



NANOPHARMA SOLUTIONS

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Nasal Spray for Rescue Medicines

Anywhere/Anytime plus Fast Onset of Action-Perfect for Rescue Medicines

Nasal Spray is well suited for on-demand medicine: portability and self/other administration

- **Narcan** for opioid overdose (2023 approval): liquid naloxone nasal spray
- **Neffy** for anaphylaxis (2024 approval): liquid epinephrine nasal spray
- **Valtoco** for seizure (2020 approval): liquid diazepam nasal spray
- **Baqsimi** for hypoglycemia (2019 approval): **powder nasal spray**



Fast onset of action **within 5 min** is a must for rescue medicine



Nano-CNS™ for CNS On-demand Medicines

- **Nano-CNS™** : unidose **powder** nasal spray of drug **nanoparticles** on mannitol
 - NT-301 for Parkinson's Disease OFF episode (Tmax 2 min in animal PK)
 - NT-401 for ALS
 - NT-501 for Traumatic Brain Injury
- **Drug nanoparticles: improving bioavailability of BCS II& IV Drugs**
 - No salt formation means gentler/milder medicines
- **Powder Nasal Spray:**
 - Better surface adhesion, better bioavailability
 - Better stability
 - No preservatives needed
 - N2B (nose-to-brain) possible





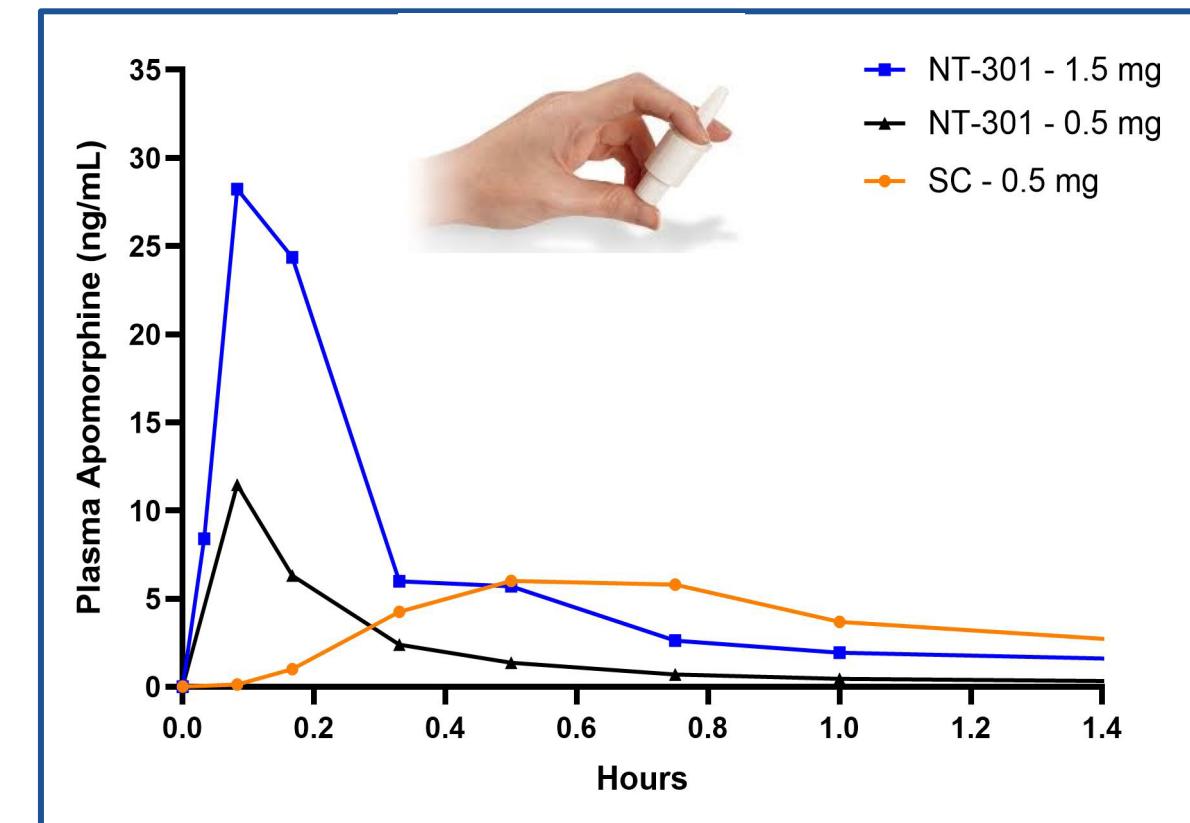
Nano-CNS™: Superior in-vivo performance

- **Dog PK Study of Apomorphine**

Intranasally administered NT-301 in nasal device has a **faster T_{max}** than SC apomorphine HCl (Apokyn)

