



# Clinical studies with biotinylated red blood cells

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Product en proces ontwikkeling

Disclosure belangen spreker bijeenkomst  
Consortium Transfusiegeneeskundig Onderzoek d.d. 06-11-2020

**Naam:** Thomas klei

Geen (potentiële)  
belangenverstrenging

Voor bijeenkomst mogelijk relevante  
relaties<sup>1</sup>

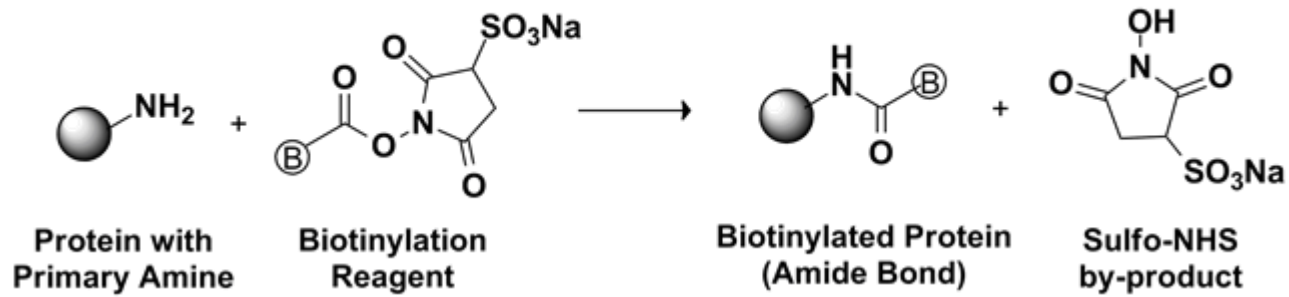
**Bedrijfsnamen**

- Sponsoring of onderzoeksgeld<sup>2</sup> .
- Honorarium of andere  
(financiële) vergoeding<sup>3</sup> .
- Aandeelhouder<sup>4</sup> .
- Andere relatie, namelijk ...<sup>5</sup>

## Why label red blood cells with biotin?

- Accurate and easy analysis of recovery and survival of RBC
- Study characteristics of transfused erythrocytes
- Study >1 RBC population concurrently.
- Can be used in vulnerable study populations.

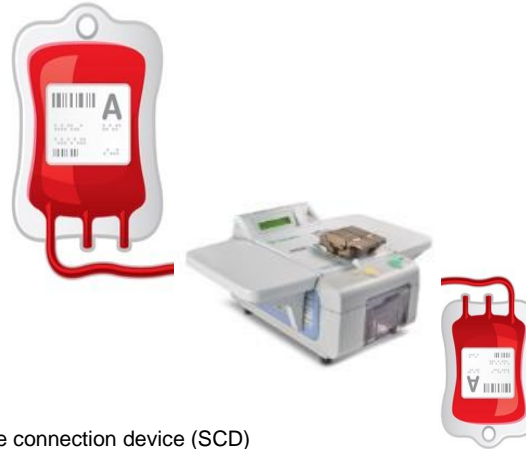
### Protein Biotinylation With Sulfo-NHS Biotin



## Why label red blood cells with biotin?

- Biotin is present endogenously
- Does not influence stability and survival of erythrocytes
- Antibody formation is possible, no clinical consequences are documented, titers resolve in time
- Only 25ml of cells is required
- Easy isolation and characterization of cells after transfusion

RCC

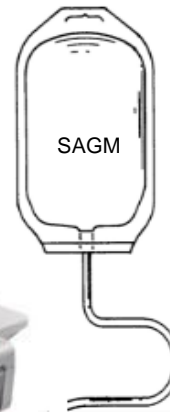


sterile connection device (SCD)

