

# Rewiring autoimmune disease with cellular nanoparticles

Daniel Beckers<sup>1</sup>, Ashwin Jainarayanan<sup>1</sup>, Catharien M.U. Hilkens<sup>2</sup>, Michael L. Dustin<sup>1</sup>  
1. Kennedy Institute of Rheumatology, Oxford; 2. University of Newcastle

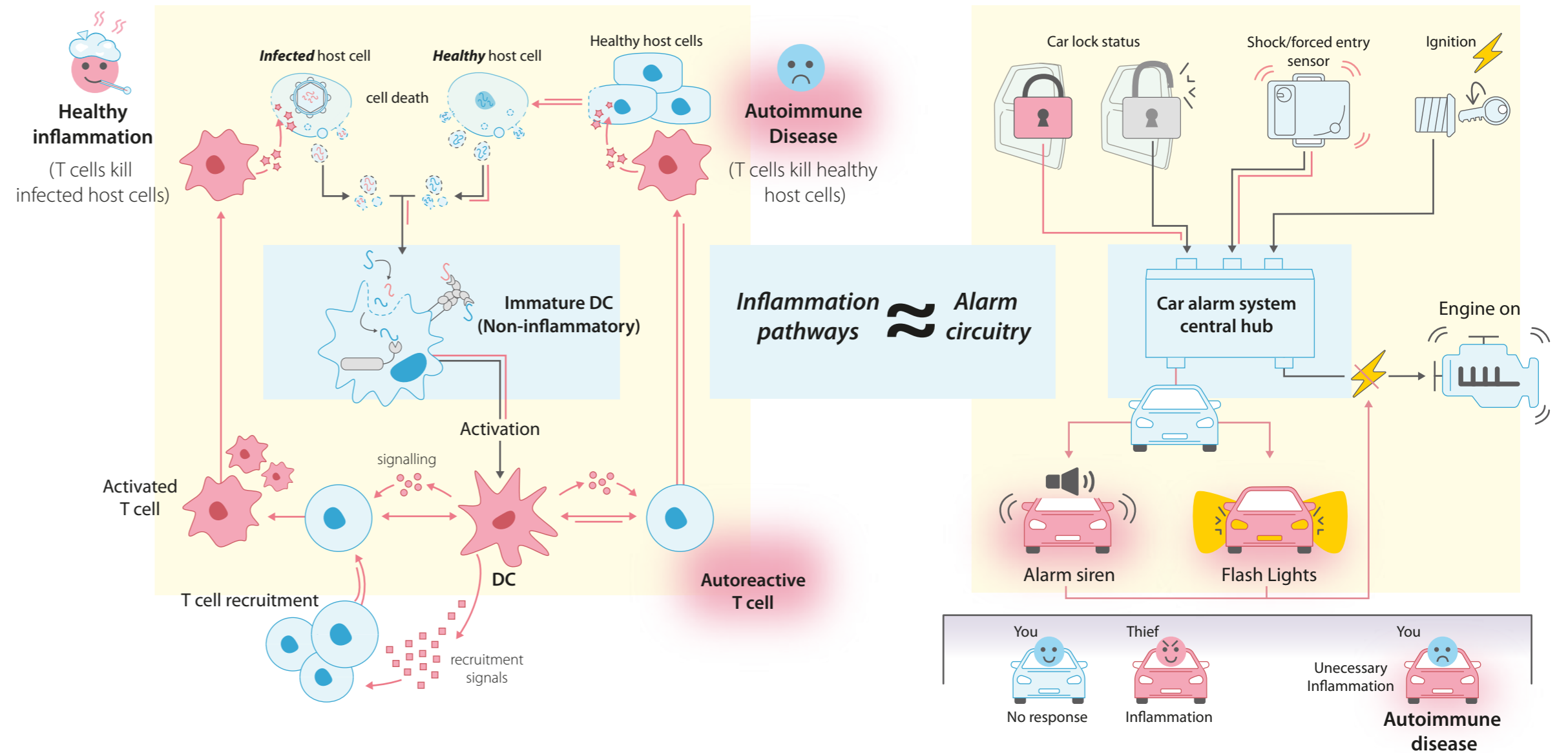
## The Problem

Autoimmunity is a mis-wiring of the immune response

**1 in 10** suffer from autoimmune diseases globally

**20%-30%** of patients do not respond to current drugs

- Rates of autoimmune disease are thought to increase by 20% each year and now verges on epidemic proportions
- Much like a car alarm system, inflammation is essential for alerting immune cells to potential threats. Autoimmune patients however suffer from **heightened and unnecessary inflammatory responses**
- Because of this immunological 'mis-wiring', **current drug treatments** that broadly suppress inflammation, e.g. steroids, **fail to target the root cause** yet increase risk of opportunistic infections



## The power of immunological therapies...

By cutting just one "wire"...

