



CERTIFICATE OF APPRETIATION

THIS CERTIFICATE IS PROUDLY PRESENTED TO:

Dr. apt. Sri Hartati Yuliani, M.Si

in recognition of his/her valuable contribution as :

Speaker

in

The 1st International Conference on Medical Technology (ICoMTech) 2021

Lombok, West Nusa Tenggara, May 29 - 30, 2021



Dr. Syamsuriansyah, MM., M.Kes

Director of Politeknik Medica Farma Husada Mataram



Idham Halid, M.Si

Chairman

The 1st ICoMTech



**YAYASAN MEDIKA CIPTA MANDIRI MATARAM
POLITEKNIK MEDICA FARMA HUSADA MATARAM
1st INTERNATIONAL CONFERENCE ON MEDICAL TECHNOLOGY
(1st ICoMTech) 2021**



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Dear Dr. apt. Sri Hartati Yuliani, M. Si

On behalf of the 1st INTERNATIONAL CONFERENCE ON MEDICAL TECHNOLOGY (1st ICoMTech) 2021 organizing committee, we would like to express our highest appreciation, for your participation as speakers in the conference. This will be a great opportunity among the stakeholders (academia, researchers, health practitioner, and students), to perform ideas-exchanging related with *Strategy And Potential Research On Health*.

As the importance and significant contribution from this conference in this area of expertise, we would like to invite you to attend the virtual 1st INTERNATIONAL CONFERENCE ON MEDICAL TECHNOLOGY (1st ICoMTech) 2021 that will be held in Lombok, Indonesia, on May 29th – 30th, 2021. This invitation letter can be enclosed for your permit for your join to conference, in accordance with the event mentioned above by virtual or ZOOM Application (including the date).

Finally, we would like to take this opportunity to thank for your participation in the 1st INTERNATIONAL CONFERENCE ON MEDICAL TECHNOLOGY (1st ICoMTech) 2021. Please do not hesitate to contact us for further information or visit our website at:

www.politeknikmfh.ac.id.

We look forward to see you in Lombok, Indonesia, in March 2021.

Cordially yours,

Kind regards,
Organizing Committee/ Head Committee



Idham Halid, S.Pd., M. Si

Strategy for Pharmaceutical Technology Development in Creating Candidates for Covid-19 Drugs



Dr. apt. Sri Hartati Yuliani, M.Si.

