

Nano Drug Delivery Systems in Smart Healthcare

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In the interest of answering questions generated by the article, "[Pretending to be Alternative](#)," I am expanding on nano delivery systems. Buckle your seatbelts!

Are all brands of [Ivermectin](#) alike?

There are many formulations of Ivermectin on the market. If Ivermectin is used 'off-label' then it can be [prescribed for unapproved uses](#). Ivermectin was intended as an anti-parasitic medication, for repeated use, since it only kills adult parasites, not the eggs.

[Several pharmaceutical companies](#) manufacture and supply Ivermectin on a global scale. Unless you, as a patient, request the package insert of the drug, you will not necessarily know the specific lot# or ingredients to ask questions of the medical doctors who dispense them.

Today, as an 'off-label' drug, Ivermectin is sold for many different symptoms. In Australia, [since June 2023](#), the prescribing of oral ivermectin for 'off-label' uses will no longer be limited to specialists such as dermatologists, gastroenterologists and infectious diseases specialists. In the U.S., Ivermectin is [still not FDA-approved](#) to treat COVID.

Most people who choose to take Ivermectin, do so because it is marketed as "alternative" and is "not FDA-approved." These phrases seem to hold special powers to some people, even

though Ivermectin is still a pharmaceutical drug.

At the same time, pharmaceuticals have been upgraded to keep up with “advances” in technology.

Do All Ivermectin drugs contain Nano Lipid Particles (NLPs)?

Little is known about when lipid nanocarriers first appeared on the Ivermectin scene, but lipid and nano-drug delivery systems have been used in pharma-drugs since [at least 1995](#). A 2017 study used nano lipid carriers [as an Ivermectin delivery system for head lice](#).

Ivermectin was not well publicized before doctors began prescribing it ‘off-label,’ as an “alternative” treatment for COVID-19.

To assess the efficacy and safety of Ivermectin for COVID, a [2021 study](#) reported: “Of the 41 study results contributed by included studies, about one third were at overall high risk of bias.” The study concluded:

Overall, the reliable evidence available does not support the use ivermectin for treatment or prevention of COVID-19 outside of well-designed randomized trials.

Generally, if scientists are writing about a protocol in their research, it implies it is used in practice as an industry standard. How else are these drugs delivered to the right part of the body? A 1995 [study described the Nano Lipid Carrier delivery method](#):

Nano lipid carriers are a delivery system composed of a solid matrix that contains liquid nano-fatty particles. These nanoparticles are approved by the Food and Drug Administration (FDA) and European Medicines Agency (EMA) and possess a controlled and continuous release capability, have a cellular dimension and are compatible with tissues and cells

Did Ivermectin, in 2021, contain NanoLipid Carrier (NPC) Delivery Systems?

It is confusing to know for sure whether Ivermectin, or other “alternative” pharmaceutical drugs, of 2021 or earlier, used lipid nanoparticles as a drug delivery system. From the the 2019 [study](#) featured in [my earlier article on Ivermectin](#), this statement is noted under “[Methods](#):”

To overcome the limitations observed in some drug formulations and resistance, we used nano lipid carriers (NLCs) as a targeted and sustained drug delivery system for IVM.

This statement does not make known whether NLCs are standard practice in the market, or typical for this drug. However, we can assume this methodology is standard practice at least in the last few decades. According to [this 2023 study](#):

Over the past several decades, liposomes have been extensively developed and used for various clinical applications such as in pharmaceutical, cosmetic, and dietetic fields, due to its versatility, biocompatibility, and biodegradability, as well as the ability to enhance the therapeutic index of free drugs.

Per this [2016 study](#): the authors wrote: “Nanomedicine is an emerging field that employs nanosized materials for applications in disease diagnosis and therapeutics. For example, nanotechnology-based methods and materials have been [developed for the diagnosis and treatment of cancer](#). Nano-carrier delivery systems are also used in the [treatment of Neuropsychiatric disorders](#) and as targeted therapy [in chronic diseases](#) since 2019. Further, off-label medications for psychiatric disorders are frequently [used for unapproved indications](#).”

To be clear, my article on Pretender Alternatives focused on [nanotechnology in general](#) not only on NLCs. Whether

products are *lipid-based-nano* or *Beeswax-based-nano*, it is still “nano.”

The doctors who prescribe nano-drugs are not trained in [nanomedicine](#) or their [delivery systems](#). By plausible deniability, doctors can deny any knowledge of nanotech in their drugs. Thus, they are not responsible for disclosing known health effects of nanobots to patients.

Nano-electric Delivery Systems

Nano-medicine implies electronics.

In the 1990s, research conducted in the microelectronics industry was [applied to the design of immunoassays](#), and since then the applications for immunoassays have expanded using nanotechnology.

This movement has been dubbed as microfluidic and [lab-on-a-chip](#) technology. Research in LOC systems is expected to extend towards downscaling of fluid handling structures as well, by using nanotechnology.

In 2024, the National Nanotechnology Initiative ([NNI](#)), celebrates 25 years of nanotechnology. That suggests 25 years in products, medicines, and food. It is also floats in the air as [Smart Dust](#) and [microplastic rain](#). *Cloudy with a chance of plastics?* The purpose of [Smart Dust](#) Smart rain, and [Smart Healthcare](#) is for wireless monitoring and surveillance.

Smart dust is a system of tiny electromechanical sensors that detect and wirelessly transmit real-time data from their environment. Measured at one cubic millimeter or less, these devices are dispersed in large quantities as a networked cluster suspended in mid-air.

Point of Care Diagnostics

Biosurveillance, through biosensors, implies [remote access to the body](#) as part of the global Smart Health evolution. This

happens through [point of care diagnostics](#):

Glucose meters can also be used by diabetics at home to monitor levels and to adjust their insulin if necessary.

[Biosensors](#) are [electrochemical](#) transducers found on, and inside, the body that turn [biological signals into wireless electrical signals](#). See [Timeline here](#).

There is no reason to look for chip technology as RFID chips, or implantable chips. In a digital-nano world chips are invisible. [Biosensors are now wireless](#) and non-invasive, used in [Point of Care applications](#) to monitor people in biomedical [healthcare settings](#) such as Telehealth and Biotelemetry.

What about binders, such as zeolites?

Zeolites are advertised to remove toxic metals by binding to them for removal from the body. Would zeolite be of assistance when it comes to nanotech?

The industry has already thought of that. Today, zeolite binds, while also [building its own system](#). Zeolites are used in many [biomedical applications](#) from detoxification to Diabetes and bone formation, including biosensors. This way, a [biosensor map of the world](#) can identify people in real-time, whether you are pharmaceutical-friendly or “alternative.” Biosensing is basis of [Smart Delivery, Monitoring, Surveillance, and Healthcare](#).

*Usage of [zeolites](#) improves characteristics of the **biosensors**. In particular, sensitivity, linear range, and limit of detection are enhanced.*

Everyone must do their own research to understand the world of electronics, its applications, and its implications for the future of health.

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