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2023

Professor
Molly M. Stevens

The Novo Nordisk Prize

Nomination of Molly M. Stevens

The Novo Nordisk Foundation is awarding the 2023 Novo Nordisk Prize to Professor Molly M. Stevens FRS FREng for her pioneering discoveries in bioengineering providing innovative materials-based solutions for regenerative medicine, biosensing and therapeutics. Her groundbreaking biomaterials and bioengineering research have led to fundamental understanding of biointerfaces and development of a range of pioneering characterisation techniques, which have led to transformative clinical applications paving the way towards a democratised access to advanced healthcare technologies.

Molly Stevens graduated with First Class Honours in Pharmacy at the University of Bath in 1995. She received her PhD from the University of Nottingham in 2001, where she focused on atomic force microscopy (AFM) to investigate single molecule biophysics and to study biomolecular adhesion and mechanics of proteins and peptides. Her PhD work elegantly demonstrated the design and creation of protein multilayers and AFM was utilised to determine surface functionality at each stage of the multilayer construction. These pioneering studies also revealed unprecedented insight into the forces governing coiled-coil peptide interactions and were awarded the Ronald Belcher Award from the Royal Society of Chemistry in 2000.

Molly Stevens then received postdoctoral training in the prestigious laboratory of Professor Robert Langer at the Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. In this position Molly Stevens expanded her skills in molecular engineering and studied fundamental molecular mechanisms and developed them into a more applied direction with the overall goal to impact lives of people with organ failure through future developments in regenerative medicine. The most prominent translational discovery during her postdoc demonstrated that large volumes of bone can be engineered in a predictable manner using an approach termed the in vivo bone bioreactor as a means for engineering autologous bone for transplantation.

Molly Stevens' highly interdisciplinary research has over the past 15–20 years contributed with numerous breakthrough discoveries on many bioengineering challenges. Building on her expertise in fundamental materials sciences, molecular and structural biology, as well as bioengineering, her work has contributed to key fundamental understanding of bio-interfaces. In addition, Molly Stevens and her group have also developed many new biomedical materials that are used in disease diagnosis and regenerative medicine applications. Molly Stevens has an outstanding scientific curiosity and talent for employing and even inventing novel analytical tools and imaging technologies, which have the potential to revolutionise clinical medicine in important

areas including advanced diagnostics, personalised medicine, digital medicine and big data. Together with her team Molly Stevens has pioneered innovative bioengineering approaches and she has demonstrated the ability to solve key problems in regenerative medicine, biosensing and therapeutics.

A primary research area for Molly Stevens and her group deals with synthesising and engineering of scaffolds, including scaffolds with gradients, dynamic elements, or other modes of complexity, that can be used to accelerate regeneration and deliver therapeutics, or study cellular and biological processes. Notably, complex, heterogeneous scaffolds are particularly interesting because they can permit the realisation of varied environments more like those found in actual biological systems. Recently, Molly Stevens and colleagues introduced a relatively straightforward approach to achieve such a class of scaffolds. They exploited the fundamental physical principle of buoyancy as a generalised approach for generating materials bearing well-defined compositional, mechanical, or biochemical gradients. This gradient formation is demonstrated across a range of different materials (e.g., polymers and hydrogels) and cargos (e.g., liposomes, nanoparticles, extracellular vesicles, macromolecules, and small molecules). Impressively, they also demonstrated the applicability of this platform in a tissue engineering context, specifically, the presentation of bone morphogenetic protein 2 gradients to produce osteochondral tissue.

The resulting tissue constructs possessed distinct regions of bone and cartilage, along with a structural transition that resembled the tidemark observed at the native osteochondral interface. Overall, the versatility, speed and ease of using this platform technology offers the opportunity for many different applications in gradient material fabrication and interfacial tissue engineering. This is just one example of how Molly Stevens and colleagues can toggle scaffold composition, via the incorporation of particles, proteins, and macromolecules.

