New Paradigm of Treating Viral Pandemics

-- NSP Physical Shielding –

From ancient clay to 21st century NSP (JJ Lin 2003)

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Conventional Methods of Treating Pandemics

1. Vaccine – raising the immune system
2. Antiviral drugs – lessening inflammatory syndrome or blocking virus entering cells
3. (wearing mask and keeping social distance)

History of Natural Clays including "cures for plague"

Historically, clays have been widely used for treating a hosts of "syndromes" in ancient society:

1. The first recorded use of medicinal clay is on Mesopotamian clay tablets around 2500 B.C. Ancient Egyptians used clays as **antiseptics** and **preservative** for making mummies.
2. Aristotle (384–322 BC) made the first reference to the deliberate eating of earth, soil, or clay by humans for **therapeutic and religious purpose.**
3. Marco Polo described how in his travels he saw Muslim pilgrims cure **fevers by ingesting** 'pink earth' to **relieve famine.**
4. Dating back to Greek , holy clay tablets were widely traded as **cures for poison and the plague**; and also used in the **Roman Catholic Church**.
5. Bible: John 9 : Jesus Heals a Man Born Blind … he spit on the ground, made some **mud** with the **saliva,** and put it on the man's eyes. "Go," he told him, "wash in the Pool of Siloam" So the man went and washed, and came home seeing.
6. Bible: Deuteronomy 33:19 (**the hidden treasures of the sand**)

In the NASA space program of 1960s
Bentonite, a natural clay, was used as the calcium supplements

A mountain of clay--Petrified Forest National Park, Arizona. (adopted from Medicinal clay; Wikipedia)

The effects of weightlessness on human body were studied by NASA in the **1960s**. Experiments demonstrated that weightlessness leads to a rapid bone depletion. A number of pharmaceutical companies were asked to develop calcium supplements, it was concluded, "**the calcium in clay ...is absorbed more efficiently ..** [clay] contains some factors promoting calcium utilization and/or bone formation."

Note (by JJ Lin):

(1) Bentonite is the raw material for NSP by Prof JJ Lin (2003).

(2) Bentonite is a water-swelling clay and commonly used as detoxifiers in animal feeds and Nylon6 nanocomposites, etc.

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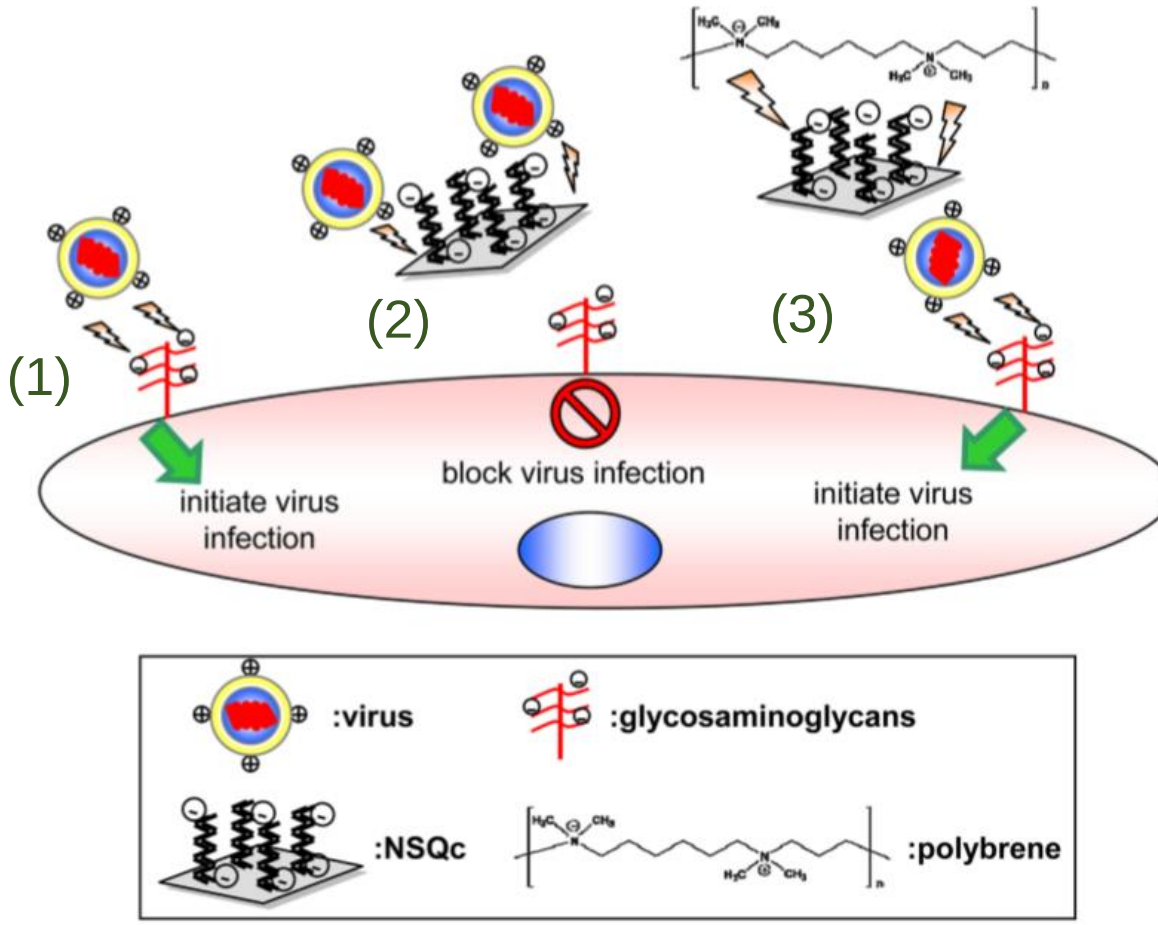
NSP for Shielding Virus-Infection