The 1st International Conference on Medical Technology

May, 29th – 30th 2021

Sanata Dharma

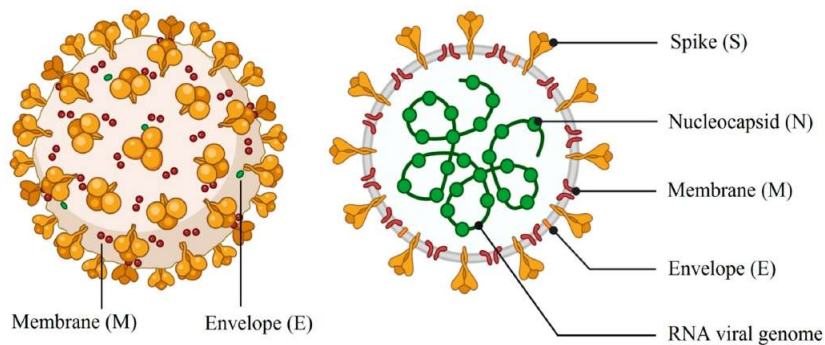
Universitas

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Sanata Dharma

Universitas

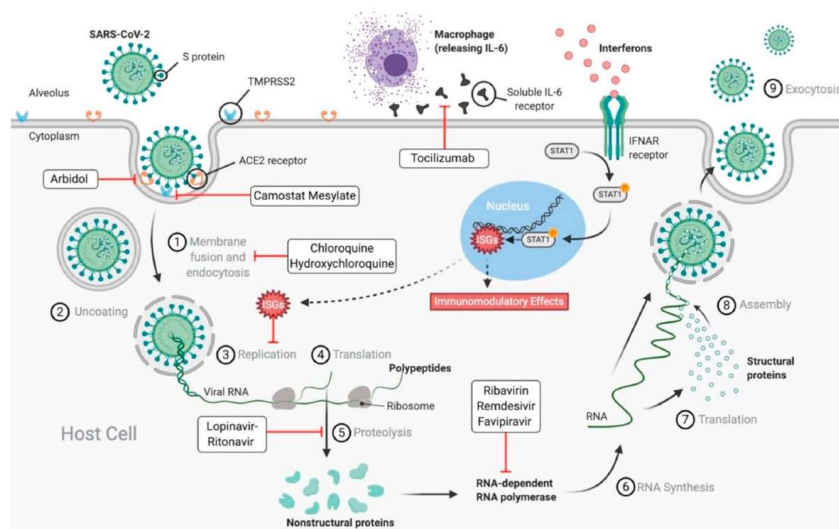
SARS-CoV-2 Virus



Alavi et al., 2020, Lectin Protein as a Promising Component to Functionalize Micelles, Liposomes and Lipid NPs against Coronavirus, *Biomedicine*, vol 8

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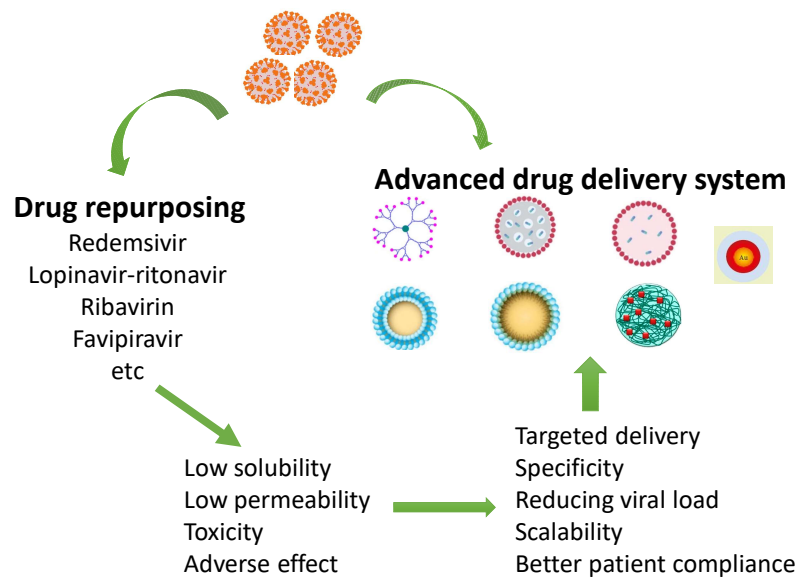
The Life Cycle of SARS-CoV-2 Virus



Lam, et al., 2020; Covid-19: A review of the proposed pharmacological treatment, *European Journal of Pharmacology*, vol 886

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The Challenge of developing antiviral drug



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Repurposing drug

definition

The therapeutic approach using existing drugs that have been approved for other purposes/indication

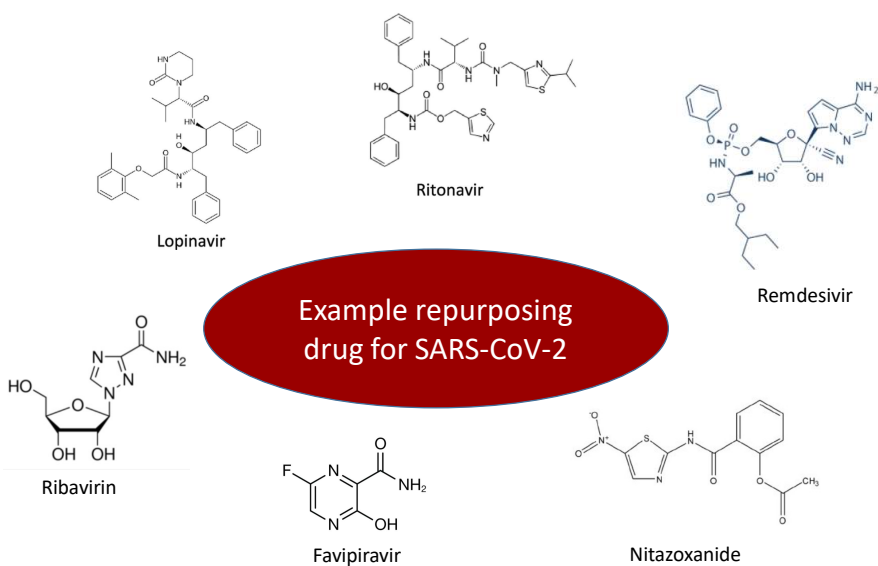
advantages

- Establish safety of known candidate compound
- Reduced development time frame and cost