Molly Stevens currently leads the UK Regenerative Medicine Platform Hub for Smart Materials and in her role as Director of this platform has created a vibrant ecosystem to train the future regenerative medicine early career researchers and facilitate the translation of biomaterials innovations

towards the clinic. As a complement to this work in regenerative medicine, Molly and her team have also made major advances in enabling better characterisation of nanoparticle-based advanced therapeutics. Their invention of SPARTA® (Single Particle Automated Raman Trapping Analysis) has led to the development of a unique benchtop instrument that can provide essential insight into the chemistry of single nanoparticles. The technique has found transformative applications in the analysis of lipid nanoparticles, polymer based particles, cell-derived exosomes amongst others and is being commercialised through Molly Stevens' recently founded company Sparta BioDiscovery.

Among Molly Stevens' greatest contributions have been creating platform technologies that can be used for biosensing applications as well as for tissue regeneration and advanced therapeutics. Molly Stevens and her group developed a variety of biodetection schemes that employ nanomaterials. They focused on designing and developing systems that can be used for the early detection of disease and that can be read-out with the naked eye (colorimetric), precluding the need for complex and expensive instrumentation. This large body of exceptional work includes the development and application of nanozymes (inorganic nanoparticles that function a little like native enzymes) and the incorporation of these into tests that can provide ultrasensitive detection of biomarkers related to early HIV infection and other diseases.

Characteristically, major parts of Molly Stevens' scientific work have been devoted to contributing to solve big clinical problems in medicine, and her entrepreneurship and dedication to bring discoveries to lives is evidenced by the more than 20 patents she has filed. Molly Stevens developed and patented the platform technology called Competitive Amplification Networks with the superior ability to detect nucleic acid biomarkers at the molecular level and to exploit this technology she also founded the company Signatur Biosciences. Recently, Molly Stevens and colleagues also developed a CRISPR-based diagnostic technology for specific sensing of long non-coding RNA biomarkers associated with human diseases. They showed that the combination of a CRISPR–Cas-based reaction with a nanozyme-linked immunosorbent assay, allowed for the quantitative and colorimetric readout of Cas13-mediated RNA detection through catalytic metallic nanoparticles at room temperature (an approach they have termed CrisprZyme). Importantly they have demonstrated that CrisprZyme is easily adaptable to a lateral-flow-based readout and that this platform can be used to identify patients with acute myocardial infarction, can be applied to tissue biopsies from cancer patients and can be used to monitor cellular differentiation in vitro. Moreover, CrisprZyme has the potential to serve as a universally applicable signal catalyst for CRISPR-based diagnostics, which will expand the spectrum of targets for preamplification-free, quantitative detection.

Molly Stevens is an exceptional scientist, a unique role model, and mentor who is inspiring the next generation of scientists as recognised by the Controlled Release Society Women in Science Award (2018). Molly Stevens is also an outstanding communicator who provided a TED talk in 2014, which has been viewed over 1 million times. Molly Stevens has already been honoured with several national and international prizes and awards including The Clemson Award for Basic Research, and The 2020 Award in Colloid Chemistry by the American Chemical Society. She has shown exceptional great leadership and successful mentoring of a large number of students and postdocs who have been extremely successful in securing their own subsequent leadership positions in industry or academia.

Her career is studded with high quality-high impact publications and remarkable achievements and recognitions in multiple fields as highlighted above. This is truly excellent. Molly Stevens has an impressive scientific output of more than 400 original publications, many published in high-impact journals such as Science, Nature, Nature Medicine, Nature Materials, Nature Nanotechnology, Nature Protocols, Nature Chemistry, and Proceedings of the National Academy of Sciences of the United States of America. Molly Stevens has also authored several top-cited review articles which span a range of important medical applications that are related to the original research articles from her group demonstrating the awareness, scientific maturity and breadth of technologies that address the clinical needs she and her team work to address.

In summary, the Novo Nordisk Prize Committee finds that Molly Stevens is a worthy recipient of the 2023 Novo Nordisk Prize based on her systematic, comprehensive, clinically important, and highly original international research in biomaterials and bioengineering, and for the impact of this in medical science.