**\$42.5 Billion**  
global market value of anti-TNF therapies

By targeting just one of the thousands-upon-thousands of cellular pathways, anti-TNF therapies showcase the power of manipulating the immune response **directly**

How about targeting the central hub...?

Tolerogenic DCs can be made from patient cells

administered into inflamed joint

Immunosuppressive drugs

Patient monocytes (from blood)

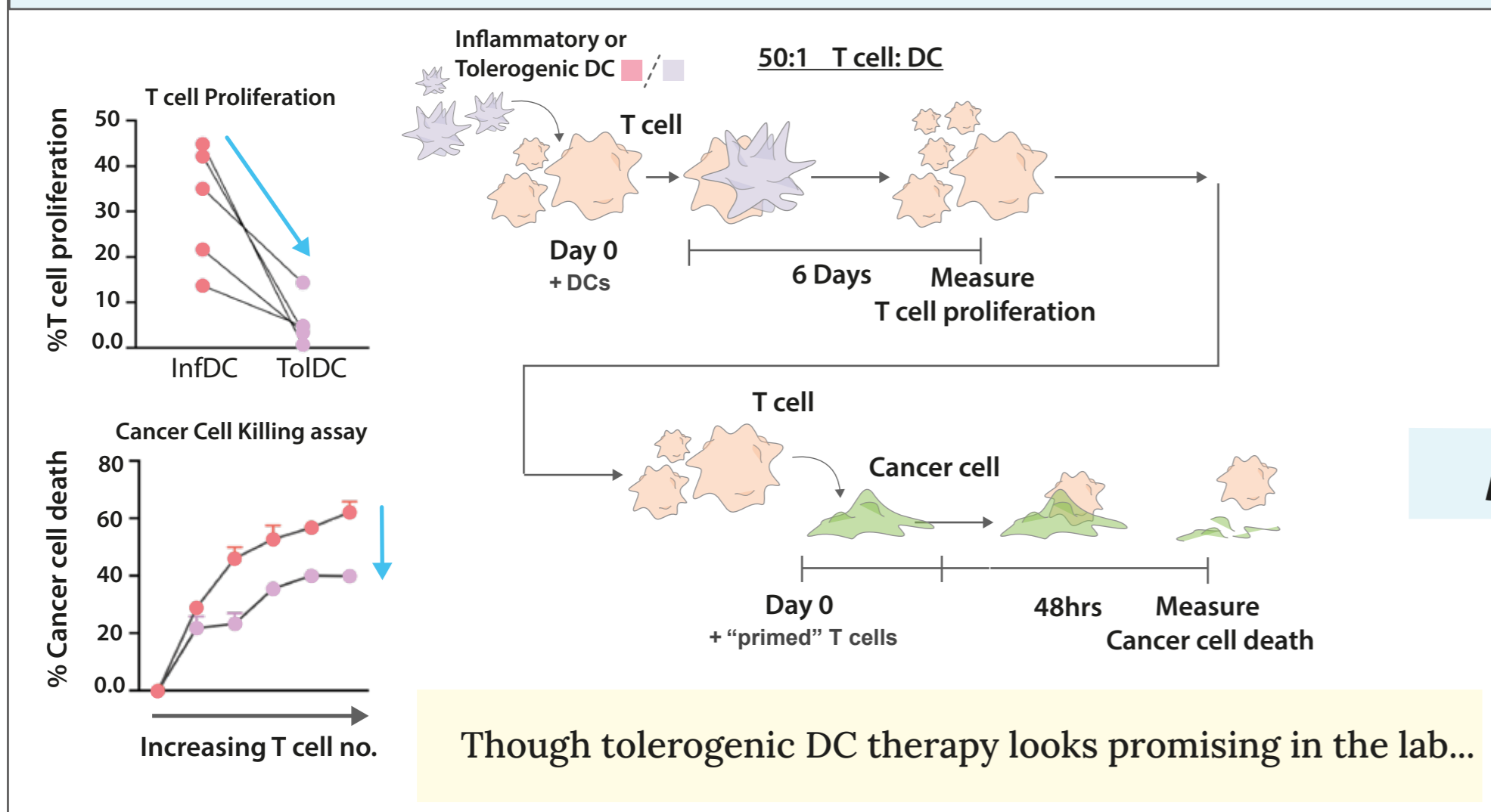
Immunosuppressive tolerogenic DC

Inflammatory DC

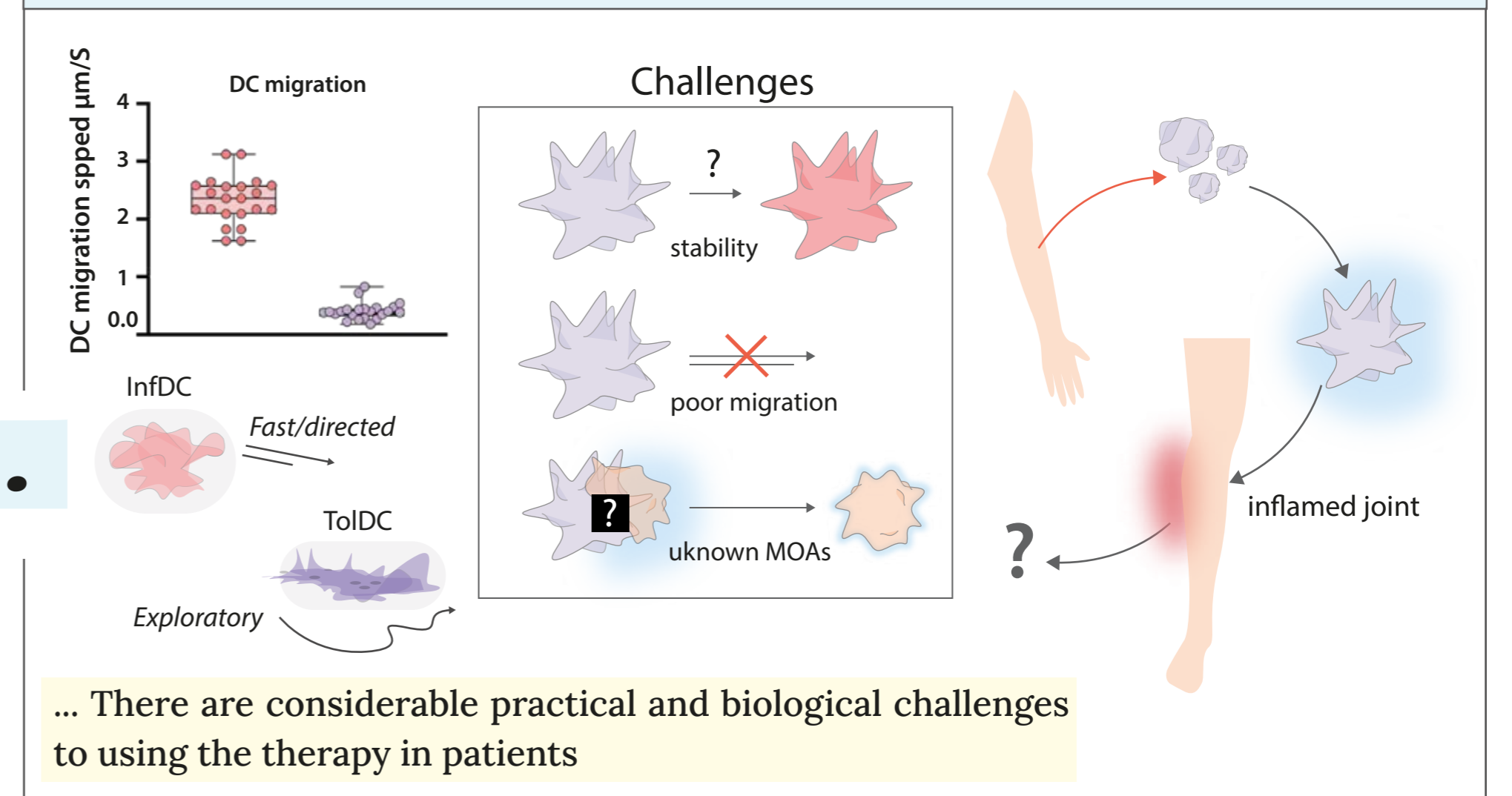
Tolerogenic DC

10µm

## Tolerogenic DCs can suppress T cell proliferation and function



## But... are challenging to use in patients



## Our solution

Particles released by tolerogenic DCs can also suppress T cells

Decreasing immune activation

1. Particles can be 1. taken up or 2. bind receptors on T cells

2. Particles can be 1. taken up or 2. bind receptors on T cells

**Summary**

- Tolerogenic DCs are a promising therapeutic to combat autoimmune diseases
- However, they have **poor viability** and **fail to migrate** within patients
- We have successfully isolated **particles** from tolerogenic DCs
- Tolerogenic DC particles **effectively suppress** T cell proliferation and functionality and are a promising solution to cellular therapy