- **Faster Relief** from Parkinson's Disease motor symptoms can be achieved by NT-301

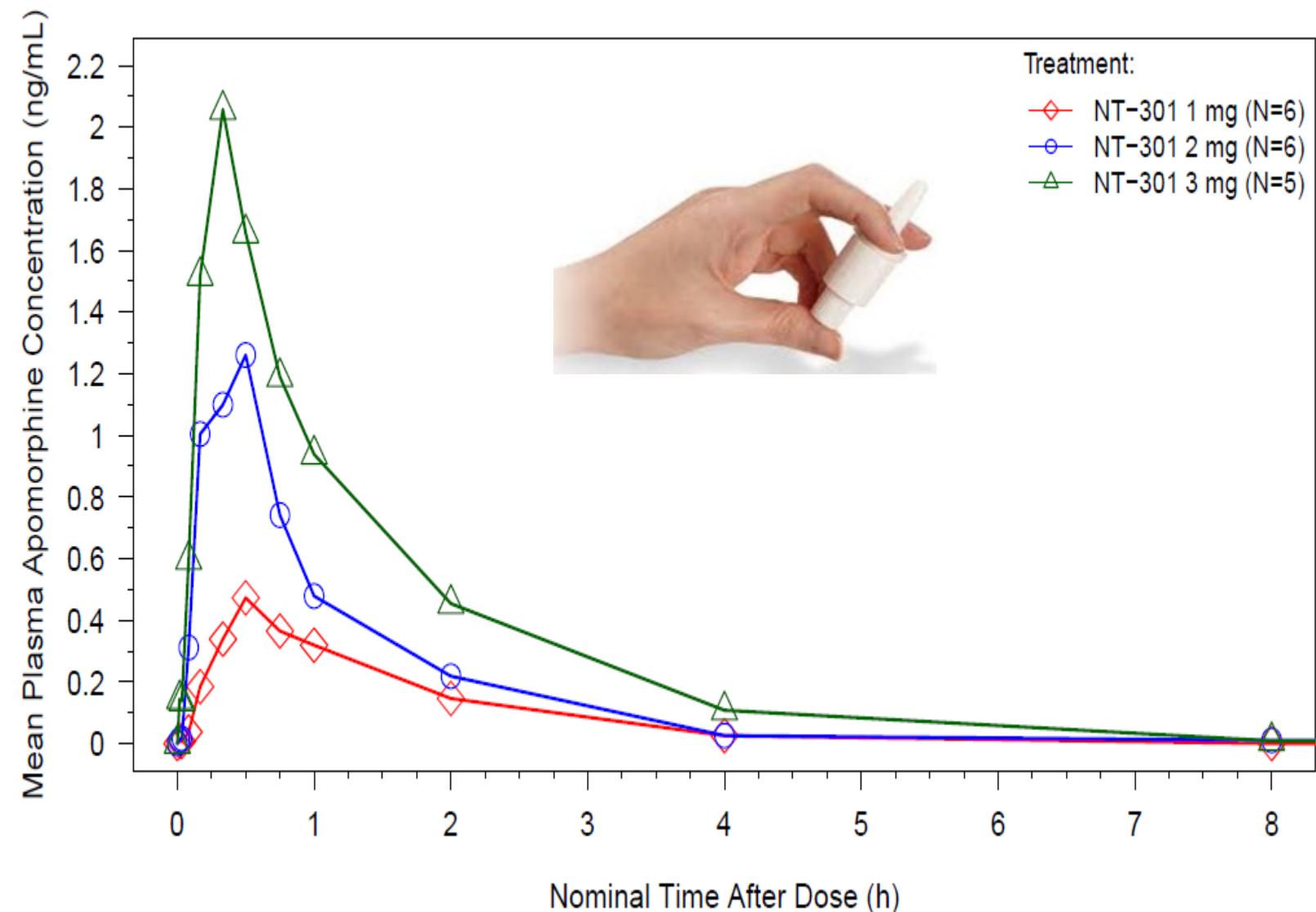
- Currently in Ph 1 Clinical Trial





NT-301 Human PK Data (interim)