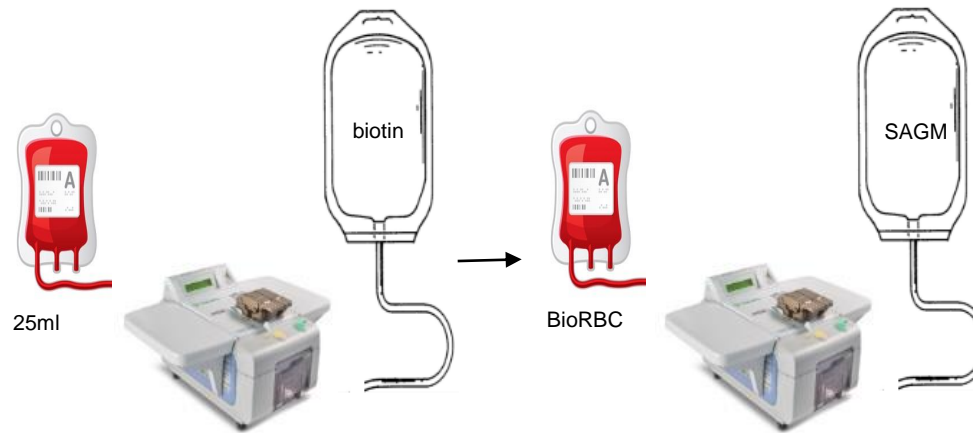
25ml



25ml



wash once with SAGM



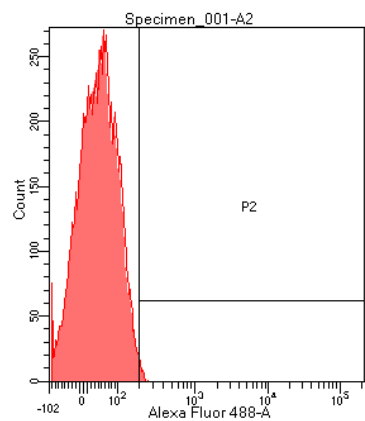
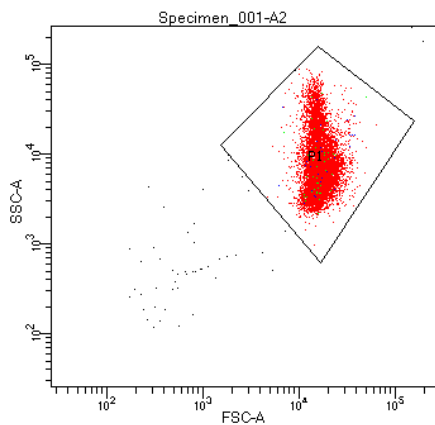
add biotin and  
incubate 1 hour at RT  
while shaken

