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Groundbreaking Genome Editing Tools Unlock New Possibilities for Precision Medicine

A team of researchers at the Carl Gustav Carus Faculty of Medicine, University of Technology Dresden, led by Prof. Frank Buchholz, has achieved a major breakthrough in genome editing technology. They've developed a cutting-edge method that combines the power of designer-recombinases with programmable DNA-binding domains to create precise and adaptable genome editing tools.

Traditional genome editing faced limitations in achieving ultimate precision until now. Prof. Buchholz's team has broken through this barrier by creating what many have sought after: a zinc-finger conditioned recombinase. This innovative approach involves integrating a zinc-finger DNA-binding domain into specially designed recombinases. These enzymes remain inactive until the DNA-binding domain engages with its target site, adjacent to the recombinase binding area.

The significance of this achievement lies in the fusion of two key strengths: the targeting ease of programmable nucleases and the precise DNA editing capabilities of recombinases. This breakthrough overcomes existing limitations in genome editing techniques and holds vast promise for therapeutic gene editing and various biomedical applications.

Prof. Buchholz expresses his enthusiasm, stating, "This breakthrough represents a harmonization of existing genome editing tools, allowing us to create precision enzymes independent of natural DNA repair mechanisms. This marks a significant step towards a safer and more adaptable approach of correcting disease-causing genetic mutations, offering immense benefits for numerous patients."

This pioneering work opens new horizons in genome surgery and promises a safer, more precise approach to treating genetic disorders. The implications of this breakthrough extend far and wide, potentially transforming the landscape of medicine as we know it. In this context, Professor Esther Troost, the Dean of the Faculty of Medicine at TU Dresden, emphasizes, "The Faculty of Medicine at TU Dresden is setting new standards for innovative medicine with groundbreaking genome editing tools. Under the leadership of Prof. Frank Buchholz, the research team is breaking traditional boundaries and paving the way for specialized gene therapy applications."

Building upon these advancements, Seamless Therapeutics GmbH, a biotechnology company founded out of the Buchholz lab, will advance these innovative findings to therapeutic application. The company has signed an exclusive licensing agreement with the TU Dresden for this novel technology that allows Seamless to further expand their recombinase platform to change the paradigm of gene editing and develop a pipeline of disease-modifying product candidates across a broad spectrum of indications.

Reference:

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<https://www.nature.com/articles/s41587-023-02121-y>

Carl Gustav Carus Faculty of Medicine at the Technical University of Dresden:

Dresden University Medicine, consisting of the Carl Gustav Carus Faculty of Medicine and the university hospital of the same name, specialises in research in the fields of oncology, metabolism and neurological and psychiatric diseases. Within these key areas, the topics of degeneration and regeneration, imaging and technology development, immunology and inflammation as well as prevention and healthcare research are of particular interest. Internationality is a prerequisite for cutting-edge research - the University Hospital Dresden lives this concept with employees from 82 nations and numerous collaborations with researchers and teams from all over the world.

TU Dresden: The Dresden University of Technology (TUD), among Germany's distinguished eleven (11) Universities of Excellence, stands proud with remarkable research achievements and the successful formation of interdisciplinary research networks. Spanning seventeen (17) faculties across five (5) departments, TUD offers an extensive array of one hundred and twenty-four (124) degree programs, encompassing a wide spectrum of research disciplines.

One of its five prominent scientific profiles lies within the "Health Sciences, Bio-Medicine, and Bio-Engineering" cluster, merging fundamental and translational research efforts. Specifically, the realm of medical systems biology constitutes a domain integrating experimental and theoretical research. By strategically focusing on this area within the Faculty of Medicine at TUD, meaningful synergies between clinicians and researchers have substantially expanded, paving the way for the implementation of personalized medicine in Dresden.

<https://tu-dresden.de/med/mf/ucc/medsys>
<https://www.buchholzlab.org/>

Seamless Therapeutics GmbH: Seamless Therapeutics is changing the paradigm of gene editing through a pioneering approach to restore health in patients with severe conditions in a safe and precise manner. Our technology platform unlocks the reprogramming of recombinases, a highly versatile class of enzymes. We are applying our proprietary know-how to develop a pipeline of disease-modifying product candidates across a broad spectrum of indications to expand the therapeutic potential of gene editing.
<https://seamlesstx.com/>

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