Translational medicine research at Novartis

Too often, new therapies fail to bridge the treacherous gap that lies between research and entry into human clinical testing. Our team of translational medicine researchers work to bridge this gap and ensure that safe, effective and innovative treatments reach patients as quickly as possible.

3-D movies of cartilage reveal structural details, including damaged spaces. Sections shown here are cartilage along the femur, or thigh bone. Image credit: Didier Laurent and Aparna Srikanth

Led by Evan Beckman, the group applies its medical and research expertise to guide promising therapeutic candidates along the path to development. Our physician-scientists have a deep understanding of disease biology and unmet medical needs. Working shoulder-to-shoulder with our discovery colleagues, and alongside a dedicated team of preclinical safety, pharmacokinetic, biomarker and clinical scientists, we identify and validate new drug targets, compounds and biological drugs, and provide insights on where novel therapies can achieve the greatest clinical benefits.

Before a new therapy is given to people for the first time, scientists in Translational Medicine first rigorously test our drugs in preclinical studies in animal models for safety and pharmacokinetic properties. Many of these scientific experts from Translational Medicine remain with the therapy as it moves into the clinic and into patients throughout the drug development process.
Our group also develops biomarkers and assays to investigate whether a given therapy alters the same disease pathways in people as it does in preclinical studies in model organisms. By using imaging data, genetic expression profiles and other powerful tools, we are able to explore treatment responses in far more sophisticated ways than was possible in the past. In that way, we let our science point us towards the best medical applications for a new therapy, instead of committing to just one disease area early on.

We evaluate experimental therapies by:

- **Characterizing their properties** and performing initial tests to confirm they act on specified targets and are safe for people;
- **Designing and conducting focused studies** in small numbers of patients to understand a candidate's therapeutic potential in different diseases; and
- **Identifying the diseases** that a therapeutic candidate will likely treat most effectively

These small-scale studies are typically carried out in smaller homogeneous populations of patients within a disease and sometimes in rare genetic diseases. The results of this careful initial testing help us streamline future efforts in diseases that may be more widespread. For instance in Osteoarthritis, a highly prevalent disease with 300 Million patients suffering worldwide. Predominantly affecting people over the age of 45, it can also occur in younger patients, especially athletes after trauma or joint injury. Patients suffer from pain, reduced mobility and relevant reduction in quality of life. It has been shown that OA increases the risks for depression and cardiovascular disease, patients experience a loss of independence and have a higher mortality risk. OA poses a substantial burden on affected individuals and an economic burden to health care systems and society.

The pathomechanism of the disease is multifactorial and research in recent years has elucidated various

factors contributing to the progressive joint destruction. Despite these efforts there are currently no treatments available that modify and change the course of the disease by affecting its underlying cause. Existing medicines only temporarily target pain as main symptom and for some patients, unfortunately, joint replacement surgery is the final option.

We have developed a rich pipeline of various compounds that target different anabolic, anti-catabolic and anti-inflammatory aspects of the disease. These small molecules, antibodies and biologic proteins allow for targeted and individualized treatment approaches. In addition, our research focuses on opportunities to improve imaging technologies, diagnostic biomarkers and patient counselling based on disease modelling to speed up development and improve the precision of future osteoarthritis therapies.

"We're taking great ideas in early research and finding suitable opportunities to advance them toward the next phases in development," Beckman says. "And in doing that, we're thinking hard about the biology and science of human diseases, while also applying a clinician's judgment to guide our therapies to the places they might have the biggest impact and change the practice of medicine."

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