Photos of Molly M. Stevens:
David Vintiner (Cover and page 3)

About Molly M. Stevens

1995	BPharm, Pharmacy, University of Bath
2001	PhD, single-molecule biophysics, University of Nottingham
2001–2003	Postdoctoral Fellow, Massachusetts Institute of Technology
2008	Professor of Biomedical Materials and Regenerative Medicine, Imperial College London
2019	Foreign member of the National Academy of Engineering (United States)
2020	Fellow of the Royal Society (FRS)


Understanding materials and the interface with biology can **revolutionise access to healthcare**

Travelling low- and middle-income countries in her twenties made Molly M. Stevens realise how completely unequal the world is in access to resources and healthcare. It made her transform her passion for science into something that could make a difference in people's lives. By designing nanomaterials to interact with biology, Molly M. Stevens and her team are developing advanced drug delivery systems, ultrasensitive biosensing and tissue engineering scaffolds to recreate eyes, bones and heart. For her groundbreaking research venture into the future of medicine, she is receiving the 2023 Novo Nordisk Prize.

Up to 3.5 billion people – almost half the world's population – lack access to the health services they need. According to WHO, almost 100 million people each year are in extreme poverty and have inadequate access to healthcare. Already early in her career, 2023 Novo Nordisk Prize recipient Molly M. Stevens realised that health innovation and digital technologies are some of the keys to solve this inequality.

"I became very motivated to be able to work on science that was not going to just benefit rich people but could also help in democratising access to healthcare. And this is still a huge motivator and helps us to set the challenges within much of the work we do in my team, such as biosensing tests that can detect HIV earlier. By bringing together fundamental concepts around understanding materials and the interface with biology, we aim to develop technologies that can revolutionise access to healthcare," explains Molly M. Stevens, Professor of Biomedical Materials and Regenerative Medicine from Imperial College London, United Kingdom.

Five years was too long

To someone external who does not know Molly Stevens, it looks like they do many different things, and she says that she is "one of

these people" that has always been interested in many different things. In school, she loved geography and languages and sciences. But in the end, she chose science and kept her interest in languages and geography as hobbies. Also, it enabled her to be creative.

"I think science is so creative. The fact that people think it might not be is misinformed. I see lots of parallels between creativity in art and creativity in science. I love exposing myself to lots of art and lots of music, because it is part of my nourishment for keeping an open mind. But science is massively creative. I am a very visual person, so a lot of my creative thinking is in images and thinking about how things come together in three dimensions."

Molly Stevens chose to study pharmacy at Bath University, United Kingdom, because it covered lots of different things – from human biology to chemistry to designing drugs for pharmacology – but not necessarily because she wanted to become a pharmacist.

"I mean, this is ironic, when I think about it now. I had been thinking about studying medicine. And I decided not to, because I thought that 5 years was too long to be at university. I have been there ever since."

1000 times better

Bath University is known for a highly regarded student experience and for providing outstanding real-world preparation. And once graduated and after working for a year in hospitals, she decided to discover the real world afterwards by taking time out to go travelling a long time in South-East Asia and India.

"During my travels, I became acutely aware of how completely unequal our world is in people's access to resources and healthcare. So, ever since, I have always been thinking in the back of my mind: how can we make a difference in this area?"

The time away while travelling also made her wonder what sort of PhD studies she wanted to do.

"I wanted to get my teeth stuck into something. I decided that I wanted to do a PhD that would be as hard as possible. That was my main motivation. I chose single-molecule biophysics because I had not studied physics at A level. And I thought that this sounded difficult and a good challenge."

For 3 years, Molly Stevens worked on her PhD in the Laboratory of Biophysics and Surface Analysis at the University of Nottingham with atomic force microscopy – invented in 1985 by IBM scientists – a scanning technique gathering information by touching the surface of a sample with a mechanical probe – a small cantilever. This results in a resolution more than 1000 times better than the optical diffraction limit – enabling scientists to study objects on the order of fractions of a nanometre.

"It was such an exciting time because it was the time where atomic force microscopy was being used for the first time to uncover the binding properties between molecules. And I got to use it to basically unravel peptides that were bound together and to measure the forces between them at the single-molecule level. I became interested in understanding

how molecules come together, what holds them together and how can we study this and understand it right down at the nanoscale."

Later, the studies of biological interactions expanded to investigating protein-to-protein interactions, and they were considered pioneering at the time when atomic force microscopy was emerging. Today, it is one of the foremost tools for imaging, measuring and manipulating matter at the nanoscale.