wash twice with SAGM

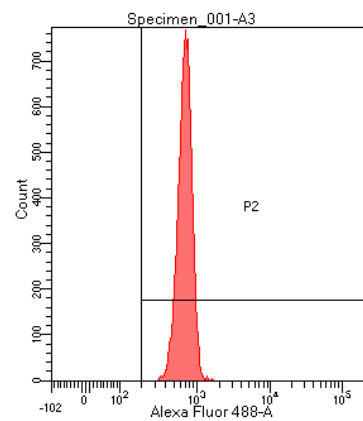
- Product ready for use in ~2 hours



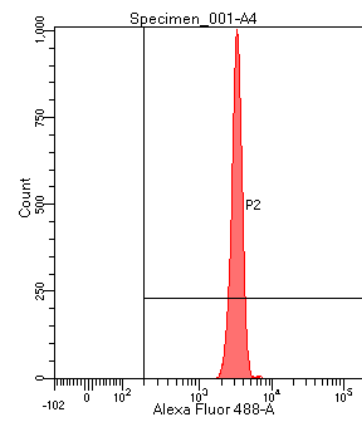
# Detection of bioRBC by flow cytometry



No biotin

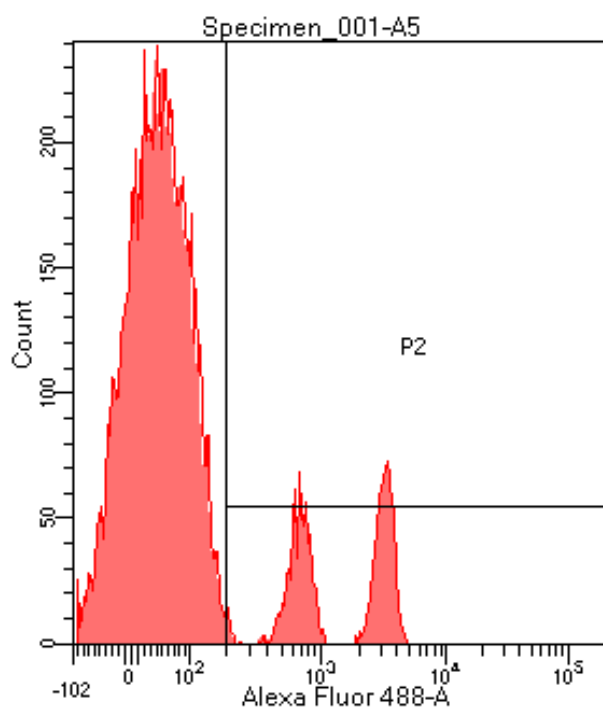
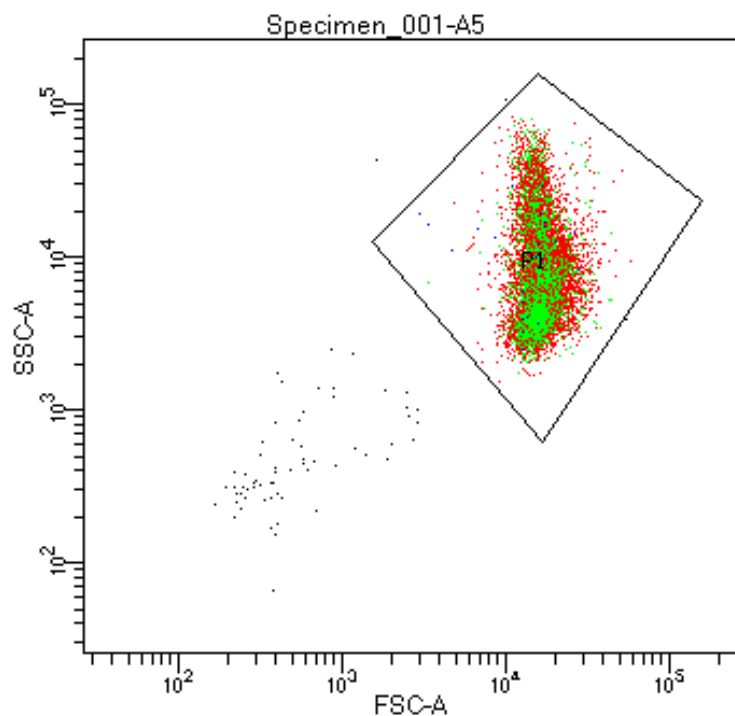