The scenario

- Same target – new virus
- Same target – new indication
- New target – new indication

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Nanoparticle as antiviral delivery vehicle

definition

Nanoparticles are a particles with at least one dimension smaller than 200 nm
another source define the particles that have size smaller than 1 μm

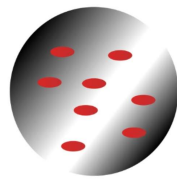
Why nanoparticle

- Targeted disease cell
- Improved efficacy of the antiviral drug
- Reduced toxicity of the antiviral drug

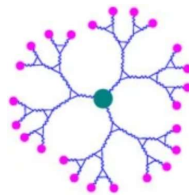
Nanoscale drug delivery advantages

Improved bioavailability	Decreased drug resistant
Controlled release	Overcome cell barriers
Protection of drug	Site-specific targeting

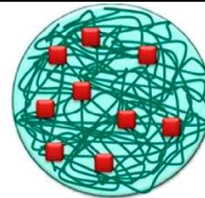
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Metal nanoparticle



Dendrimer

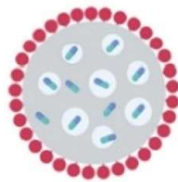


Polymeric nanoparticle

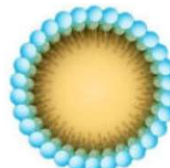


Solid lipid nanoparticle

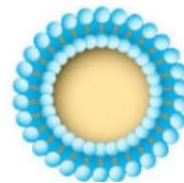
Nanocarriers for antiviral drug



Nanostructured Lipid carrier



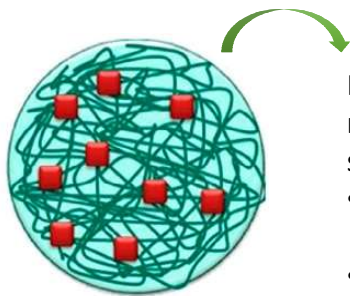
Micelle



Liposome

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Polymeric Nanoparticle



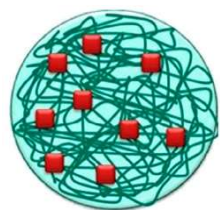
Polymeric nanoparticle

Polymeric nanoparticles are solid polymeric, made of natural or sintetic polymer and had 10-1000 nm in size

- Nanocapsule: the drug encapsulated in the polymer
- Nanosphere: the drug was adsorbed in the surface or embedded in the matrix

Polymeric nanoparticle will increase solubility of hidrofobic drug, improve stability in the extracellular environment, minimize toxicity and has high therapeutic ratio. It is able to target specific site target related to its nanosize and has also shown potential as a controlled drug delivery

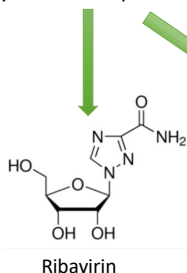
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Polymeric nanoparticle

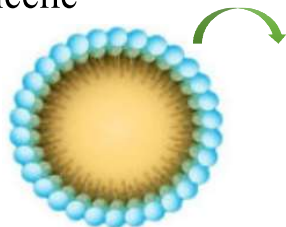
Surface modification

- Minimize nonspecific interaction with protein serum
- Avoid phagocytosis



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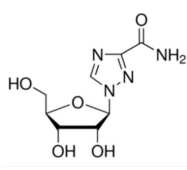
Micelle



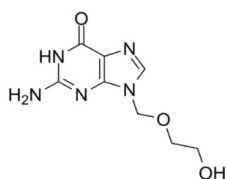
Micelle is the spontaneous formation of colloidal particles with a diameter of 5-100 nm which has a hydrophobic center and a hydrophilic surface.