- Fast Absorption
- Dose Proportional





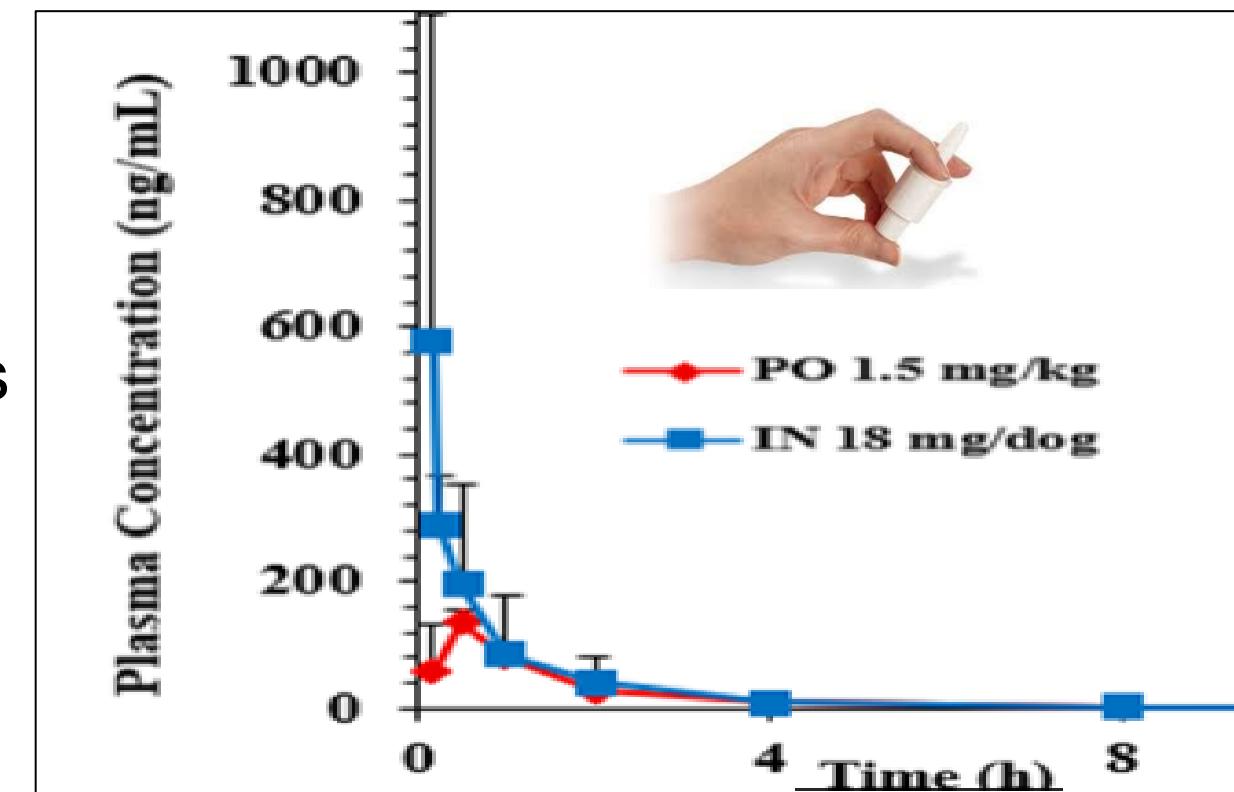
Nano-CNS™: Superior in-vivo performance II

- **Dog PK Study of NT-401**

Intranasally administered NT-401 in nasal device has a **faster T_{max}** than Oral drug

