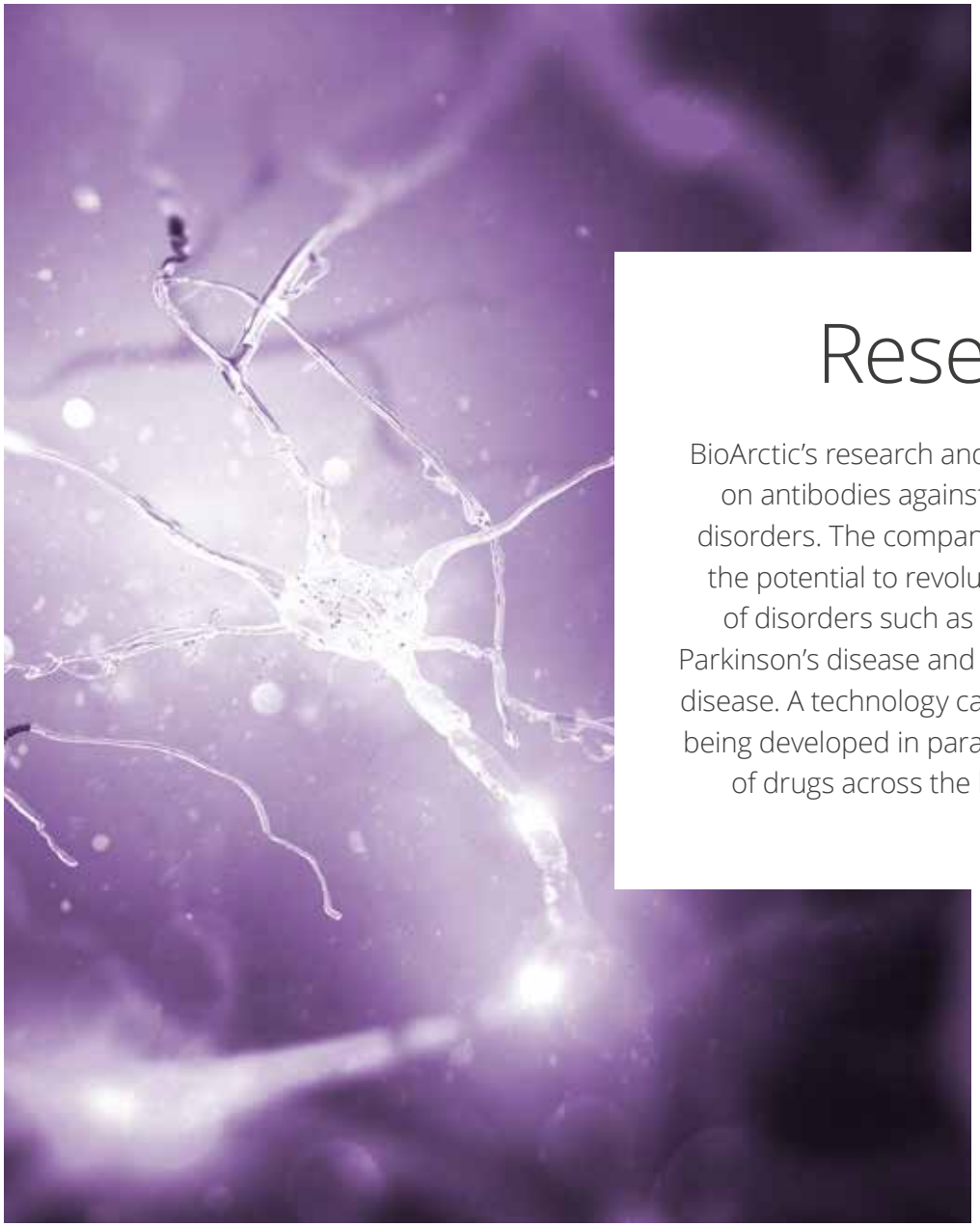
"We have good molecules and solid hypotheses today in several serious diseases of the central nervous system. It's just a question of getting down to work, we already have ideas for at least another 20 years."