From a completely different field

The year 2000 in which Molly Stevens finished her PhD studies was full of all sorts of enormous millennium conferences. She attended one in San Francisco, where she happened to be walking past a room where a picture grabbed her attention. On the screen was a little boy with severe liver failure. The talk was about how to design materials that would help the body to heal itself.

"I thought this was just wonderful and it totally, totally inspired me that one's research could have so much impact on helping people. This was completely unexpected, and within a few minutes I felt certain that this was what I wanted my next field to be."

After the talk, Molly approached the person giving the talk, and asked if she could do a postdoctoral fellowship with him – it was world-renowned engineer *Robert Langer*.

"I was coming from a completely different field. So, I was probably less nervous speaking with him than I would have been if had realised quite how famous he was, but I just loved his approach and his energy. And, of course, I had a wonderful time in his lab. I kept my skill sets, but I learned to apply them in a completely different way."

The bone bioreactor

The next 3 years in the Department of Chemical Engineering at the MIT in Cambridge, MA developed Molly Stevens' skills into a more applied direction with an overall goal to affect the lives of people and kickstarted her career in a new field.

"I got to work on an exciting project with Robert Langer and Prasad Shastri – the bone bioreactor – about growing bone on the outside of the legs. So, you could transplant it somewhere else. It seemed like a high-risk project. But I was not too worried about that. I thought it was going to have some chance of success. And if it works, it is going to be amazingly cool."

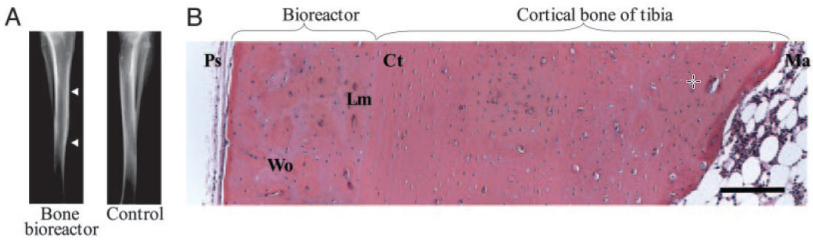
Bone is generally quite good at repairing itself in the body. For repairing complex bone fractures, bone grafting from the iliac crest to replace missing bone is the gold standard but can lead to significant pain in the iliac crest years

after. The idea with the bone bioreactor was to recreate the generation of bone within the body.

"We have a layer of stem cells along our long bones called the periosteum. My contribution to this was developing liquid that we would inject under this layer. The liquid turns into a rigid gel to create an artificial cavity next to the bone, and it worked out. These stem cells wake up when you have a fracture, and we managed to create the same effect with an introduced biomaterial, so we were able to generate amazing amounts of well-organised bone for transplantation elsewhere in the body."

have a group meeting, you can be incredibly innovative and bounce a lot of ideas around and get a healthy dose of realism, because we might propose something from an engineering viewpoint. And the surgeon might just turn around and say that we do not do that in practice."

People often told Molly that she should either focus on completely fundamental research or very applied research. But she took a different path because this made more sense to her. "Because the insights you get from understanding something, for example, at the



A feeling of positive energy

A simple alginate gel – derived from seaweed – formed the scaffold for the bone bioreactor. Likewise, Molly Stevens' stay at MIT turned out to form part of the crucial foundation for her future career. Following her postdoc, in 2004, she joined Imperial College London, where she then started a highly interdisciplinary research group.

"The team and a palpable feeling of positive energy is a key to success. You have biologists, engineers, physicists, material scientists and surgeons. It is amazing. Because if you

nanoscale, can feed directly into making the best applied innovations."

Capturing the degree of complexity

Again and again during her career, Molly Stevens has thus returned to the starting-point: learning the basics through thorough analysis. One method that has stuck with her is Raman spectroscopy – a chemical analysis technique based on the interaction of light with the chemical bonds within a material. The technique is both non-destructive to living material and delivers detailed information such as crystallinity, structure and molecular

I am interested in how cells interact with materials: for example, to help in tissue regeneration and organ regeneration. You might design new materials by simply mimicking the bulk properties of an existing one, but it makes a lot of sense to also think and examine what is happening right down at the nanoscale or at the level of the cell, so that you can recreate materials that are going to give the best possible cell environment to make the best possible tissue."

interactions – and can thus help provide a biochemical fingerprint of a living cell.

