Vector and Non-Vector Infection up to Nano-Vector in Association with RNAI Transfection

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Received:- 08 October 2022/ Revised:- 15 October 2022/ Accepted:- 21 October 2022/ Published: 31-10-2022

Abstract— *Transfection is a translocation of DNA or RNA pieces, which could occur naturally or from human effort through laboratory/pharma results, that is so advanced now. Still the same incidence and prevalence in natural-huge laboratory/ incubator tropical rainforest is neglected as the pathogenesis mechanism on the laden from nano-infection. Nano-vector could deliver 3 different payloads incl. plasmid, mRNA, and RNP for CRISPR/Cas9 genome editing. They were knowing the benefit and disadvantages of transfection in association with the high prevalence of transfection diseases such as gen silencing/ failure in gene expression/ gene blocking/ gene mutation and gene polymorphism. This review article manually using a search engine. First, confirm the difference between the host and vector. Then digging non-vector transfection, nano-carriers, and nanoparticles, in drugs delivery using 'binahong' (Anredera cordifolia) leaves which are already used in pharmacies and imaging diagnostics. Lipid nanoparticle, the first siRNA drug deliver. Ferrite Nickel (NiFe2O4) synthesis, and CoFe2O4 nanoparticle synthesis using 'binahong, kelor, salam', etc. leaves extraction, also are nowadays nano-carriers. Meanwhile, the main class of vector viruses which had been tested for clinical application, incl. retroviruses (RV), adenoviruses (AV), adeno-associated viruses (AAV), lentivirus (LV), and herpes simplex viruses (HSV). Vector viruses, plasmid, mRNA, RNAi, and Lipid, polymer, or inorganic composition, which are used for drugs, could occur in nature. This study concluded that RNAi for nowadays drugs and Next Generation (NG) Pharma, occurrences, exist in the laboratory, at home, and in the garden, and naturally.*

Keywords— Transfection; Payload; Nano-vector; CRISPR/Cas9; RNAi; Silencing.

I. INTRODUCTION

The high prevalence of transposon (nanomolecule) transfection in tropical rainforests incl. Indonesia and India are not watching out for the vector aspect in the prevention and promotion application so specific character is neglected. Singapura and Japan has solved DHF by making big water tunnels so that there is no puddle at the beginning and the end of rainy season. Indonesia solves DHF by buying vaccines and doing fogging which is vulnerable to becoming pesticide resistant. This study aims to look over the information about vector dan non-vector transmission of transposon/ virus to humans.

Efficient and effective prevention and promotion with parsimony spirit.

Focus on diseases caused by CGG-repeat[1,2,3,4] and sepsis.[5] is now a usual occurance so that almost cases in primary care and ICU could find these patients. Macro- (parasite), micro- (bacteria) and nano- (virus) infection in meter measurement have patients which are not known as infectious diseases, but as proteomic and metabolomic failures. Abnormality such as Parkinson Syndrome, Autism, Bipolar, and other brain diseases, also mental and behavioral, and social disorders, are far away from infectious and are known as non-communicable diseases, which are separated from infectious diseases. Several cases are broadly known caused by pesticide use.[4] This study appoints these cases as transposon transfection from the vector and non-vector aspect.

The aims of this study is the prevention and promotion of vector and non-vector chains related to countermeasures nano-infection in the tropical rainforest areas.

II. MATERIAL & METHOD

The review article was done manually using a search engine. Firstly, writing the Problem, Interference, Comparison, and Outcome (PICO) from the topic, that is vector transfection. Secondly, consolidation of the definition from keywords and

similarity which related especially with nano infection. Thirdly, aims and Topic which discuss such as vector and non-vector in the nanometer infection, which is mRNA/RNAi vector e.g. virus, lipid/polymer, and semiconductor, etc. Aims and topic become the title of this review article.

III. RESULT

Nano transfection patients, with and without vectors, up to nano-vectors, nano-carriers, semiconductor nano-particles are found as follows:

3.1 Patients and what kind of transfection vector is needs

The transfection method could be through chemical or physical manner. With mRNA vectors (nanometer), the delivery of mRNA used transfection reagents used for optimizing lentivirus vectors.[6]

Transfer mRNA into cells after treatment with the high electric field. Also with nonelectromagnetic field, but with the help of ultrasound is used in mRNA delivery. 'Gene gun' is also used for mRNA transfection delivery. Injection mRNA delivery also occur. Besides all, reporting of Bactofection and mycofection for delivering mRNA. Following the samples' DNA/RNA delivery with the vector. Plasmid DNA,[7] ultrasound/microbubbles for mRNA delivery,[8] GLP-1AR, and FGF-21 is safely delivered *in vitro* and *in vivo* with silica nanoparticle,[9] non-contact delivery of encoding EGFP plasmid in electromagnetic frequent with high intensity,[10] bioelectrochemistry,[10] RNAi with vector-mediated viral,[11] as nanometer-transfection which occur in laboratory and Pharma.

