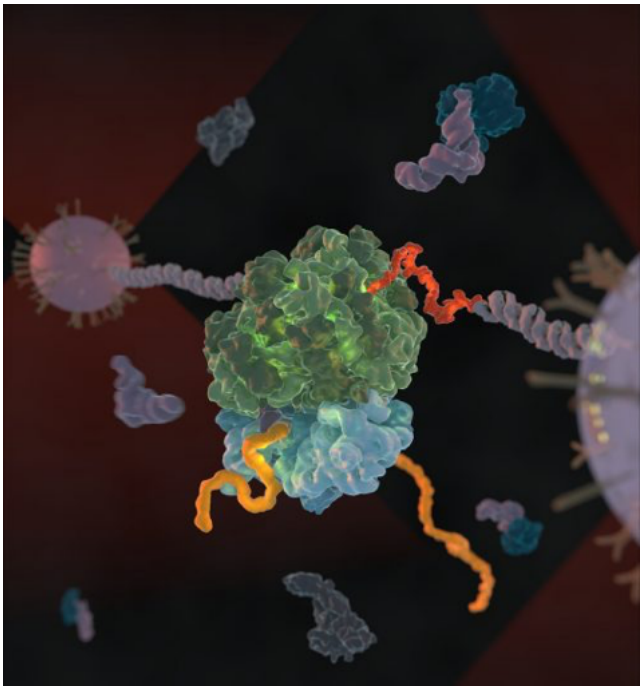
Viewing protein folding helps scientists home in on neurodegenerative disease

Posted May 20, 2017

A team of international researchers led by Professor in Physics at Trinity, Martin Hegner, an Investigator in CRANN, has for the first time observed how proteins fold while being produced in real time.

The work has significant implications for understanding protein synthesis generally, and particularly in neurogenerative diseases such as Alzheimer's and Parkinson's. The team's findings have been published in the prestigious journal *Proceedings of the National Academy of Sciences*.

Professor Hegner's work focuses on individual ribosomes, which are complex molecules that use genetic information to assemble proteins. There can be several million ribosomes in a typical human cell and they are about 20 nanometres in diameter. The assembly of proteins is crucial for a healthy functioning body as all the proteins in our bodies must fold into complex shapes to do their job.



Single ribosome assay. Credit: Trinity College Dublin

While protein synthesis is of fundamental importance in cellular processes, how they are created is not fully understood. One of the events that occurs during protein synthesis is "folding", where the chains of amino acids (polypeptides) fold into their final 3-dimensional structures.

Several neurodegenerative diseases (such as Alzheimer's) and many allergies are believed to result from misfolded proteins. This research is thus important in developing further understanding of such conditions and in developing drugs that can target and prevent certain foldings. There has been interest expressed in Professor Hegner's work by pharmaceutical companies.

Professor Hegner said: "The ribosome translation machinery is a highly complex system, involving many different factors such as energy input, messenger RNA decoding, amino acids, as well as their relative movements and interactions. Investigating this system at the single-molecule level required a highly ambitious and multi-faceted approach that pushes the boundaries of what is technically possible.

"We have identified key mechanisms within individual ribosomes using our unique optical tweezer instrumentation, of which there are only approximately five world-wide. Our expertise in the design of the device and the biological experiment, along with colleagues in Germany enabled us to "grab" the ribosome and the nascent protein chain and provided sufficient stability and sensitivity to observe the synthesis and folding of single polypeptides in real time at the nanometer scale. This was the first time this was observed world-wide and it is very significant to the research community and in developing more in-depth understandings of protein synthesis, – folding and certain diseases."