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Deciding when to divide, when to specialise and when to self-destruct are ongoing processes within cells, but equally important to regulate cell fate are external signals from the surrounding extracellular matrix.

"Bone, for example, is beautifully organised with lots of bloods vessels and a 3D matrix of equally organised nanofibres that give a lot of information to the cells – an extracellular matrix that is part organic and part inorganic. A key challenge of our work has thus been to capture the degree of complexity that is needed to functionally replicate the natural tissues as complex as bone, cartilage, heart and the eye."

In very different new directions

Whereas some tissues like bone can be grown in situ in a bone bioreactor, Molly Stevens quickly realised that other kinds need other scaffolds. Already in 2007, she had co-founded a company that developed platforms to grow and repair both soft and hard tissue based on her research, and she served as Chief Scientific Officer in the company for 5 years in parallel with her academic positions.

"We wanted to have enough information to get the cells to do what we want but not be so complex that it would make it too difficult to get to the clinic. Only by understanding the fundamental concepts around materials and the interface with materials can we solve some of the key problems. And one thing we thought about a lot at that time was trying to understand the structure of the tissue in the body."

In 2008, Molly Stevens was promoted to Professor, making her one of the youngest professors in the history of *Imperial College London*. The applied work Molly did there in the beginning was still in regenerative medicine, leading on from some of the things she learned during her postdoctoral fellowship but characteristically also went in new and very different directions.

"To someone external, it would look like we do many different things: advanced delivery systems, ultrasensitive biosensing and tissue engineering scaffolds. But to me, they are all the same thing. They are designing materials to interact in interesting ways with biology. And that is the sort of central foundation for all these different areas where we apply this insight."

Identifying marginal cells of a tumour

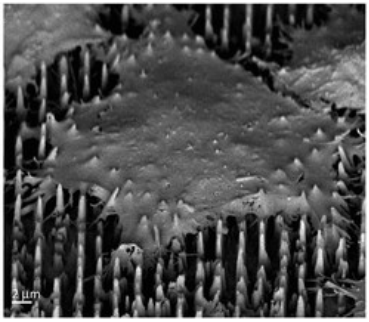
Molly Stevens envisaged how the work on materials could lead to medical implants engineered with nanoscale features to enable stronger interaction with the host tissue for a longer time but also how the nanostructures could lead to both implanted biosensors and bioactive composites to deliver drugs.

"One of our great motivations has been that we have been using different types of nanoparticles for drug delivery or maybe in trying to make new and better vaccines. We have also worked in collaboration with the Houston Methodist Research Institute in the USA on materials that look like a tiny bed of needles. Cells can interact with them, and you might get 50 or more of those needles per cell. And what that can do is help you to deliver things into cells and tissues but also monitor things that are happening within those cells or tissues."

The researchers showed arrays of biodegradable and biocompatible needles could be fabricated using chemical etching and standard microfabrication. The needles – created out of many different materials and only nanometres at the apex – could be used to deliver nucleic acids such as DNA or

proteins to cells but could also be used for intracellular sensing of biomarkers in a highly efficient and non-toxic way.

"We were interested in how we could perhaps measure differences between cancer cells and healthy cells. We know that there are many differences in the environment – pH and in intracellular enzymatic activity – especially the protease called *cathepsin B*, which is upregulated in cancer cells, and so we functionalised the needles with short peptides that had a fluorophore on the end."



A fluorophore is a chemical compound that can re-emit light when excited by light. When the cathepsin B-protease in the cancer cells cleaves the fluorophore, it lights up and labels the cell – which enables surgeons to identify marginal cells of a tumour and to remove it completely with higher precision. The researchers have also been able to use the nanoneedles to deliver quantum dots – nanocrystals of a semiconducting material – into the cells.

"I was excited about this since our group was the first to use these quantum dots for measuring enzyme activities such as kinase and acetyl transferase enzymes."

Turning things upside down

The journey of Molly Stevens' team into understanding the interface between materials and biology has thus led to major advances in both regenerative medicine and how nanoparticles can target and deliver cargoes in the body. Sensors for detecting disease is the third and equally large part of the research portfolio of the Stevens Group at Imperial College London.