Meanwhile, the case information of those non-communicable disorders in nature are not identified. The real information lack is specific covered by taboo but easily found in foundations and many clubs with the same kind of cases. Domestic culture, religiousness, and social stigmatization, make the patients consider have normal physic, but more often known as LGBTQA behavior, or mentally bipolar.[1]

3.2 Transfection patients and are they need a host or not to transmit

The jargon of host and vector refers to the transmission track of some infectious diseases from human to animal. Host is a living creature which bacteria, viruses, protozoa, and other microorganisms which usually cause diseases, stay inside their body.

The host is larger and incl. human which give nutrition and a place for the growing of other organisms such as a parasite, mutualistic guest organism and symbiont commensal, where vectors are small living creatures that transmitted infectious agents from an infectious animal to a human or other animals. A known example usually is a biological vector, such as mosquitos, and bugs, which may bring pathogens that multiplicated in the body and than could be transmitted to a new host, usually through bites. Anopheles is a definitive host and human is an intermediate host for malaria diseases.

DHF has Aedes Aegypti as a vector, malaria has also a specific vector Anopheles. Cattle is an intermediate host of in human. Bats and birds has been mentioned as vectors of avian flu, and SARS virus and SARS-CoV-2 in COVID-19, which the last is transmitted from human to human, also, SARS. *Severe acute respiratory syndrome* (SARS) is in the Coronavirus family.

Vector virus mediated by RNAi used the power of RNAi which is a strong mechanism for gene silencer, incl. signal delivery to a target cell, immune response, and change the endogen microRNA (miRNA).[11] Avian flu is a flu transmitted from bird to human, caused by the H5N1 or H7N9 virus. Swine flu a kind of flu transmitted from pig to human, is caused by the H1N1 virus, which in 2009 then transmitted between humans. A newer type of Virus H1N1, the R4N1 variant, developed far faster then the parent.

3.3 Transfection of mRNA, long before occur naturally, as genesis on biodiversity in wet-warm climate area

But nowadays, not only natural as the transfection on the genesis of biodiversity mechanism, because transgenic in tropical rainforest areas, at night, where CO2 level is high by CO2 loss from leaves, the same condition in the laboratory of technology progression for diagnosis and treatment. A prestige presentation in the economy of the biomolecular pharmaceutical companies, and also in superior seed production for agriculture and agribusiness.[12] The side effect of using ARMGs of superior seed, give Antibiotic Resistance monoculture. Become the source in increase of high prevalence of *Multi-Drug Resistance* (MDRs), sepsis, and new antibiotics are born. Nowadays, sepsis treatment even gets around the use of old antibiotics in a rural and remote areas.[13]

IV. DISCUSSION

Various vector viruses from mRNA/RNAi could be in the form of Viruses, lipids, polymers, inorganic composition, plasmids, etc. In this discussion, trying to open step by step with grouping, as RNAi or its' vector, either for silencer or to increase gene expression.[14]

4.1 Vector virus from mRNA/ RNAi

Various viruses are recorded as vectors, such as Lentivirus,[14,15] herpes simplex virus,[16] adenovirus DNA- and V-2 mRNA-Covid-19,[17] Nano-vector for editing gene CRISPR/Cas9,[18] and also for combating against vectors mechanism and mechanism of vector-borne viruses (RNAi).[19] Lentivirus vectors are broadly known used for delivering alien genes for long-term expression. The possibility to integrate into human genome is shown by vector vaccines or adenovirus vaccine of COVID-19.

Is the expression of adenovirus genes expressed in vaccines based on vectors? Each of them has its specificity, for silencing, increase gene expression, or editing.[18] Non-viral nano-vector deliver *payloads* CRISPR/Cas9 genome editing.[18] Non-viral vector carrier is also known as nanocarriers or nanoparticles. Moreover, Agarwal reported new molecules approach to combat vectors and *vector-born viruses*: focus specific on interference RNA (RNAi) mechanisms.[19]

4.2 Lipids, polymers, or inorganic composition

Three of them, are samples specific from nano-vector.[18] In open-air tropical rainforests, camouflage insects similar of color and form, to plant habitat, has reported as RNAi indigenous.[20]

Microemulsions (μEs) and in the form of Solid Lipid Nanoparticles (SLNs Solin TM), Lipid nanocarriers are used for drug delivery, also active stuff which is for used in cosmetic or in nutritional fields. Also used for cardiovascular disease imaging (contrast, phospholipids, liposomes and micelles). Lipid nanovector also find nontoxic and noninduced the form of *Reactive Oxygen Species*/ROS, and also not give response to stress, and give pro-survival signal line.[21,22] Stimulate-respond lipid-based magnetic nanovectors based on lipid increasing apoptosis.[23] Cationic lipid-nanoceria hybrids, is nonviral vectors used clathrin-caveolae-mediated endocytosis and loss subsequent release of endosomes.[21] Lipid nanoparticle is a siRNA delivery for drugs. Then, knowing Nickel Ferrite (NiFe2O4) synthesis,[24] and also CoFe2O4 nanoparticle synthesis using binahong (*Anredera cordifolia*) leaves extract which has the potency for medical diagnosis.[25] Cobalt Ferrite is also found in *salam (Syzygium polyanthum), papaya (Carica papaya), kelor (Moringa oleifera*) leaves besides *binahong*. Synthesis and having magnetic characteristics from nanoparticles cobalt ferrite (CoFe2O4) is prepared in the way of wet chemical, is reported in Magnetism and Magnetic Materials journal.[26]

