

## Abstract

Every year, 650,000 new cancer patients are treated with chemotherapy. As a side effect, their neutrophils, the most common white cells fighting infection, fall to low levels. The severity and prolonging of this state, called neutropenia, significantly increases the risk of infection episodes, called febrile neutropenia (FN), which entail costly hospitalization and even death. Current technologies for neutropenia testing require blood draws at healthcare centers and thus happen too infrequently. We aim to overcome this limitation with the first noninvasive screening device that can be used routinely in local health centers or at home for the early detection of severe neutropenia before FN occurs.

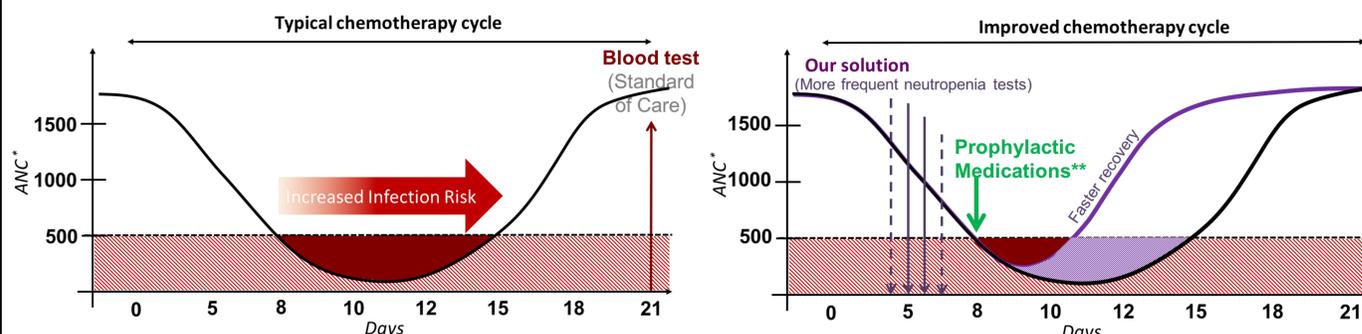
## Problem statement



**650,000** Patients start chemo in the US every year  
**110,000** Suffer an infection while neutropenic  
**\$25,000** In hospitalization costs per episode

**\$2.7B** Healthcare burden / year

Life-threatening infections commonly occur due to undetected low neutrophil counts during chemotherapy

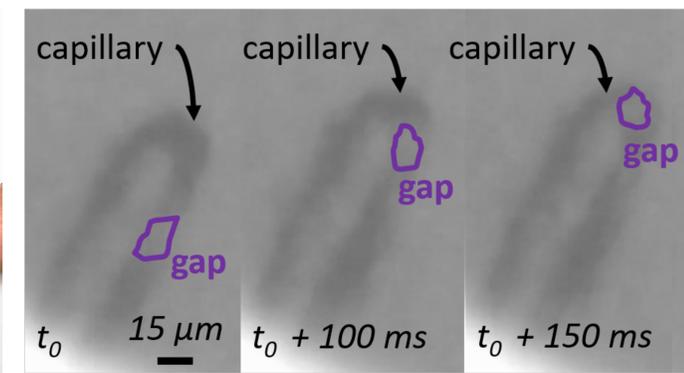
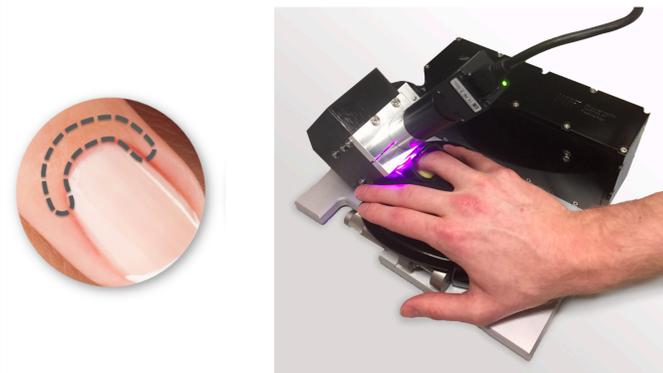


