



**Niels Borregaard 1951 -2017**

# **Niels Borregaard – the short and incomplete story**

**More than 24000 citations**

**More than 280 publications**

**H-index: 81**

**19 persons received their Ph.D./doctorate from working in Niels's laboratory**

**Began with two first authorships in Lancet**

***Last major project was regarding the lacking granule proteins in patients with Papillon-Lefèvre syndrome patients deficient for cathepsin c***



**Niels received many prizes  
and honours including**

**The Novo Nordic Prize**

**Dana Lim prisen**

**KFJ prize - Copenhagen  
University**

**Honorary doctorate – Lund University 2008**



**Born 1951 in Hjørring. Parents were school teachers.**

**Began studying physics at the university in Århus, but changed to Medicine after a couple of weeks (1973)**

**Met his wife, Susanne, through their common interest in music in 1973**

**At Marseilborg Hospital Niels began his research in Neutrophils as a student.**



**He became MD in 1978 and just three years after he got his Danish doctorate in 1981 on the thesis: The Activated Neutrophil.**

**Went to the laboratory of Robert A. Clark in Boston where he invented the Percoll Gradient for subcellular fractionation of neutrophil granules**

## The Percoll gradient



### Subcellular Localization of the *b*-Cytochrome Component of the Human Neutrophil Microbicidal Oxidase: Translocation during Activation

NIELS BORREGAARD, JEANNE M. HEIPLE, ELIZABETH R. SIMONS, and ROBERT A. CLARK

*Evans Memorial Department of Clinical Research, and Departments of Medicine and Biochemistry, Boston University Medical Center, Boston, Massachusetts 02118. Dr. Borregaard's present address is William B. Castle Haematology Research Laboratory, Boston City Hospital, Boston Massachusetts 02118.*

ABSTRACT We describe a new method for subcellular fractionation of human neutrophils. Neutrophils were disrupted by nitrogen cavitation and the subcellular components were fractionated by Percoll density gradient centrifugation.

**This sealed Niels's fate – the granule hunter was born**

**In the rest of Niels's life he should work with neutrophil granules and granule proteins**

**In 1984 Niels returned to Denmark from the US and moved to Copenhagen**

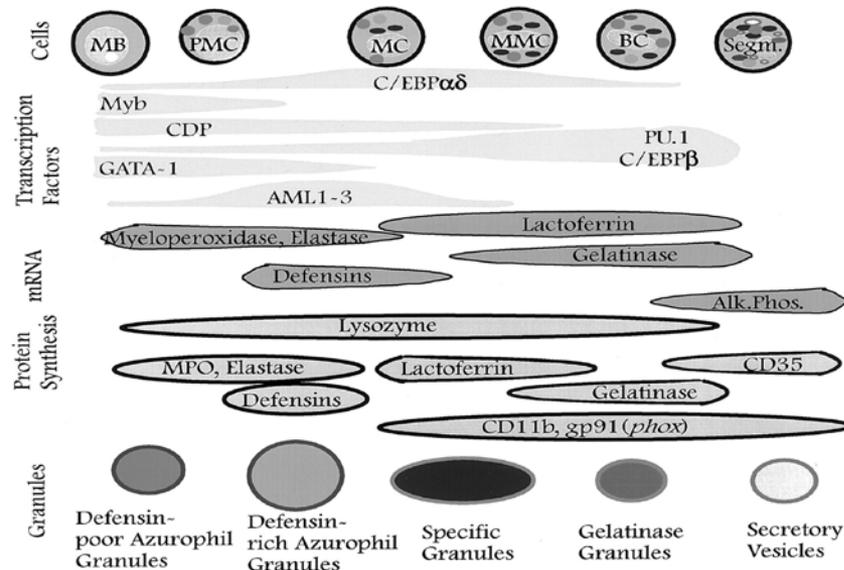
**He continued his research in his spare time while doing clinical training in internal medicine and hematology**

**In 1985 he hired his “technician in chief” Charlotte Horn and founded “The Granulocyte Research Laboratory”**

**Neutrophil secretory vesicles were discovered**

**The lab solved the dispute regarding gelatinase granules and demonstrated that peroxidase-negative granules could be divided in lactoferrin-rich gelatinase-poor specific granules and lactoferrin-poor gelatinase-rich gelatinase granules**

**During the years many granule proteins were investigated and Niels demonstrated that the sorting of granule proteins were determined by the timing of their biosynthesis during neutrophil differentiation**



Niels Borregaard, and Jack B. Cowland Blood  
1997;89:3503-3521



**This timing of granule protein expression established a clock leading to a detailed delineation of the neutrophil differentiation program**

**But Niels continued to be interested in sorting of granule proteins**

**..and along finally came a Papillon-Lefèvre Syndrome Patient**

The Journal of Clinical Investigation

RESEARCH ARTICLE

## **Papillon-Lefèvre syndrome patient reveals species-dependent requirements for neutrophil defenses**

Ole E. Sørensen,<sup>1</sup> Stine N. Clemmensen,<sup>2</sup> Sara L. Dahl,<sup>2</sup> Ole Østergaard,<sup>3</sup> Niels H. Heegaard,<sup>3</sup> Andreas Glenthøj,<sup>2</sup> Finn Cilius Nielsen,<sup>4</sup> and Niels Borregaard<sup>2</sup>

**Apparently even properly sorted granule proteins could disappear**

**One last riddle to solve before retirement**

**But Niels never got the chance**

**He was diagnosed with lung cancer in June 2016 though he never smoked**

**The tumor was unresponsive to treatment and Niels died January 2017**



**Niels –  
Thank you!**