4.3 Nano-vector could deliver 3 different payloads incl. plasmid, mRNA and RNP for CRISPR/Cas9 genome editing.[18]

Appearance researches of CRISPR using Ribonucleoprotein (RNP) is a variance delivery method of Cas9-gRNA RNP. CRISPR-Cas9 plasmids is used in human patients, often is not optimal due to effects which is not wanted such as cytotoxic and unpredicted situation. Integrated DNA Technologies. CeO2/DODAB nanovector could do genes transfection in vivo without cause toxic sign. Nano-vector has potensial using in genes delivery in biomedic aplication.[21]

4.4 RNAi is a new class therapy strategy for silencing endogen and viral gene of mosquito.[19]

Double stranded dsRNA long chain for RNAi (RNA *Interference*) application that is for silencing a gene from an organism, which blocking gene expression. Long dsRNA synthesis for plants, insects and RNA Virus for agriculture and aquaculture Blocking mechanism on gene expression (gen *silencing*) in post transcription. Through dsRNA induction into target cells so that stick to mRNA sequence. Technology application of RNA *Interference* (RNAi) in Aquaculture.[4,20,27,28]

Although remind by medical faculty about high relative humidity in tropical rainforest area increase the insertion of RNAi in global warming action, about separation of risk laden that have to bear such as LGBT crisis, hypospadia crisis, sepsis crisis etc., it is need to promote and prevent to industrial countries so that this effect is not continuously neglected. Meanwhile, the effort to empowering seashore and rice field, forest, mountains, river, in tropical rainforest area, consider potential to be main player of sea grasses, fishery, agriculture for industry 4.0 raw material and food/energy crisis.[28,29]

This condition is important occur around one month toward the sign of G-20 Indonesia presidential Nov 2022 summit, 15-16 November, with the material of discussion about green activity, blue carbon, food crisis, energy crisis, climate crisis, economy crisis as the consequence of Rusia-Ukraina war VS. The sound of development countries with LGBT, hypospadias, sepsis

laden problem which steadily blame on using pesticide and wild use of antibiotic. Meanwhile the use of RNAi and Antibiotic Resistance Markers Genes (ARMGs) for superior seed constantly still hidden.[12]

V. LIMITATION

This review article has limitation on:

1) Large cases transfection of GMEs/ RNAi/ dsRNA /ssRNA in wet and warm climate area is seldom occur in dry-hot climate area. The difference of steam-bath vs. Sauna, industrial countries which not have wet, moisturized climate is difficult to accept that bulk of problem in healthy proteomic and metabolomics in tropical rainforest countries such as Indonesia and Thailand in SEA. Moreover, the artificial nano-transfection, associated with industry 4.0 is now depends on collagen and cellulose as the main raw material. This situation is known as industry 4.0 without society 5.0, where nano-vector is still often imagine as macroform such as bats and microform such as adenovirus. In the other hand, RNAi is considered as editing and silencing gen for therapy, not as a gen silencer in agriculture and aquaculture in tropical rainforest climate countries.
2) Many comparisons do not associate vector without connected with climate, such as dry-hot and dry-cold VS. wet-warm and wet-cold, which has to be given a needed large attention
3) Observational design seldom consider far away from physics law and chemical law which is has always to be a remembered.
4) Confounding risk are weak because widely broadly known that pesticide is the cause, not RNAi
5) This review article offers important information about the advantage and the harm of the using RNAi in the laboratory and in the garden of tropical rainforest area.

VI. CONCLUSION

Prevention and promotion of vector chain and non-vector chain associated the countermeasures nano-transfection in tropical rainforest with the effect silencing/blocking the genes, has already reported and described for the first time opportunity. RNAi for nowadays treatment Next Generation (NG) pharma could occur in the laboratory, at home, and in the garden in nature.

ACKNOWLEDGEMENT

Akademi Ilmu Pengetahuan Indonesia (AIPI) as Indonesian Academy of Science which with courage, already have raised the high prevalence of non-communicable diseases, mainly hypospadias. CRID-TROPHID which ask medical physics departement to participate and take a role in health tropical problem and infectious diseases incl. Infection nanometer size. IMERI catalog of XGA-10053 about the mystery of High Relative-Humidity (HRH) specifically Indonesia which should be communicated to industrial countries. IJSER which has published carbon nanotube in industry 4.0 should be supported by sociology 5.0 in area with wet and warm climate. Prof. Dr. dr. Ari Fahrial Syam, SpPD-KGEH, MMB FINASIM, as the dean of medical faculty of University of Indonesia 2nd period, which in the first period, push medical physics department organize one-day seminar/symposium on 6/6/2018 at IMERI fl.6 R6 about the role of a machine, electronspinning in the making of various composite in different hardness biopolymer mainly from raw material industry 4.0 cellulose and collagen in the association with patients in the hospital and dental clinic.

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