- **Faster Neuroprotection** for TBI victims who may be unconscious

- **Currently no approved drug** for TBI

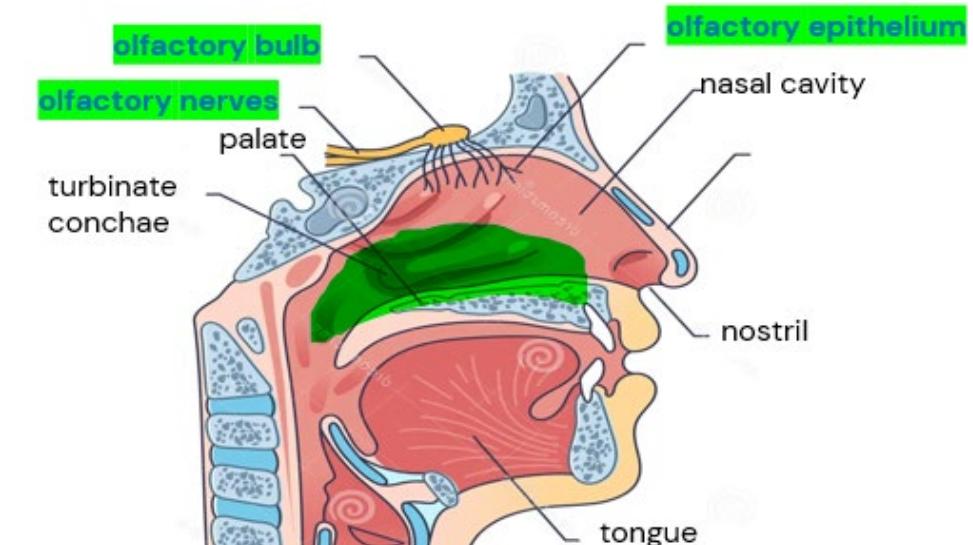
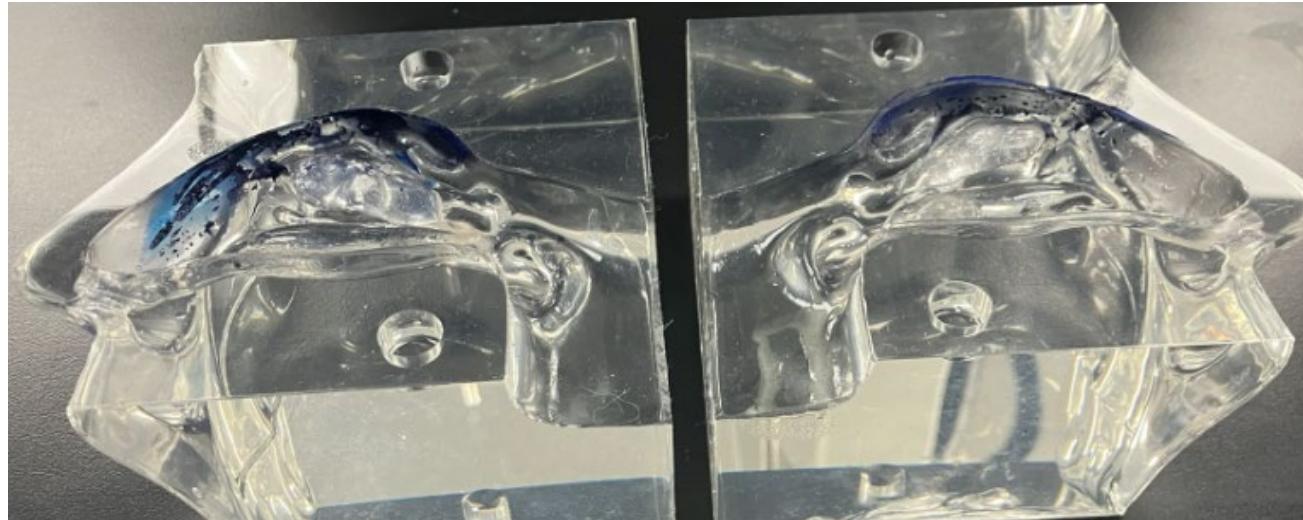




Nano-CNS™: Nasal CNS for On-demand

Drug delivery to brain without crossing BBB is possible through olfactory and transgeminal nerves

- **NT-301** is nasal nanopowder spray for Parkinson's in Ph 1 trial
- N-granule™ of apomorphine in Aptar's UDP device
- Manufactured by **Mikart, LLC** (Atlanta, GA)