Micelle

↓ applied



Ribavirin

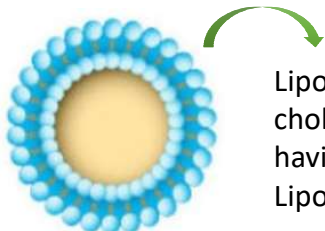


Acyclovir

- Improved aqueous solubility
- Improve bioavailability
- Reduce toxicity and adverse effect
- improve permeability across physiological barriers
- Increase biodistribution

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Liposome

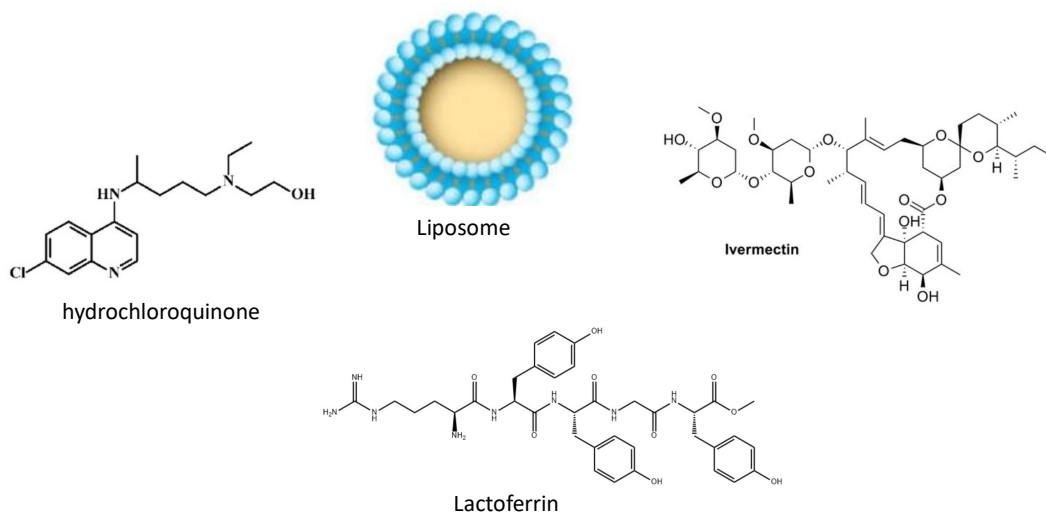


Liposome

Liposomes are small spherical carriers that made of cholesterol or non-toxic natural phospholipids having particle size 15 – 1000 nm
Liposome is a phospholipid bilayer membrane

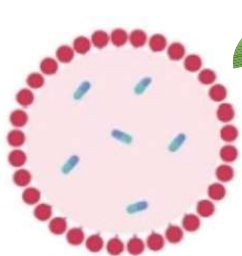
- Improve delivery and efficacy of the drug
- Preventing early degradation of the encapsulated drug
- Minimize systemic toxicity
- Improve performance feature of the drug
- Biocompatible and biodegradable

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Solid lipid nanoparticle (SLN)



Solid lipid nanoparticle

A system similar with liposome but differ in their lipid aggregation, spherical in shape with the diameter 50-1000 nm.

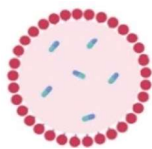
Ingredient

- lipids that are in a solid state at room temperature
- Emulsifier
- API
- Suitable solvent system

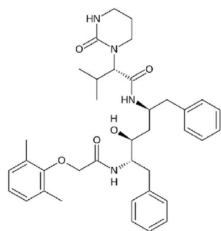
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Issue	Advantages SLN over liposome
Avoidance of organic solvent	Avoidance of organic solvent when desire
Preparation and reproducibility	Excellent reproducibility and feasible large-scale production
stability	Increased stability of the active ingredient because of the rigid core lipid matrix
Biodegradability	Both liposomes and SLNs are biodegradable
Binding, entrapment and release	SLNs impose greater entrapment efficiency for hydrophobic drugs Ability to allow controlled release and drug targeting by coating/attaching ligands to SLNs

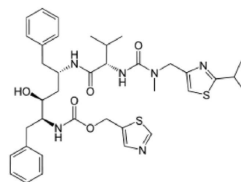
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Solid lipid nanoparticle



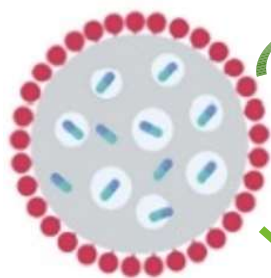
Lopinavir



Ritonavir

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Nanostructured Lipid Carrier (NLC)



