Crystal engineering for antiparasitic drug multicomponent crystal: crosscut in drug discovery and drug development

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Both strategies in drug discovery, the first, short-to-medium term one, based on fixed-doses combinations of the known compound classes, and second one, long-term relying on identifying the new lead compound with defined biological effects caused by known molecular targets, are underway for screening antiparasitic drugs [1].

The revealing of new molecular entities which varieties of their structures are designed toward both in silico molecular modelling and reactions in organic synthesis performed by high-Throughput Screening (HTS) impacts the engineering of the single solid phases within a single or multi compounds that are appeared as new solid substances available for product development. By applying this "bottom-up" approach of assembling and packing molecules as "building blocks" in 3D reproducible multiplicity along sides of the crystal lattice, it is possible to modulate the growing of macroscopic crystals with varieties of shapes and sizes and unique physicochemical properties that consequently affect the biopharmaceutical profile and the performance API's powder during its handling and processing. Therefore, Crystal engineering concept becomes crosscut stage where overlapping drug discovery and drug development enable tailoring the desirable properties through screening the solid phases and selection the appropriate one. The nature of non-covalent interactions among molecular/ionic counterparts in stoichiometric ratio influence either crystallization of the single component solids (polymorphs) or multicomponent solids (solvates/hydrates, salts, cocrystals or inclusion complexes etc.) to occur beside the amorphous solid phases [2].

The presented case studies for searched crystal structures for several compound classes of antiparasitic drugs which are deposited in Cambridge Structural Database (https://www.ccdc.cam.ac.uk/) reveal the opportunities for studying the frequency, prevalence and hierarchy of appearing the non-covalent interactions in their molecular crystals and to perceive the opportunities for designing new solid phases for multicomponent crystals of either the combinations of antiparasitic drugs with different molecular structures or antiparasitic drug cocrystalized with reliable conformer that improve the drug properties.

References

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