



# Cystic Fibrosis Research News

## **Title:**

ESTABLISHMENT OF A  $\Delta$ F508-CF PROMYELOCYTIC CELL LINE FOR CYSTIC FIBROSIS RESEARCH AND DRUG SCREENING

## **Authors:**

Scott Jennings, Hong Pong Ng and Guoshun Wang

## **Affiliations:**

Department of Microbiology, Immunology and Parasitology, Louisiana State University Health Sciences Center, New Orleans, LA 70122, USA

## **What was your research question?**

Cystic fibrosis (CF) lung disease is triggered by bacterial infection. The fact that CF patients cannot defend themselves against the infection suggests some functional impairments in their host defence cells, such as neutrophils, a type of white blood cell that is specialized for bacterial killing. Currently, the only source for obtaining neutrophils for research is from patients' blood. This source is often limited by volume, and complicated by differing genetic backgrounds and varied statuses of infection. Furthermore, blood neutrophils are short-lived and cannot duplicate in culture. This bottleneck problem impedes extensive investigation of the cells in CF lung disease onset and development. Our current research is to address the question whether it is possible to create a CF neutrophil cell line.

## **Why is this important?**

A CF neutrophil cell line will allow us to produce unlimited quantities of CF neutrophils. In contrast to neutrophils taken directly from CF patient blood, the derived CF neutrophils are of identical genetic background and free from any interference of infections. Such a cell line will provide a powerful tool to study CF host defence defect and lung infection, and to facilitate drug screening for effective therapy.

## **What did you do?**

Using a new technology called CRISPR/Cas9 gene editing, we introduced the most common CF mutation  $\Delta$ F508 into a neutrophil precursor cell line. After chemical induction by DMSO, the resulting mature neutrophils were examined for their morphology, function and behaviour.

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[cfresearchnews@gmail.com](mailto:cfresearchnews@gmail.com)



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## **What did you find?**

The cell line was capable of deriving into CF neutrophils, which gave us large quantities of research material at will. The derived CF neutrophils demonstrated similar morphology, functional impairments, and behaviour changes as neutrophils taken from the CF patients with the same gene mutation.

## **What does this mean and reasons for caution?**

The derived CF neutrophils will serve as a valid cell model for learning more about CF neutrophil biology and CF lung disease, and for testing drugs for effective CF therapy. It is worth noting that the established CF cell line was generated from the HL-60 cell line that was originated from a patient with leukaemia, a type of blood cancer. General caution should be taken when the cells are used in any situation.

## **What's next?**

We will characterize the cell line further and establish it as a platform for drug screening.

## **Original manuscript citation in PubMed**

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