Small Molecule Medicines: Why They're Vital for Patients

Small molecule medicines are what most people think of when they imagine a medicine. They are chemically synthesized medicines that are typically taken orally in the form of a pill or a capsule. Small molecule medicines serve specific purposes that are essential to the treatment of different diseases in unique ways. As they account for the majority of novel medicines approved by the U.S. Food and Drug Administration (FDA) they are indispensable in providing patients, caregivers and health care providers with the tools necessary to prevent, treat or cure various diseases.

Here are some key benefits to know about small molecule medicines:

1. Small molecule medicines can reach therapeutic targets inside of cells.

To treat a disease, a medicine must be able to reach a specific therapeutic target. In most cases, a therapeutic target is a protein associated with a specific biological process that can cause disease if it isn't functioning properly. Due to their smaller size, simpler structure and lower molecular weight, small molecule medicines have the ability to cross cell membranes with relative ease to reach therapeutic targets inside cells to facilitate clinical benefit. This capability is critical to reach specific biological mechanisms associated with certain diseases.

Driving treatment advances for cancer patients:

Small molecule targeted therapies have emerged as a critical part of the treatment arsenal against cancer, due in large part to the ability of these medicines to reach medicine targets inside cells, where cancer originates. Gene mutations inside cells lead cancer cells to divide and spread. Improved understanding of the genetic basis of cancer has led to the development of medicines directly targeting these mechanisms inside cells that drive cancer cell growth–including the genetic characteristics of an individual patient's cancer cells. Small molecule targeted therapies have contributed greatly to a paradigm shift in cancer treatment, allowing medicines to increasingly target the underlying cause of cancer cell growth, while sparing normal healthy cells.

2. Small molecule medicines can cross the blood-brain barrier.

While the blood-brain barrier plays an important protective role in the body by regulating which substances can pass from the blood into the brain to protect the central nervous system, it can also serve as a formidable barrier that can inhibit delivery of medicines for diseases whose therapeutic targets are inside the brain. The unique ability to cross the blood-brain barrier allows small molecule medicines to serve a critical role in the treatment of health conditions impacting the central nervous system, such as mental illness, stroke, epilepsy, various neurodegenerative diseases such as Alzheimer's disease, dementia, Parkinson's and many more.

3. Small molecule medicines provide great flexibility and convenience, reducing barriers to treatment adherence.

Effective disease management often relies on good adherence to medicines. Dosage forms that make medicines easier to take are an important driver of medication adherence. Small molecule medicines can be made in a wide range of dosage forms. A dosage form is the physical form a medicine takes to deliver an effective dose of the medicine's active ingredient to the patient. Most commonly, small molecules are available as pills, tablets or capsules, which is often the most preferred method to take a medicine. But they are also often formulated as injections, oral suspensions, and a range of many other dosage forms to meet the diverse needs of different patient populations.[1,2] These features, in turn, reduce barriers for patients to access and adhere to prescribed treatments, keeping patients healthy and reducing the need for use of other costly forms of medical care.

4. Greater convenience offered by small molecule medicines can help reduce health disparities.

Housing instability, unemployment and inadequate social support are just some of the factors associated with poor adherence to medicines. For example, evidence suggests that patients are 1.8 times more likely to be non-adherent if faced with transportation challenges.[3] These factors have a disproportionate impact on disadvantaged communities who are the least positioned to handle them. Small molecule medicines, however, particularly oral dosage forms, are often stored at home and can be easily self-administered, providing great convenience to patients as they require fewer visits to a doctor or infusion center to receive treatment. These features in turn help reduce the burden of transportation challenges, caregiver costs, lost wages and other hurdles that have played a role in driving treatment non-adherence and longstanding health inequities.

The Inflation Reduction Act's (IRA) price setting provisions discourage the development of small molecule medicines and jeopardize patient access to needed medicines.

The importance of small molecule medicines in providing patients with critical and unique treatment options cannot be overstated. Despite this, government price setting policies that were signed into law in 2022, as part of the IRA essentially ignore the indispensable attributes that have made small molecule medicines valuable to patients and our health care system.

Under the law, small molecule medicines can be selected for price setting seven years after they are approved by the FDA, with their government set price taking effect two years later. This is substantially earlier than their average effective patent life of 13 to 14 years and would consequently discourage investment into these medicines. Biopharmaceutical companies are already taking the IRA into account when making tough decisions about their R&D projects. In a survey of biopharmaceutical companies,[4] 63% said they expect to shift R&D investment away from small molecule medicines because of the IRA.

To continue to incentivize development of innovative small molecule medicines, policymakers should change the timeline for price setting of these medicines such that they may not be selected for price setting until 11 years following FDA approval, and the government set price should not go into effect until 13 years following FDA approval. These changes can have a meaningful impact on the R&D decisions that biopharmaceutical companies are having to make now and help ensure patients can continue to realize the benefits these medicines have to offer, now and into the future.

1 Balkrishnan R. Predictors of medication adherence in the elderly. *Clin Ther*. 1998;20(4):764-771. doi:10.1016/s0149-2918(98)80139-2

2 Wertheimer AI, Santella TM, Finestone AJ, Levy RA. Drug delivery systems improve pharmaceutical profile and facilitate medication adherence. *Adv Ther.* 2005;22(6):559-577. doi:10.1007/BF02849950

3 Qato DM, Alexander GC, Chakraborty A, Guadamuz JS, Jackson JW. Association Between Pharmacy Closures and Adherence to Cardiovascular Medications Among Older US Adults. JAMA Netw Open. 2019;2(4):e192606. Published 2019 Apr 5. doi:10.1001/jamanetworkopen.2019.2606

4 https://catalyst.phrma.org/wtas-inflation-reduction-act-already-impacting-rd-decisions