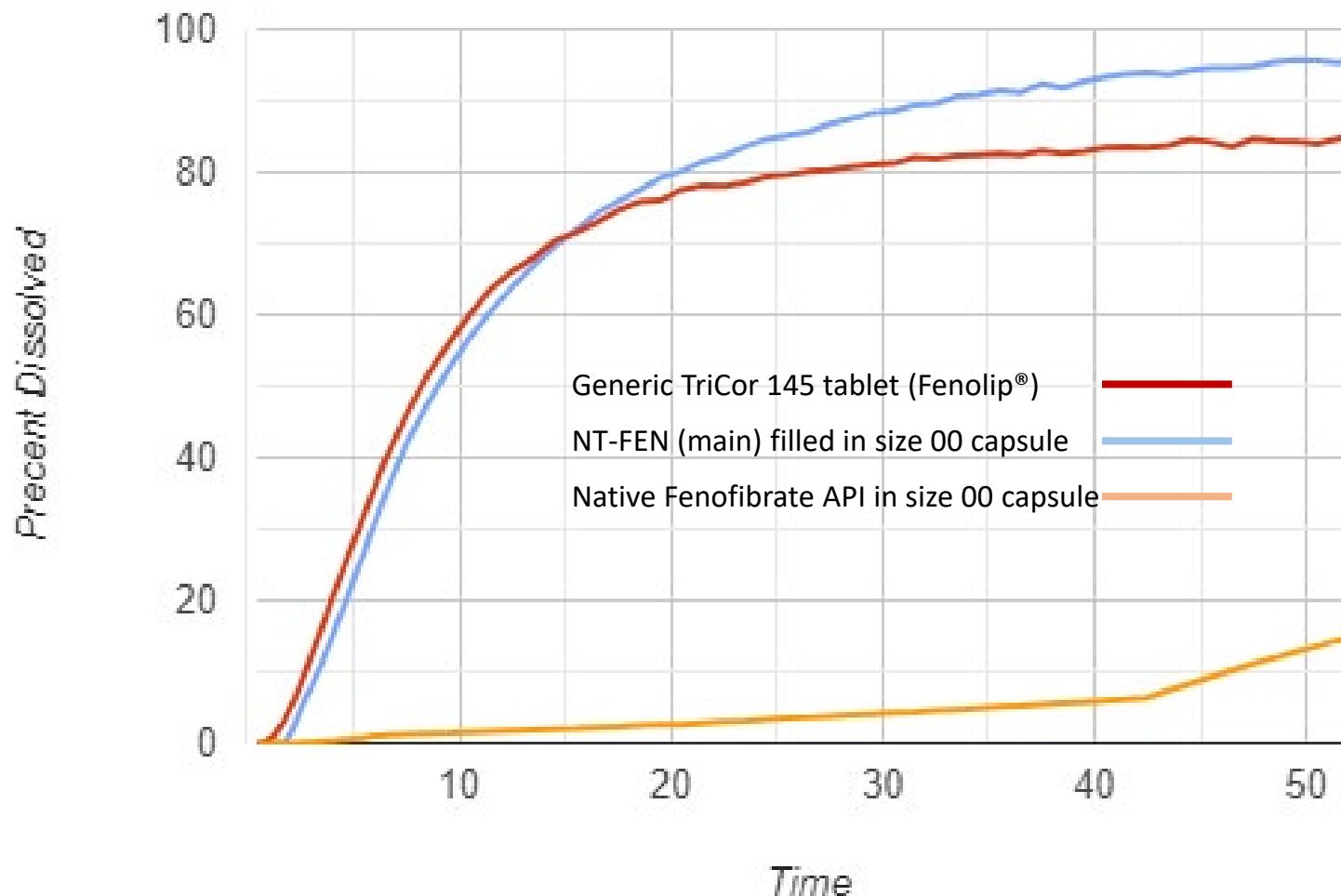


NanoTransformer™ Technology

- Patented (US #12,370,145, Japan & China)
- Differentiated nano-API for Broad Range of Dosage Forms
- BCS Class II and IV drugs with solubility-limited bioavailability
- PVD based drug nanosizing technology
- GMP Mfg operation since 2024
- N-granulation by NanoTransformer® for superior bioavailability to spray drying without using any solvent or polymers