(2014)

Jian-Jong Liang, Jiun-Chiou Wei, Yi-Ling Lee, Shan-hui Hsu*, **Jiang-Jen Lin*,** and Yi-Ling Lin*, **2014.** Surfactant-modified nanoclay exhibits an **antiviral activity with high potency and broad spectrum,** Journal of Virology, 88, 4218-4228.

Taiwanese Patent: 44. 林江珍，林宜玲，徐善慧，梁健忠，李憶玲，魏郡萩，中華民國專利第I546080號 (2013) “脫層黏土/界面活性劑錯合物作為抑制致病性病毒的用途”

Left diagram showing (1) virus entering a host cell through “receptors” (2) NSP shielding virus by opposite charge “attraction”, and (3) the control experiment, a polyamine-cation prematurely interfering NSP and losing ability to capturing virus



NSP Shielding Virus (in vitro and in vivo tests)

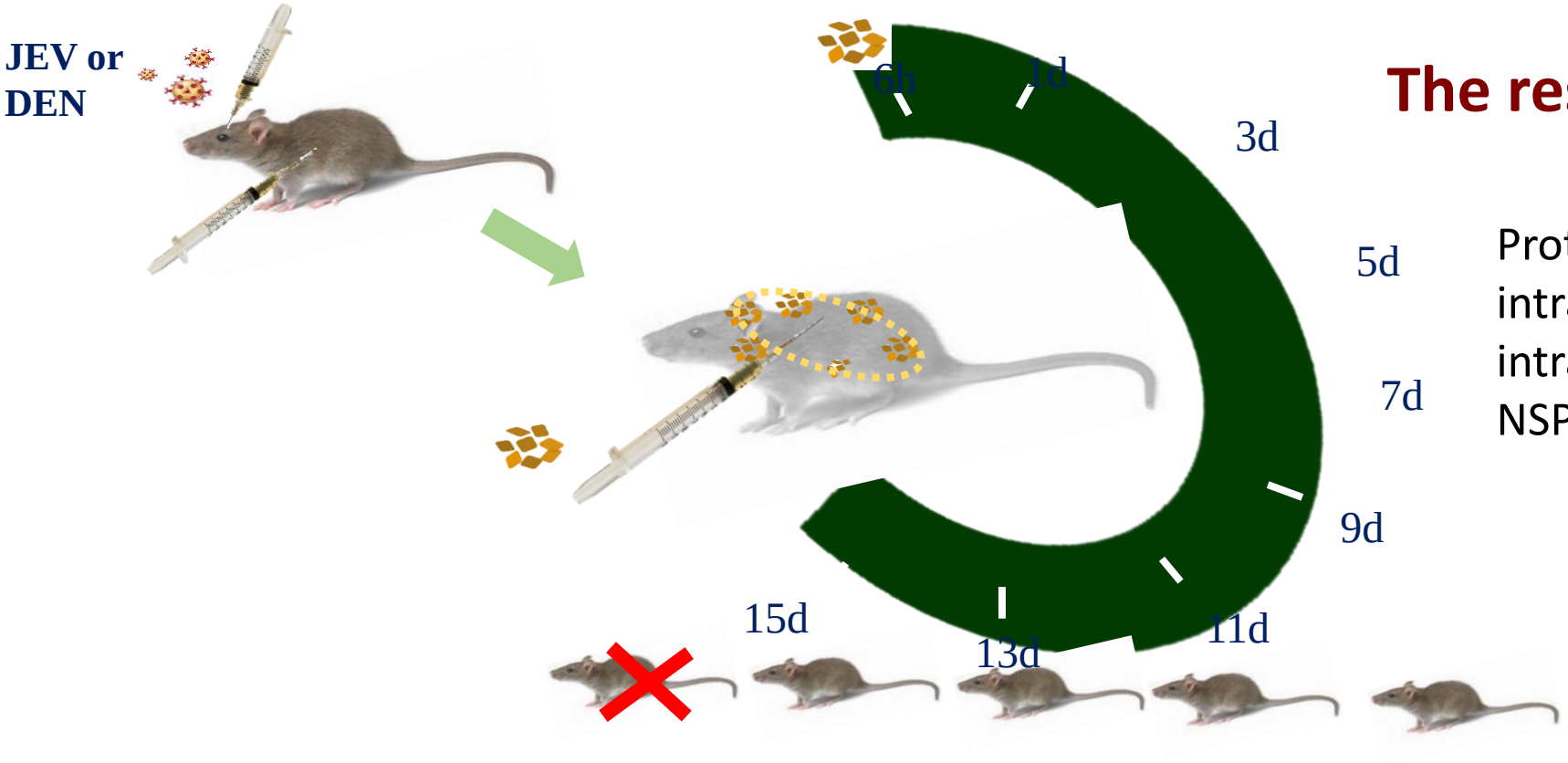
Showing the High Efficacy of Using NSP (modified by a, b, c three different surfactants)

In vitro	NSP-a	NSP-b	NSP-c	AgNP (control)
Concentration of suppresses the plaque-forming – JEV (IC_{50}) (μg/ml)	2.2	11	6.6	Silver is le effective tha NSP wit NSP-a > -c -b
Concentration of 50% cytotoxicity, CC_{50} (μg/ml)	48	72	70	
Therapeutic index (CC_{50}/IC_{50})	22	6.7	11	
In vivo (mice fatality rate)				
Survival rate after JEV injection then NSP (μg/ml) treatment (without NSP: 20% survival)	10 (100%)	20 (80%)		
Survival rate after DEN injection then NSP (μg/ml) (without NSP: **0% survival**)	20 (100%)	20 (100%)		

- Hsu, Lin and Lin, Journal of Virology, 88, 2014, 4218.
- Note: in vivo tests, the survival rate increased from 20% up to 100 % by NSP injection into mice at 20 (μg/ml)