Nanostructured
Lipid carrier

Main ingredient

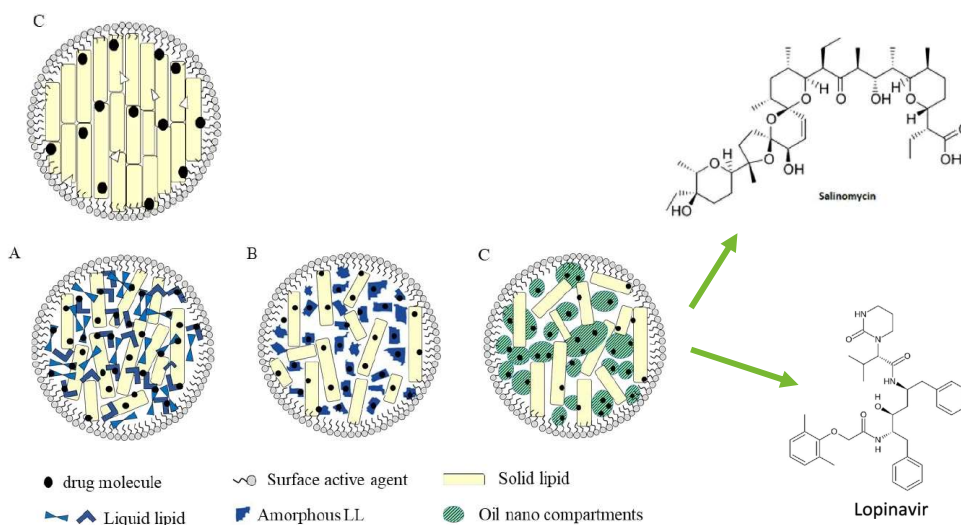
- Solid and liquid lipid
- Emulsifier (hydrophilic, lypophilic, amphiphilic)

Nanostructured lipid carrier is a drug delivery system consisting of solid and liquid lipids as a core matrix, with sizes between 10-1000 nm.

This NLC is an SLN development in order to overcome the weaknesses of SLN

Weaknesses of SLN: unpredictable gelation, low drug incorporation, drug release from matrix during storage

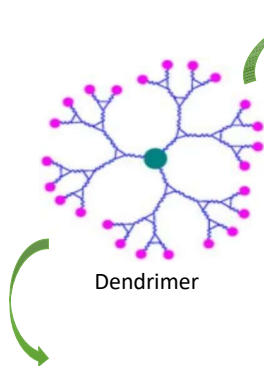
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Haider, et al., 2020; Nanostructured Lipid Carriers for Delivery of Chemotherapeutics: A Review, *Pharmaceutics*, vol 12

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Dendrimer



Dendrimer is a globular macromolecule measuring 1-100 nm with an architecture consisting of three distinct domains: the central core, the branched mantle, and the corona with peripheral reactive functional groups.

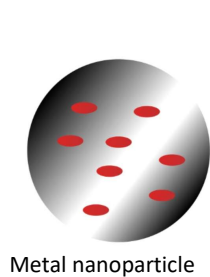
Preparation methods

- Divergen
- Convergen

- PAMAM effective for MERS-CoV
- PAMAM conjugated sialic acid effective for pneumonia influenza H3N2 Virus
- Polianionic Carbosilane effective against HSV and HIV

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Metal Nanoparticle



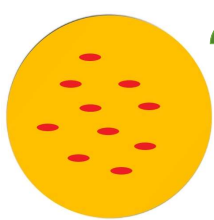
Metal nanoparticles are usually defined as particles of metal atoms with diameters between 1 - 100 nm.