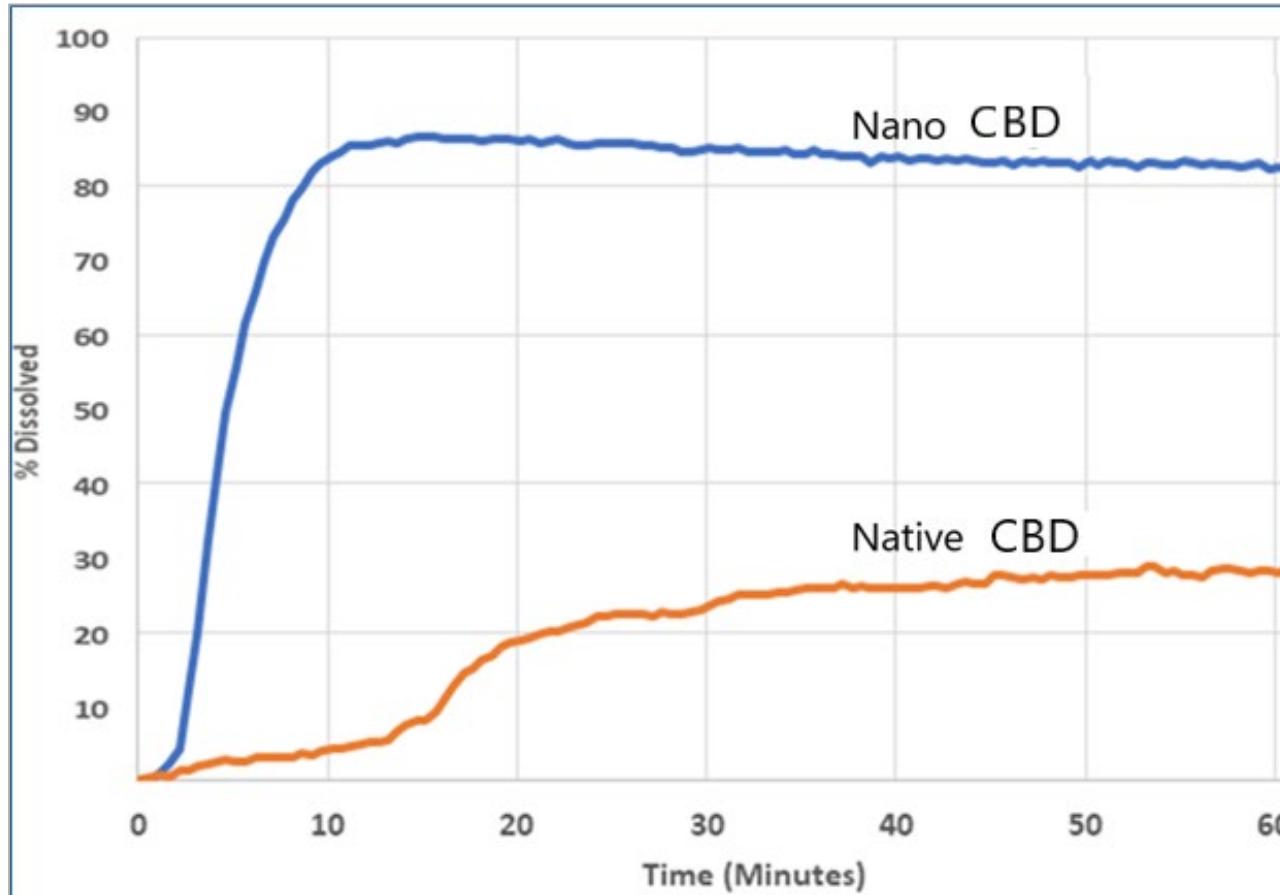
In-vitro Dissolution Comparison

- USP Dissolution Method for TriCor: SDS solution
- Online UV Detection at 284 nm (Opt-Dis 410 by Distek)