Lars Lannfelt, professor and co-founder of BioArctic



Research

BioArctic's research and development focuses on antibodies against neurodegenerative disorders. The company develops drugs with the potential to revolutionize the treatment of disorders such as Alzheimer's disease, Parkinson's disease and ALS, as well as Gaucher disease. A technology called BrainTransporter is being developed in parallel to facilitate passage of drugs across the blood-brain barrier.

Misfolded proteins cause **serious disorders in the central nervous system**

BioArctic's research and development are focused on developing innovative antibody drugs that help the body remove accumulations of misfolded protein aggregates in the central nervous system. The objective is to develop disease-modifying drugs for serious neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease and ALS. The company's business model is to conduct early-phase research and development in-house and to out-license commercial rights and late-phase development to global pharmaceutical companies at the appropriate time.

In the past few decades, it has become increasingly clear that misfolded proteins are the underlying cause for many disorders of the central nervous system. Alzheimer's disease, Parkinson's disease, Huntington's disease, Creutzfeldt-Jakob's disease, and ALS are all due to various proteins, for one reason or another, beginning to misfold.

Misfolded proteins form toxic aggregates

Several things could happen when a protein begins to misfold. The protein could lose its function, which means that the cell's processes no longer work like they should. A misfolded protein can also begin affecting some other process in the cell than what it was intended for, which can lead to negative consequences. Or, as is particularly common with neurodegenerative diseases, they can begin clumping together and form larger and larger accumulations, or aggregates, of misfolded proteins. In certain diseases, such as Alzheimer's disease, these aggregates finally form such large accumulations that they are no longer soluble but harden and form visible clumps called plaque that can be shown, for example, with PET cameras. However, these aggregates cause the greatest damage while they are still soluble, since they are still biologically active and can impact various functions in the cells. These soluble aggregates are called oligomers, or protofibrils, and BioArctic's drug development focuses specifically on these forms without disrupting the basic form of the protein.

BioArctic's Research and Development Leadership Team. From left: Mikael Moge, Gunilla Osswald, Tomas Odergren, Lars Lannfelt, Johanna Fälting, Christer Möller and Per-Ola Freskgård.

Antibodies against well-defined targets

To slow or stop neurodegenerative diseases that are caused by misfolded proteins, the harmful accumulations must be cleared away and the production of new aggregates must be prevented. BioArctic is developing antibody drugs that work by binding to misfolded proteins in the brain. For an antibody treatment of this kind to be effective, it must be clear which misfolded protein causes a particular disease. Only when this is known can an antibody be developed that is selective toward that specific target and thus efficiently clear away the protein that is causing the disease without disrupting its basic physiological form.

This is a misfolded protein

A protein consists of a long chain, often of a few hundred amino acids, whose sequence is determined by our DNA. The types of amino acids and the order in which they are placed affects the specific three-dimensional form that the protein takes. In turn, this form determines what function the protein has in the body. If one amino acid is replaced, the three-dimensional form and function can change radically. The form of the protein can also be changed depending on the surrounding environment. When something happens, for example a mutation or random error, a protein could begin to fold itself improperly, which could create a protein that aggregates and become pathogenic.

15 research projects

The total number of projects in BioArctic's portfolio for neurodegenerative diseases.

New drugs for severe diseases that currently lack treatment

BioArctic's first approved drug, lecanemab for early Alzheimer's disease, is an antibody against misfolded aggregates of the protein amyloid beta. In Parkinson's disease, the hypothesis is that misfolded aggregates of the protein alpha-synuclein cause the disease, and in ALS, BioArctic's hypothesis is that the protein TDP-43 is the problem. BioArctic's researchers are continually identifying new targets where the company's capacity for developing innovative and selective antibodies can make a difference for patients with neurodegenerative diseases.