NSP Shielding Virus (in vivo)
Treating JEV, dengue and influenza A Infections

Hsu, Lin and Lin, Journal of Virology, 88, **2014**, 4218

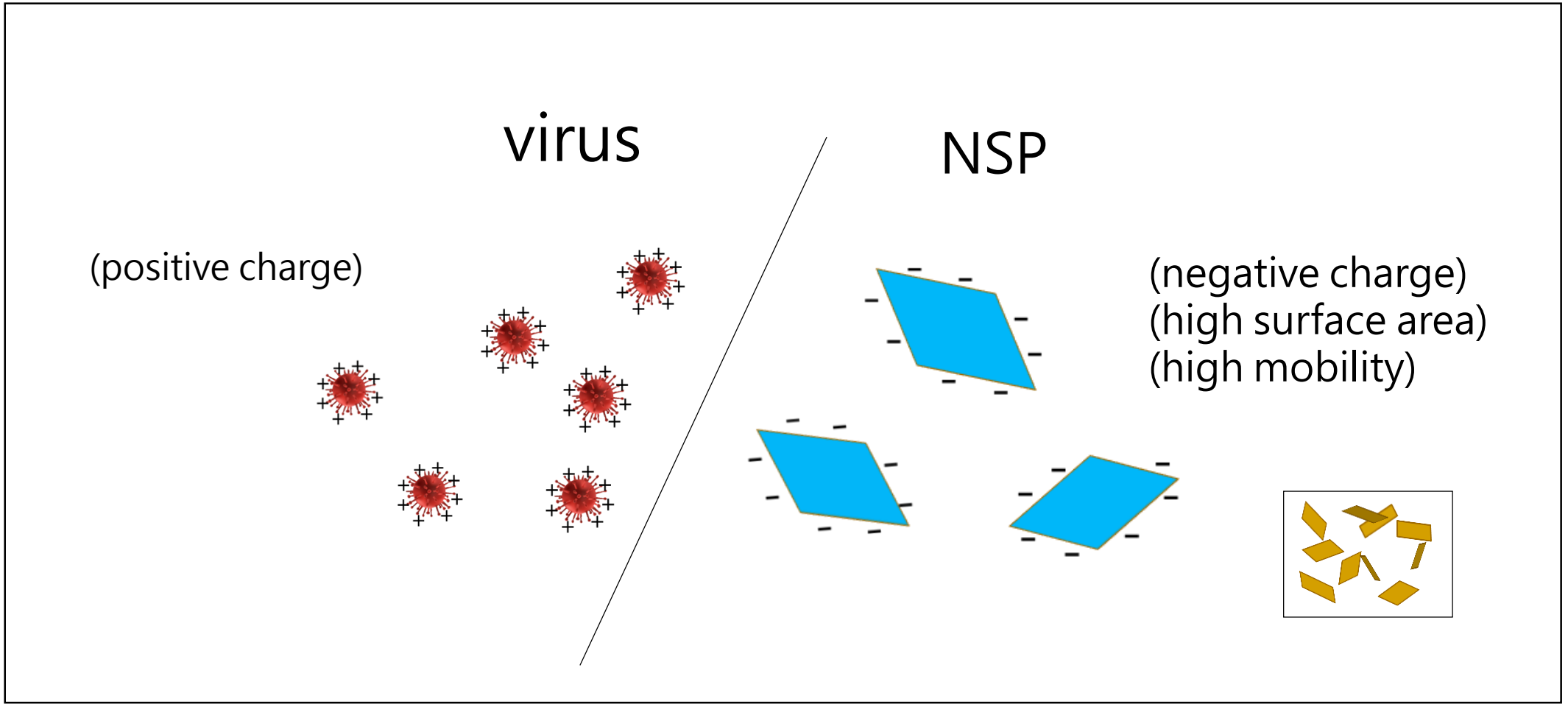


The results are outstanding!

Protocol: Virus introduced into mice intraperitoneally (i.p.) and intracerebrally (i.c.); followed by NSP i.p. treatment at 20 μg/ml dose.

NSP Shielding Virus (increasing the survival rate from 0-20% to 80-100% in mice tests)

Unique NSP-Virus Surface Adsorption



New Paradigm of Treating Pandemics

Conventional Methods

- Vaccine
- Antiviral drugs

New Paradigm: NSP Physical Shielding

The advances of nanotechnology in 2000's allowed us to make NSP from the natural clays. The silicate nanoplatelets enabled to "shield-off" virus and protect normal cells. The conventional paradigm is shifted from the "chemical" treatments to the NSP physically shielding mechanism in a safe and benign manner. The *in vivo* tests had proven its high efficacy and potentials for treating viral pandemics.

Potential uses of NSP for “shielding” viral infections

1. Spray or coating to face-mask, personal protective equipment, hospitals, restaurants, airplanes, and public areas
2. Disinfectant (replacing bleach) for environmental large-area spray disinfection, deodorizing and cleaning
3. Hand sanitizer (replacing ethanol or chlorinated chemicals)
4. Mouthwash (deodorizing and cleaning)
5. Medical uses of the NSP “physical shielding” to protect human cells from virus infection by oral uptake and injection

For further consultation

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