\* ANC = Absolute Neutrophil Count (per  $\mu\text{L}$ )  
Crawford J, et al. N Engl J Med, 1991  
Meza L, et al. Proc Am Soc Clin Oncol. 2002  
\*\*G-CSF= Growth Colony Stimulating Factors (e.g. Neupogen®)  
Lynn C. Hartmann, N Engl J Med, 1997

Currently, a typical chemotherapy patient only gets tested for neutropenia once per cycle. Thus, oncologist are mostly in the dark about their patients' immune system status and have limited information to prevent infection (fever), morbidity and hospitalization costs

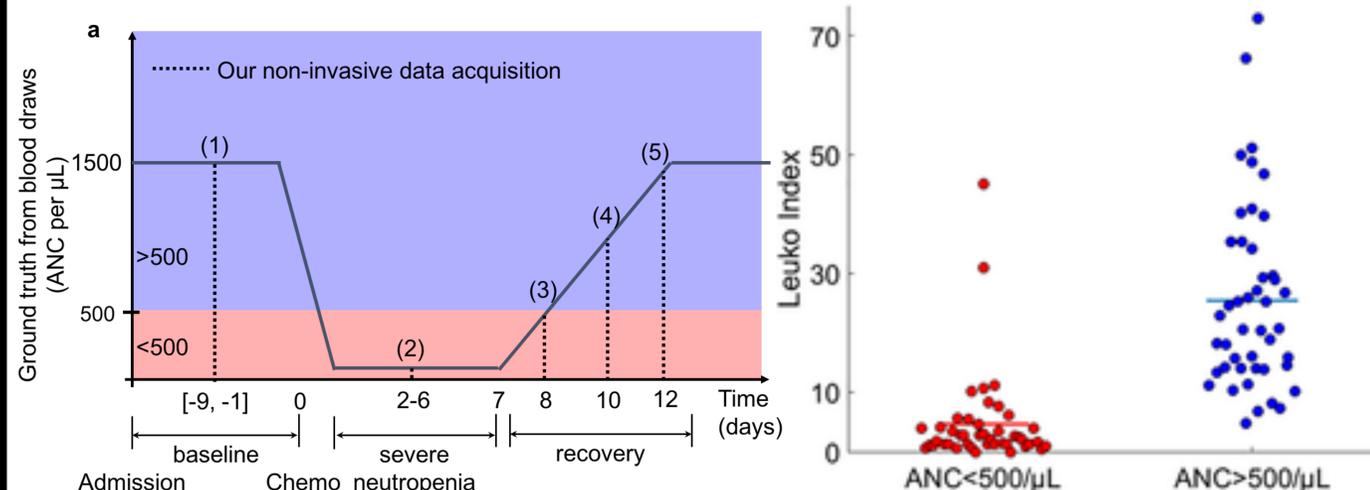
We aim to provide more frequent neutropenia monitoring in between chemotherapy cycles. With that timely information, doctors can deploy preventive treatments before fever ensues therefore reducing infection risk, morbidity and hospitalization costs

## Status of solution



Our idea: Estimating neutropenia non-invasively with a portable optical device that detects flow gaps (FG) in the micro-circulation of nailfold capillaries. In certain cases, FGs correlate with neutrophil levels

Images taken from videos of the capillaries show red blood cells (dark areas in the vessel due to light absorption). Neutrophils are transparent, and thus should show up as flow gaps (outlined in purple) in our image



With prior funding, we obtained nailfold capillary videos from 45 bone marrow transplant patients over the time course of their chemotherapy

We developed AI algorithms that analyzed these data and could detect severely neutropenic cases with an area under the curve (AUC) of 0.95

## Next de-risking milestones

With CAPCaT support, we will work towards the following deliverables:

- Production of clinical-ready unit
- Clinical efficacy study at MD Anderson Cancer Center to support FDA submission
- Further customer discovery including CMS and/or other insurance payors