"The work has key obvious applications within infectious diseases but also for detecting early heart failure or cancer. All these diseases can benefit from early detection, and this drives us. How can we use these nanomaterial systems to enable better early detection so that our patients can ultimately be treated better?"

The work focuses on precluding the need for complex and expensive instrumentation and instead designing and developing systems that can be read out with the naked eye. In some of her earlier work, Molly and her colleagues introduced a system that could detect ultralow concentrations of prostate-specific antigen in serum.

To do this, the researchers took nanometre-sized gold particles that were linked together via short chains of amino acid at their surface. When the nanoparticles are aggregated, they form a blue solution. But when the solution contains the prostate-specific antigen enzyme – related to prostate cancer – the link is cut, the particles separate and the solution turns red.

And because each enzyme can cut through many molecules, again the signal is amplified. This out-of-the-box thinking is characteristic of Molly's research.

"I think many of the ideas come from having different disciplines coming together. The interface between different disciplines is a challenging thing, but it is so exciting, because it is less studied in many ways than the individual disciplines. You can have a lot of creativity at these interfaces."

A plethora of applications

The invention of new and sometimes surprising concepts is characteristic of Molly Stevens'. A recent example of this is her group's exploitation of buoyancy principles to generate new materials bearing well-defined compositional, mechanical or biochemical gradients.

"The tissues and bones that make up our bodies are complex and formed from a variety of components. Replicating these materials has therefore been complicated. We therefore tried to develop a simple, quick and versatile way of creating them."

The targeted challenge was the osteochondral interface – the region between cartilage and bone.

"It is an inhomogeneous construct with a natural gradient across multiple materials. By injecting one liquid into a second denser one, we were able to produce a tuneable gradient simply by exploiting the fundamental *force of buoyancy*. We could then preserve the gradients by gelation and polymerisation."

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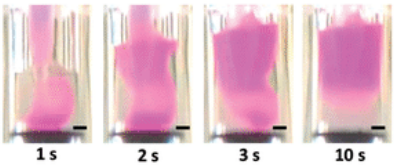

Molly's team took things even further to form gradients with various nanoparticles and small molecules, and they were even able to tune sharp and gradient transitions in the material. "This opens up possibilities for a plethora of applications in gradient material fabrication and interfacial tissue engineering."

In enabling the design of better medicines, however, one thing had so far kept Molly Stevens' team from catalysing the biggest revolutions.

"One of our great motivations has been using different types of nanoparticles to try to make new and better therapeutics, but one frustration we had is the lack of techniques that could help you to understand nanoparticles at the single-particle level."

For nanoparticles in particular, heterogeneity in the material can severely affect function and applicability, and conventional chemical analysis techniques only worked for whole big population of nanoparticles.

"Without more fundamental understanding, we are more limited in rational design that can help us with applications for all sorts of things. What my team has done is invent a technique that is the first in the world that can trap single nanoparticles and measure their chemistry in an automated way.

With SPARTA® (Single Particle Automated Raman Trapping Analysis), the team used their experience using Raman-based characterisation to develop a machine that automatically can trap particles and analyse their chemistry for size, composition, reactivity and surface functionalisation.

"That can have many different important applications. You could understand how much drug is inside a material. How are proteins associating to the shell of the nanoparticle? And how does this affect how a particle travels in the body and gets to the right cells of interest? With our technology, you can now measure real-time changes on a single particle, which is just amazing to me."

SPARTA® is already helping researchers to study other biological and nano-bio systems. "It can enable you to design better medicines. You can monitor the quality of nanoparticle products better, but you can also make improvements to the design as well."

A dream comes true

Molly Stevens has just been appointed to the John Black Professorship of Bionanoscience at the University of Oxford and will be Deputy Director of the newly established interdisciplinary Kavli Institute for NanoScience Discovery. But even though her career has been extremely successful, one dream still lurks in the back of her mind: the dream that originally ignited her desire to revolutionise the medical world.

"When you are traveling, for example in Africa, you see a lot of people in difficult conditions in terms of having less access to resources that many people take for granted in high-income economies. Trying to address this inequality has always been very motivating for me, and I always keep that in the back of my mind. My dream is for our science to help people all around the world."

