCE WORKSHOP NANOMEDICINE AND PHARMACEUTICAL NANOTECHNOLOGY

Tempat : Kampus Universitas Inslam Indonesia, Gedung MIPA, Jl kaliurang Km 14,5 Sleman Yogyakarta

Penyelenggara : Departemen Nanoteknologi Prodi Farmasi Fakultas MIPA Universitas Islam Indonesia, Yogyakarta

Tanggal Kegiatan : 3-4 Oktober 2018

Deskripsi Kegiatan :

Workshop ini mendiskusikan tentang perkembangan nanoteknologi selama dua hari yang bermanfaat untuk para peneliti, akademisi, praktisi industi farmasi. Para peserta mempelajari karakterisasi pengukuran nano dengan metode DLS dan SEM, membuat formulasi nanoteknologi liposom dan nano gold untuk terapi kanker dan Teknik visualisasi jaringan, penentuan % entrapment pada formulasi liposom dan teknik pelabelan nanopartikel menggunakan nano gold.

Tujuan Kegiatan :

Membuat sediaan nano gold dengan mereduksi ukuran partikel dengan menggunakan metode biosintesis dan mampu membuat sediaan liposome dengan berbagai metode

Key note Speaker :

1. Dr. Tetuji Yamaguchi (Head R n D Horiba Japan)
2. Assoc. Profesor. Dr. Josbert Metselaar (RWTH-Germany)
3. Robert Tungadi, M.si.,Apt (Doctor Candidate-RTWH Germany)
4. Bambang H Nugroho, M.Sc., Apt (Nanopharmacy-UII)

Materi : Assoc. Profesor. Dr. Josbert Metselaar (RWTH-Germany)

LIPOSOME PREPARATION AND CHARACTERIZATION

Lecture Contents

Why Liposome ?

Drug targeting with liposomes has been studied for over 25 years and has demonstrated its value in clinical practice. Liposome was discovered in 1965 by Alec bangham, and Liposomes are small artificial vesicles of spherical shape that can be created from cholesterol and natural non-toxic phospholipids. Due to their size and hydrophobic and hydrophilic character (besides biocompatibility), liposomes are promising systems for drug delivery system for hydrophilic, lipophilic, and amphiphilic APIs. Because lipids are amphipathic (both hydrophobic and hydrophilic) in aqueous media, their thermodynamic phase properties and self assembling characteristics influence entropically focused confiscation of their hydrophobic sections into spherical bilayers. Those layers are referred to as lamellae. Liposome properties differ considerably with lipid composition, surface charge, size, and the method of preparation. Furthermore, the choice of bilayer components determines the ‘rigidity’ or ‘fluidity’ and the charge of the bilayer. For instance, unsaturated phosphatidylcholine species from natural sources (egg or soybean phosphatidylcholine) give much more permeable and less stable bilayers, whereas the saturated phospholipids with long acyl chains (for example, dipalmitoylphos phatidylcholine) form a rigid, rather impermeable bilayer structure.

It has been displayed that phospholipids impulsively form closed structures when they are hydrated in aqueous solutions. Such vesicles which have one or more phospholipid bilayer membranes can transport aqueous or lipid drugs, depending on the nature of those drugs.. Generally, liposomes are definite as spherical vesicles with particle sizes ranging from 30 nm to several micro meters. They consist of one or more lipid bilayers surrounding aqueous units, where the polar head groups are oriented in the pathway of the interior and exterior aqueous phases.

Liposomes are extensively used as carriers for numerous molecules in cosmetic and pharmaceutical industries. Additionally, food and farming industries have extensively studied the use of liposome encapsulation to grow delivery systems that can entrap unstable compounds (for example, antimicrobials, antioxidants, flavors and bioactive elements) and

shield their functionality. Liposomes can trap both hydrophobic and hydrophilic compounds, avoid decomposition of the entrapped combinations, and release the entrapped at designated targets (Figure 1)

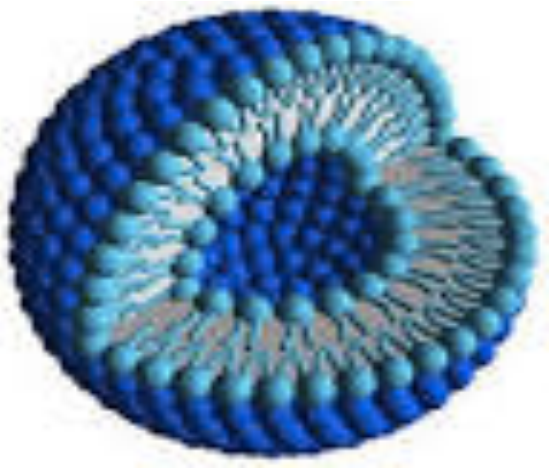

Figure 1. Liposome Basic Structure

Choice of targeting ligand For active targeting of liposomes any ligand with specificity for cell-surface receptors that are selectively expressed on the surface of the target cell population can be used, as long as chemical conjugation of the ligand to the liposomal surface is feasible without loss of receptor specificity and/or affinity. Frequently used ligands for this purpose are antibodies, as they can easily be raised against a variety of antigens and often show high selectivity and affinity for their antigen. Besides antibodies other ligands have been studied, such as vitamins, peptides and aptamers. An important aspect to consider when choosing the appropriate targeting ligand is its immunogenicity. Some ligands, especially those produced in other species, can be recognized as 'foreign' by the immune system of the patient especially when the ligands are conjugated to the distal ends of the PEG chains of LCL (Figure 2).

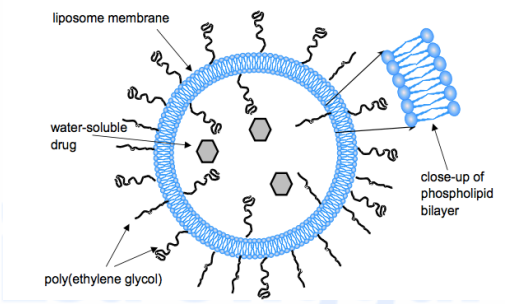

Figure 2. Schematic representation of a drug-containing long-circulating PEG-liposome