Report on e-Seminar on "Crystal engineering for pharmaceuticals development"

Speaker – Prof. Venu Vangala, University of Bradford, UK

Date: May 20, 2020 Time: **18:00 (Indian time)**

Dr Venu Vangala is one of the leading scientists and an academic at the University of Bradford (UoB), United Kingdom in the research area of solid-state pharmaceuticals. He has delivered a Zoom webinar entitled '**Crystal Engineering for Pharmaceuticals Development**' to the University of Lucknow on 20 May 2020. Around 400 distinguished scientists and students across world have participate this e-Seminar. Dr Vangala aims to apply the fundamental principles of crystal engineering for tailoring the physical properties of drugs.

A significant fraction of drugs are delivered in the solid (tablet, capsule) form. Therapeutic effectiveness and commercial sus Note Venuccess of a drug primarily depends on the bioavailability, stability, quality and manufacturability of the dosage form. ~40% of the marketed and 90% of new chemical entities present concerns with poor solubility, which limits bioavailability despite having desirable pharmacological activity. Several strategies are currently being used to enhance the solubility and biological activity of drugs.

In the past decade, crystal engineering (solid-state arrangement) based multicomponent solids (hereafter referred to as pharmaceutical cocrystals), active drug and safe additive molecule(s) forms homogeneous complex with intermolecular interactions and exists in solid-state at ambient conditions, demonstrated a significant potential in terms of modifying the physicochemical properties, absorption and manufacturability of drugs. Aside bioavailability, active drugs present challenges pertaining to physicochemical transformations during processing and formulation, chemical degradation and poor compressibility. Dr Vangala's Research Group have successfully demonstrated for **the first time** that cocrystals could offer photo-stabilisation (chemical stability) to the drug, which has potential applications in manufacturing and packaging. Accordingly, pharmaceutical cocrystals have attracted pharmaceutical industry and academia now as novel pharmaceutical materials for positively modifying the drug physical properties and manufacturability.

Thus far, publications have outlined various aspects of cocrystals at the molecular level concentrating on their design, growing techniques, and physicochemical characterizations. However, to take cocrystals from bench to bedside, they have to be incorporated into suitable formulations notwithstanding that the attention paid to cocrystal formulations is so diminutive. This contribution comprises the **first systematic review** based exclusively on cocrystals formulations. Dr Vangala's talk consist of some of their cocrystal formulations efforts (Figure 1).

The research findings suggest that after physicochemical characterisations, a number of approaches are desired in order to develop successful cocrystal formulations. It further highlights the main hurdles encountered with cocrystals formulation and other challenges to the transformation of cocrystals into viable medicines to have the full picture. There are marketed cocrystal products now, and it can be said it is only a matter of time before cocrystals are added to the main selection toolbox alongside salts for developing medicinal products.

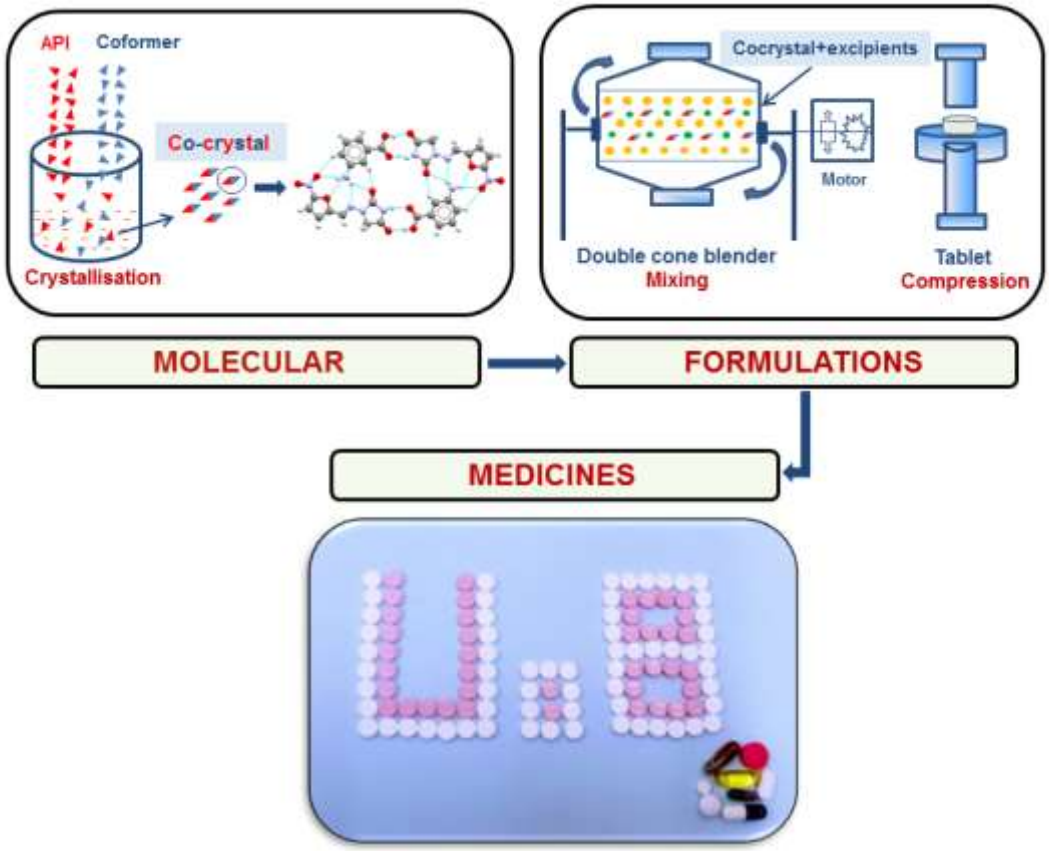

Figure 1. Molecular level of understanding and tailoring of physical properties and successful formulations pave the way for the drug development.

YouTube - https://youtu.be/ovcoq-dlbgE