Nanoparticle-based Opioid Abuse Deterrent Formulations

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- Biotechnology
- Pharmaceuticals

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- Drug abuse
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NCS: Researchers at Purdue University have developed a new method to deter opioid tampering. Drug abusers may tamper with opioids to experience the analgesic effects as quickly as possible. Tampering methods include pulverizing the drugs or extracting them with common household solvents such as ethanol or vinegar. Abuse deterrent formulations (ADFs) are used to limit the physical and chemical tampering of drugs without compromising their therapeutic effects. However, there are publicized methods to circumvent ADFs. The Purdue researchers' method to prevent opioid tampering uses nanoparticles along with ADFs. The researchers encapsulated opioid compounds in nanoparticles resistant to household solvents to prevent solvent extraction. The nanoparticle-based ADF is also resistant to pulverization because they are too small to crush. What's more, if injected, nanoparticles preferentially accumulate in the liver, where they are converted to inactive forms. The nanoparticle ADFs used by the researchers also prevent physical manipulation by gelling when subjected to liquids.

Technology Validation: When thebaine, a model opioid drug, was encapsulated in nanoparticles and mixed with excipients, all the drug remained in the powder, unextracted after subjection to common solvents like ethanol, acetone or sodium bicarbonate solution for 1 h. Tablets made with nanoencapsulated thebaine and the excipients formed a gel that cannot be injected when added to aqueous solvents and did not release thebaine upon crushing followed by extraction.

Advantages
-• &Pvents organic solvent extraction
-•&W6—7F çB Fò €ysical crushing or gelling

Applications
-• &Pventing opioid tampering

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