Nano Dissolution Comparison

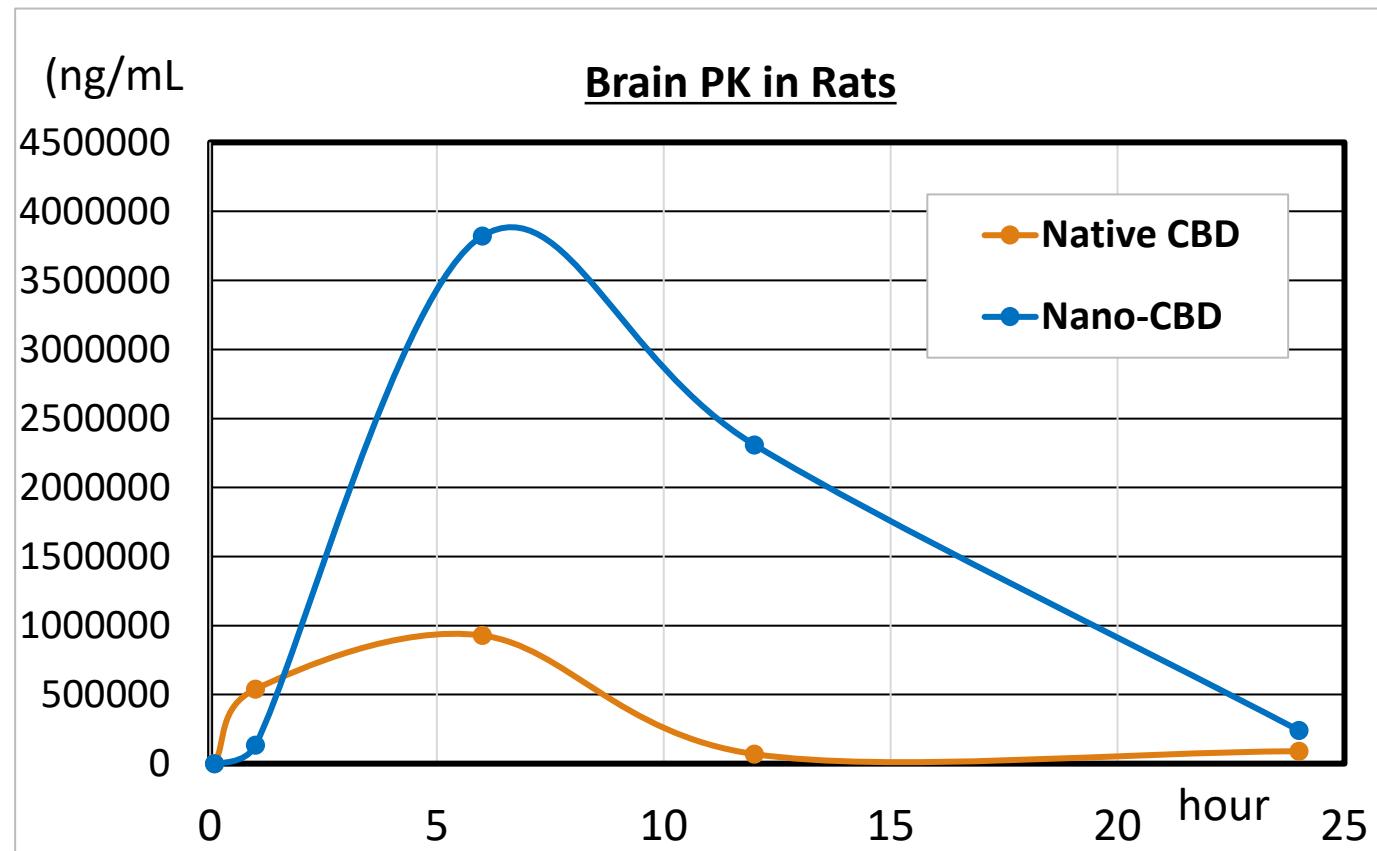


Measured every 5 sec using Distek Opt-Diss 410 fiber optic UV sensor (USP 1153)



Animal PK Comparison

Brain Absorption of Nano-CBD in Rat is 5.3X of native-CBD when given orally



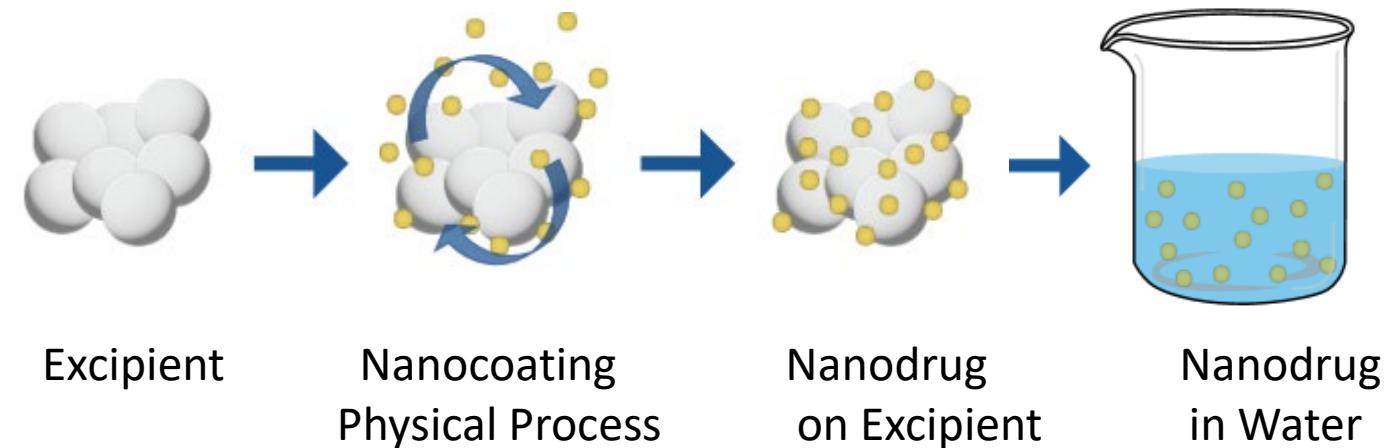


NPS' unique approach: Nano-coating of drug under vacuum (PVD)

- Using High vacuum/Low pressure & low heat to evaporate drugs
- Nano-coating of drug on hydrophilic excipient-Nano Granulation



