

Nano drugs: Insoluble medicines can be made orally available if in nano crystal form

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Researchers in India have demonstrated that producing nanoscopic crystals of a pharmaceutical product can allow the medication to be absorbed by the gut even if the drug is not soluble in water.

Research suggests that more than half of the medicinal drugs being developed by the pharmaceutical industry dissolve only very weakly in water, if at all. This is a major problem for administering such drugs as it means they are not effective if taken by mouth. The industry has developed many approaches to addressing this problem, such as adding a small quantity of an organic solvent, such as ethanol, to the mixture, coupling the drug with a charged ion to increase bioavailability and in more recent times using water-soluble "carriers", such as the ring-shaped cyclodextrin. A much more effective approach would be to somehow make the drug soluble without resorting to such additives.

Scientists have, over the last decade or so, discovered that producing microscopic crystals of a pharmaceutical product can make it soluble in water even if the bulk compound is not. The tiny particle size, means a much greater surface area to volume ratio giving access to more [water molecules](#) that can surround the particles, which is the essence of dissolving a compound. This effect can then allow the particles to be carried across the lining of the gut wall where they would previously simply move past with no interaction. The effect can be explained in terms of the [physical chemistry](#) and mathematics known to nineteenth century scientist Lord Kelvin, Herbert Freundlich, and Wilhelm Ostwald.

Now, R. Ravichandran of the Regional Institute of Education (NCERT), in Bhopal, India, writing in the *International Journal of Nanoparticles*, has demonstrated that gymnemic acids derived from the herb *Gymnema sylvestre*, can be made more readily bioavailable by forming the active compounds as nanoscopic crystals, nanocrystals. The compounds have medicinal activity in a range of diseases, in particular diabetes mellitus, with the native herb having been used in traditional medicine for several centuries.

Ravichandran's detailed examination of the physical and chemical properties of nanocrystals of gymnemic acids could provide important clues as to how to transfer the medical benefits of the herb to a regulated pharmaceutical product for further investigation and with a more strict profile in treating disease.

More information: "Physico-chemical evaluation of gymnemic acids nanocrystals" in *Int. J. Nanoparticles*, 2010, 3, 280-296

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