15 ug/ml biotin

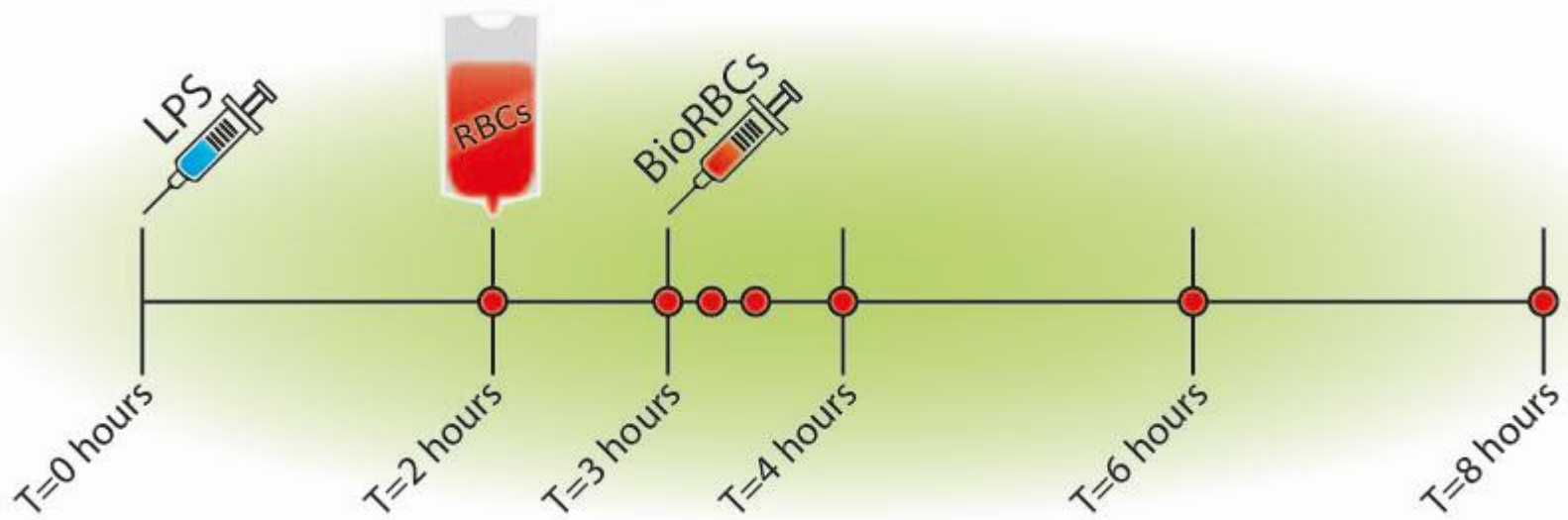


48 ug/ml biotin

## Detection of bioRBC by flow cytometry

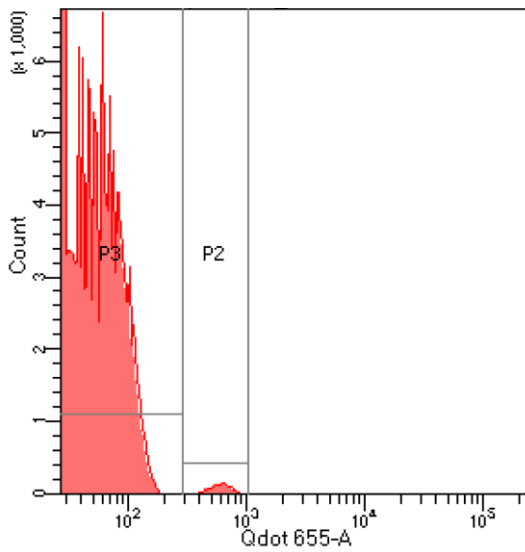
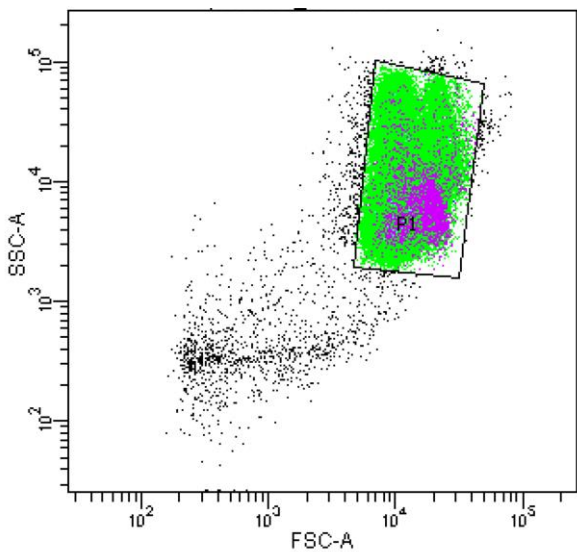


## Autologous transfusion of bioRBC in volunteers

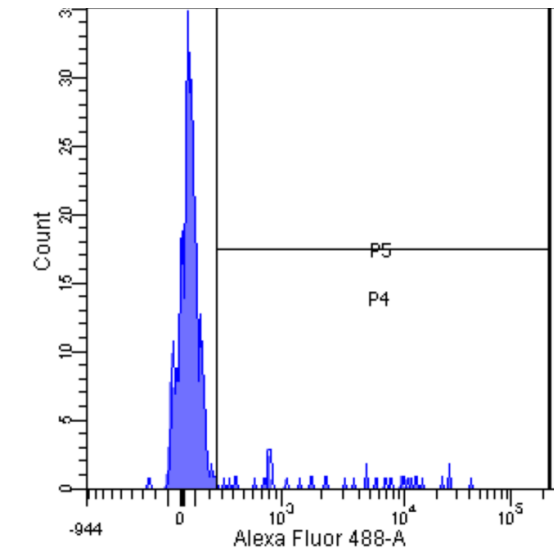


Peters et al, Transfusion 2016

# Autologous transfusion of bioRBC in volunteers



Biotin positive



Annexin V

## Clinical studies

- Chimaera: Studying clearance rate and characteristics of transfused erythrocytes stored in PAGGGM or SAGM
- Mr. Stable: Studying clearance rate and characteristics of transfused erythrocytes in sickle cell and  $\beta$ -Thalassemia patients
- Diva: Biotinylated platelets
  
- Upcoming: Biotinylated cultured RBC
- Other applications in cellular therapy? Study CAR-T homing in solid tumors?