NanoTransformer Equipment



Excipient

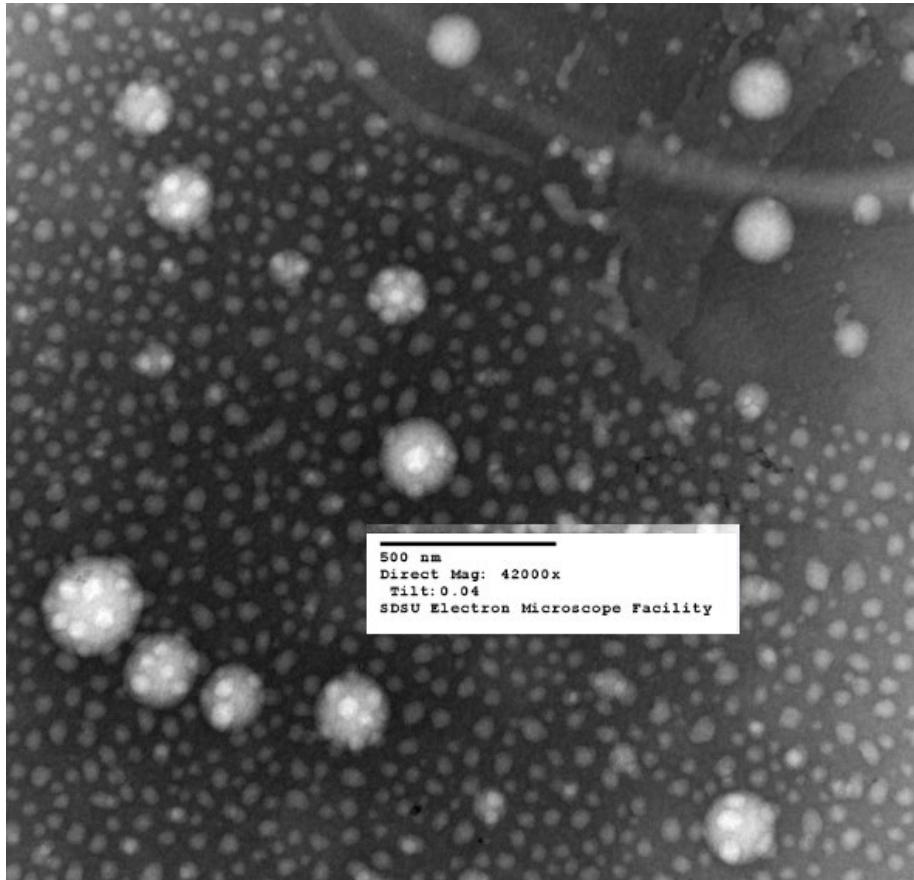
Nanocoating
Physical Process

Nanodrug
on Excipient

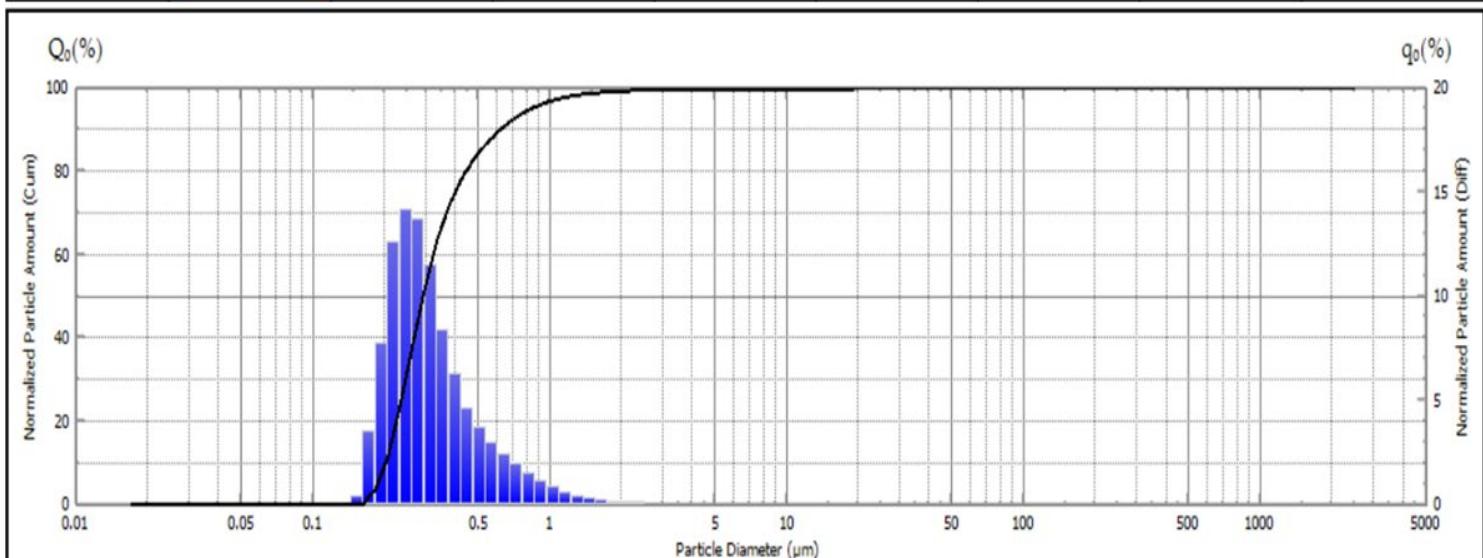
Nanodrug
in Water



Particle Size of Drug Nanoparticles



File Name	Test 3				Meas Date	2021/11/15 11:49:33(-0800)		
Sample ID	CBD sample 4				Sample No.	4		
Comment	----							
Median D	0.291	Mean V	0.324	Absorbance	0.143	----	----	----
Modal D	0.282	Std Dev	0.204	----	----	----	----	----
25.000 %D	50.000 %D	75.000 %D	90.000 %D	0.000 %D	0.000 %D	0.000 %D	0.000 %D	0.000 %D
0.233	0.291	0.395	0.613	0.000	0.000	0.000	0.000	0.000



TEM (as water suspension)

Nano Tracking Analysis PSD