AgNPs and AuNPs showed a high activity against influenza, HIV-1, HSV, dan dengue type-1 virus

Khazimir interaction and Van der Waals force between metal NPs and virus surface protein will inactivate the virus

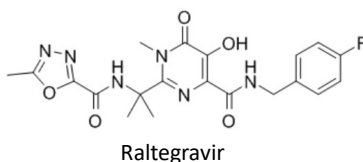
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Metal Nanoparticle - AuNPs



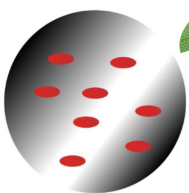
AuNPs

AuNPs have a particle size between 1-150 nm
The surface area of AuNPs is a negative charge so that its easy to functionalized with biomolecules like drugs, gene, or target ligand



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Metal Nanoparticle - AgNPs

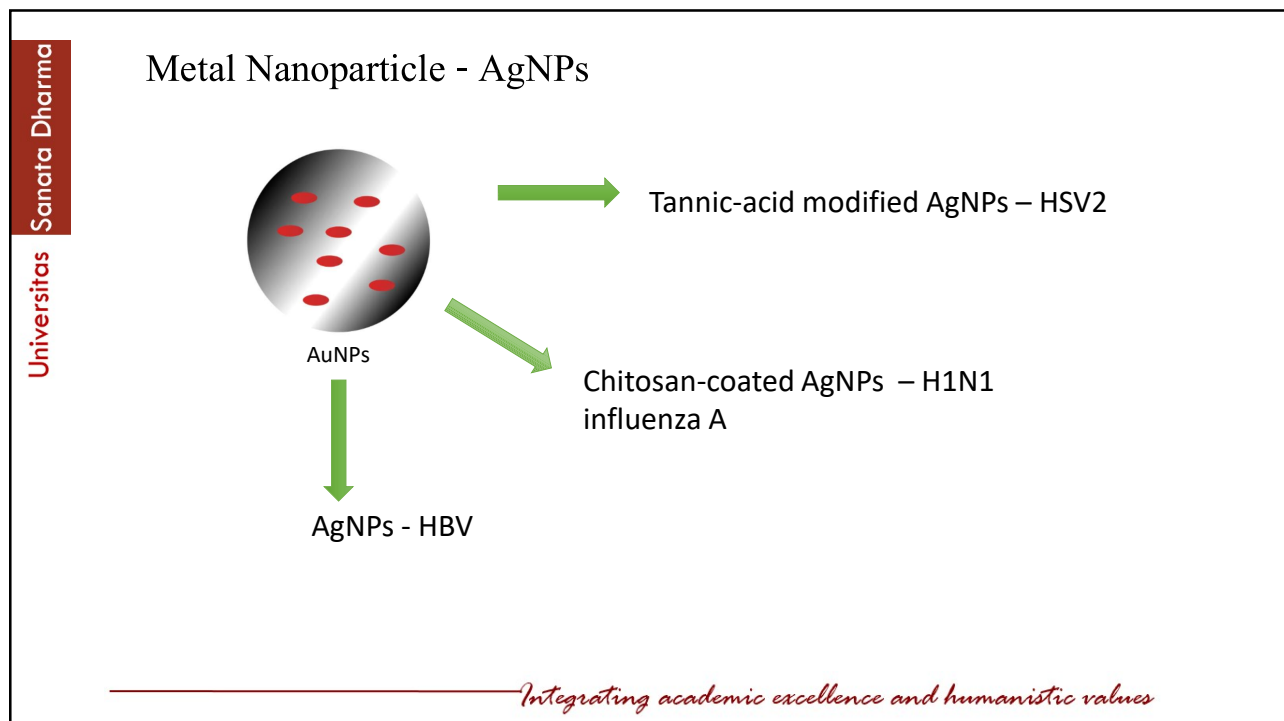
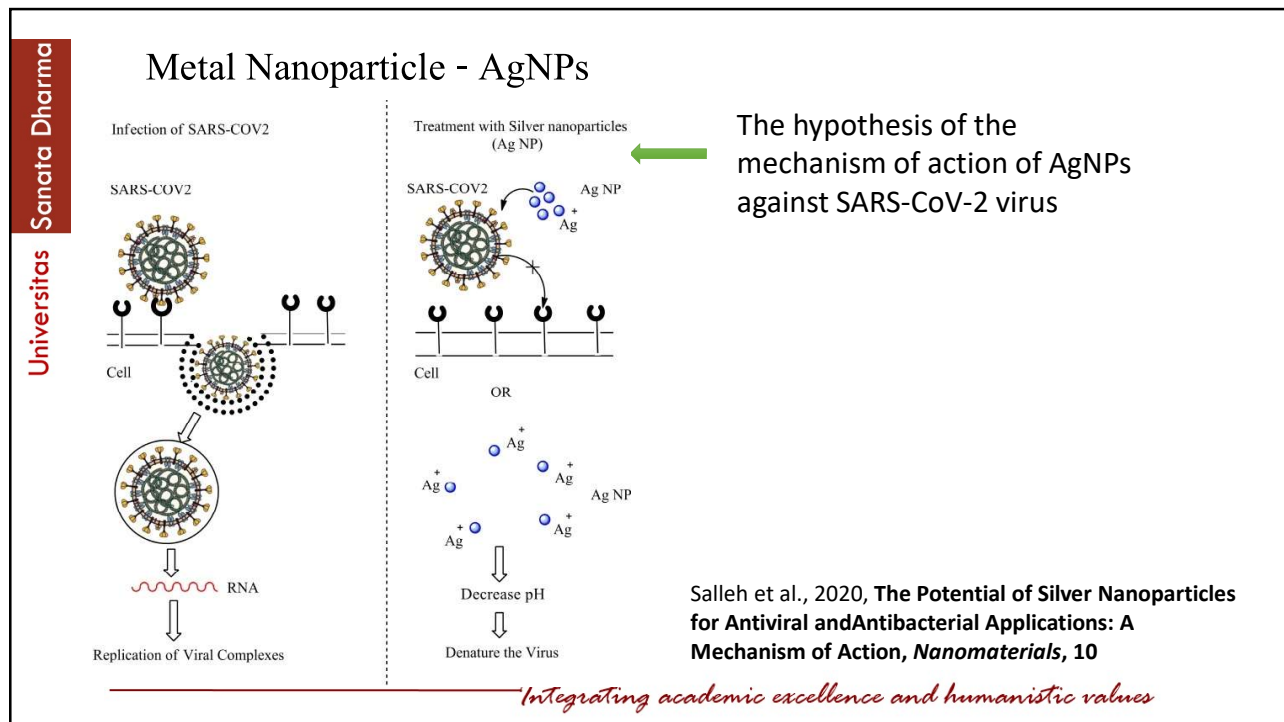