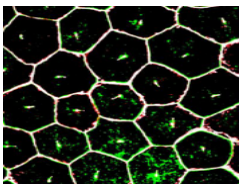
Source: Trinity College Dublin

LIFE SCIENCES & TECHNOLOGIES

DASH ranked Best Diet Overall for eighth year in a row by U.S. News and World Report *Today*

Dont be Shellfish, Plant a Reef: How the Military Uses Oysters to Protect Shores *Yesterday*

Raspberry Pi: A hedgehog cam or two *Yesterday*

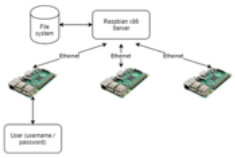


NIH discovery brings stem cell therapy for eye disease closer to the clinic *Yesterday*

Spurring the body to repair itself *Yesterday*

More news about Life sciences

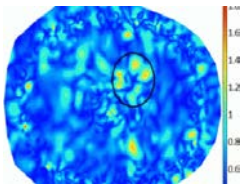
DEVELOPMENTS



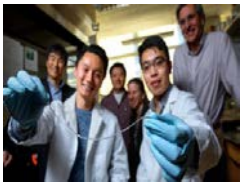
Raspberry Pi: The PiServer tool *Today*

Raspberry Pi: A hedgehog cam or two *Yesterday*

Virtual Twin in Ten Minutes *Yesterday*



Portable 3D brain-scanner set to save lives *2 days old*



Removable implant may control type 1 diabetes *2 days old*

More news about Developments

RELATED TOPICS:

Alzheimer's disease (511)

cell biology (1861)

neurodegenerative diseases (277)

Parkinson's disease (210)

proteins (1104)

68,427 science & technology articles

Search…

CATEGORIES

Spotlight news

Space & astronomy

Physics

Information processing

Life sciences & technologies

Materials & substances

Energy & transport

Geoscience & environment

Economics & social

OUR ARTICLES (see all)

9 out of 10 sewage blockages are caused by one single item – are you flushing it too? *(3 days ago)*

Combining Twitter Data, Citizen Science, and Artificial Intelligence to Improve Early Flood-Warning Systems
(4 days ago)

Robust Sex Differences in Children's Toy Preference Across Different Settings, Ages, and Cultures *(4 days ago)*

Researchers 3D-Print Ear Bones in Hopes of Treating Hearing Impairments
(5 days ago)

Allowing PTSD Patients to 'Hear' their own Brainwaves Alleviates Symptoms
(5 days ago)

GENERAL NEWS

DASH ranked Best Diet Overall for eighth year in a row by U.S. News and World Report *(Today)*

Four-dimensional physics in two dimensions *(Today)*

You Knew This Day Was Coming. Alien Megastructures Ruled Out for Tabby's Star. Dust is the Culprit *(Today)*

NIH discovery brings stem cell therapy for eye disease closer to the clinic
(Yesterday)

Virtual Twin in Ten Minutes *(Yesterday)*

A fossil fuel technology that doesn't pollute *(Yesterday)*

Space Station Research 2017 Highlights in Pictures *(Yesterday)*

Supermassive Black Holes can Turn Star Formation On and Off in a Large Galaxy
(Yesterday)

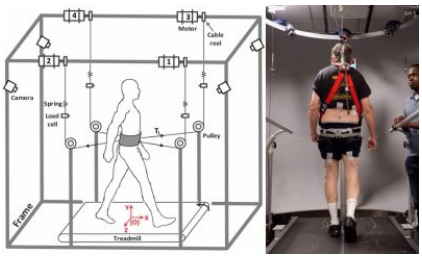
MOST POPULAR ARTICLES

1. Mysterious Filament is Stretching Down Towards the Milky Ways Supermassive Black Hole *(December 24, 2017)*
2. NASA Develops new Tool for the Search of Extra-Terrestrial Life *(December 23, 2017)*
3. Scientists found a way to enhance longevity by 10 % *(December 1, 2017)*

4. Yes Please! NASA is Considering a Helicopter Mission to Titan
   (December 23, 2017)
5. A new portable gel that could save an injured eye *(December 11, 2017)*

FOLLOW US

FEATURED VIDEO (see all)



Robotic device improves balance and gait in Parkinson's disease patients

Some 50,000 people in the U.S. are diagnosed with Parkinson's disease (PD) every year. The American Institute of…

FEATURED IMAGE (see all)

Virtual Twin in Ten Minutes

In order to create avatars for the ICSpace system, the researchers "scan" people. The computer scientists use a…