Worldwide, many infections remain undiagnosed and untreated because of poor diagnostic tools, resulting in ongoing transmission of serious infections or delay in identifying emerging threats, leading to major consequences for millions of people. For example, an estimated 38 million people are currently living with HIV.

"The existing tests detected antibodies to HIV, which means that you must wait weeks, and that is because the tests that could be used in the field to detect the virus itself were not sensitive enough."

Democratising worldwide access

To solve this, the researchers transformed the existing lateral flow assay – like COVID-19-quick tests – to sense p24 – a protein found on the outside of the HIV virus. By

incorporating in-house designed catalytic nanoparticles that produced an amplification stage, they increased the sensitivity up to 100-fold, enabling detection even when virus level is very low.

The plan is to distribute and use the tests in remote settings: a plan taking advantage of the current expansion in mobile phone technology, with an estimated 6 billion users worldwide.

"Many people will have difficulty in getting to a healthcare centre, but they could use a test that could be read by their own mobile phone. By making a test that can work in decentralised settings, you can access more people, and again, help to democratise access to healthcare."

Molly Stevens believes that having these kinds of simple and robust tests with ultrasensitive biosensing capability can help ease the effects of many infectious diseases that affect people all around the world, as seen with COVID-19.

"Early diagnosis plays a vital role in the treatment, care and prevention of infectious diseases, but especially based on the impact in low- and middle-income countries, there is a great need for diagnostic tests that can detect diseases much earlier at affordable price points. My hope is that when this succeeds, it can finally pave the way towards democratised worldwide access to advanced healthcare technologies."

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The 2023 Novo Nordisk Prize was awarded at a prize ceremony in Bagsværd, Denmark on 21 April to Molly M. Stevens, Professor of Biomedical Materials and Regenerative Medicine at Imperial College London.

The Novo Nordisk Prize
- Advances in medical sciences

The Novo Nordisk Prize recognises an active scientist for her/his excellent research, inspirational leadership and mentoring, leading to a major discovery or breakthrough in biomedical science. The prize is intended to reward and further support biomedical research in Europe.

The Prize of DKK 5 million (EUR 672,000) consists of a research grant of DKK 4.5 million (EUR 605,000) and a personal award of DKK 0.5 million (EUR 67,000). An additional DKK 0.5 million will be awarded for hosting an international symposium within the Prize recipient's field(s) of research. In addition, in celebration of the award, the recipient gives a lecture lasting about 1 hour at his or her workplace, sponsored by the Foundation.

Nomination call
Nominations are invited from the scientific community worldwide defined as academics and scientists working in companies. The public call is published on the Foundation's website in the spring. The nomination and review processes are confidential.

Selection process
At the meetings the Committee considers the nominees' research contributions and medical impact of their discoveries based on the submitted nominations. The short-listed candidates are then selected for further evaluation including a comprehensive bibliometric analysis and international peer review.

The peer reviews, bibliometric report and the nominees' scientific leadership impact serve as basis for the Committee deliberations and decision of awarding the Prize.

The award event usually takes place in the spring at the Novo Nordisk Foundation Prize Celebration.

History of the Prize
The prize, originally DKK 50,000, was first awarded on 16 February 1963. The prize was called the Novo Prize from 1963 until 1989, when it was renamed the Novo Nordisk Prize. Until 2020 the Prize was given for a Danish contribution. From 2021 the prize is awarded for a European contribution.

Committee on the Novo Nordisk Prize

- → **Professor Jørgen Frøkiær, chair**
  Aarhus University Hospital,
  Aarhus University
- → **Professor Harriet Wallberg**
  Karolinska Institutet
- → **Professor Jaakko Kaprio**
  University of Helsinki
- → **Professor Rolf Reed**
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- → **Professor Liselotte Højgaard**
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  CEO - Novo Nordisk Foundation









Novo Nordisk Fonden
Tuborg Havnevej 19
2900 Hellerup
Denmark

Phone: +45 3527 6600

nnfond@novo.dk
www.novonordiskfonden.dk/en/

novo nordisk
fonden
Benefitting people and society