Neurodegenerative diseases

1

Nerve cells break down

In neurodegenerative diseases, nerve cells break down and they gradually lose their function. For the person affected, this means impairment or loss of either cognitive ability or mobility – or both.

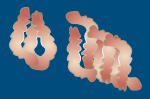
2

Accumulation of misfolded proteins damages cells

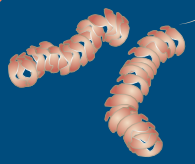
Proteins that misfold begin clumping together and form increasingly larger accumulations, or aggregates.

MONOMERS
Harmless

SOLUBLE FORMS



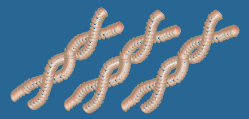
OLIGOMERS



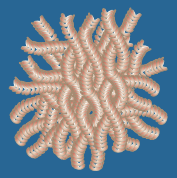
PROTOFIBRILS

The soluble aggregates cause the greatest damage since they still float around, are biologically active, and can impact other functions in the cells.

INSOLUBLE FORMS

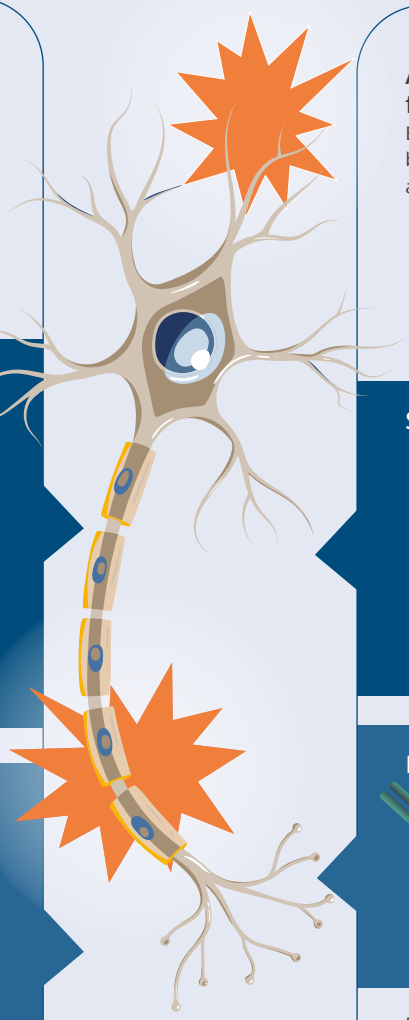


FIBRILS



PLAQUE

Finally, accumulations are formed in the brain that are no longer soluble. They are seen, for example, as plaque in Alzheimer's disease, as Lewy bodies in Parkinson's disease, and as TDP-43 inclusions in ALS.



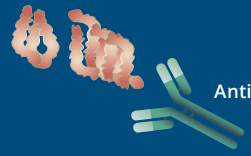
3

Antibodies clear away the harmful forms of misfolded proteins

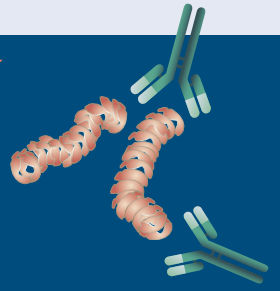
BioArctic is developing antibodies that bind to amyloid beta, and specifically identify the misfolded and harmful aggregates and clear them out.

MONOMERS
Harmless

SOLUBLE FORMS



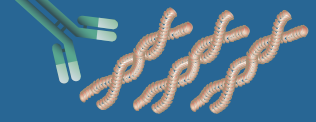
Antibody



OLIGOMERS

PROTOFIBRILS

INSOLUBLE FORMS



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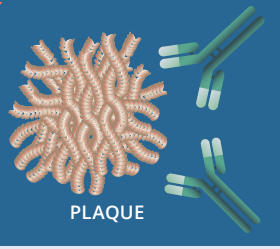

PLAQUE

BioArctic's antibodies are extremely selective toward the specific misfolded variant of the protein. This means that the healthy version of the protein, which often fulfills a function in the body, is not destroyed.

ANTIBODY