AuNPs

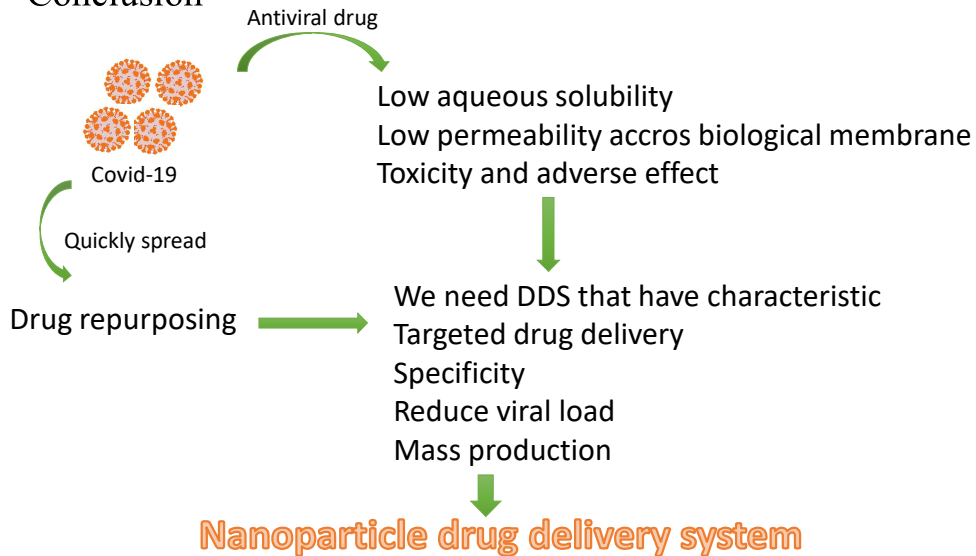
AgNPs are metal NPs that are widely used as antivirals.
AgNP is most effective metal NPs against bacteria, viruses and other eukaryotic microorganisms

Synthesis of AgNPs such as metal NPs is carried out using physical, chemical, and biological methods. Synthesis of AgNPs using biological methods has become popular because it is cost effective, simple and has a high yield. This biological synthesis is also friendly to the environment because it does not use hazardous or toxic materials.

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Conclusion



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