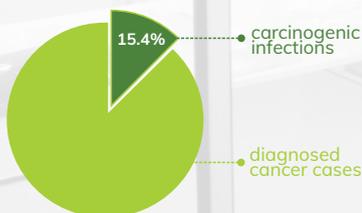


## GAME-CHANGING DELIVERY DEVICES

### TOWARDS A WORLD WITHOUT CANCER

*“Cancer is the second leading cause of death at an annual global economic cost of 1.16 trillion dollar (2010)<sup>1</sup>”*

Vaccination can have a major impact on the increasing global cancer burden that is expected to exceed 20 million new cases per year in 2025. Where prophylactic vaccination has the potential to prevent cancer caused by HPV or HBV infection, therapeutic vaccination will boost the body's natural defense of people already diagnosed with potentially any type of cancer. VAX-ID, a unique injection system, can be used for both prophylactic and therapeutic intradermal vaccination.



**2.2 MILLION CANCER CASES** (15.4%)  
WERE ATTRIBUTED TO CARCINO-  
GENIC INFECTIONS (2012)<sup>1</sup>



**VACCINATION PREVENTS 1M**  
INFECTION-RELATED CANCERS<sup>1</sup>



**THERAPEUTIC VACCINATION ENABES**  
**TARGETED CANCER THERAPY**



## VAX-ID® A safe and user-friendly solution allowing accurate and standardized injection

VAX-ID® offers a unique and user-friendly intradermal injection system that allows for improved ID delivery of both prophylactic and therapeutic vaccines.

The well established Mantoux technique for intradermal injection is technically challenging, susceptible to variability and painful for the patient.

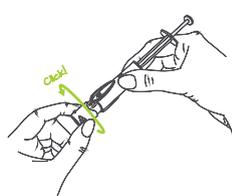
- Accurate injection and dose delivery
- Dose sparing
- Activation protection and needle-stick injury prevention
- Low in pain and no needle phobia
- Easy to use, potentially leading to self-administration
- User independent



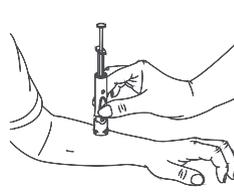
1. Draw volume from vial



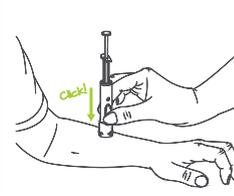
2. Mount syringe into VAX-ID®



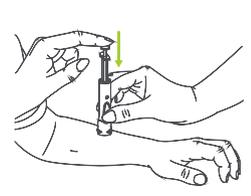
3. Twist to activate



4. Make skin contact



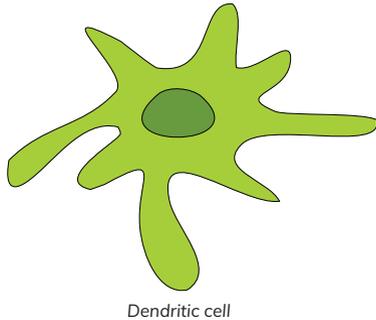
5. Push housing to penetrate



6. Push plunger to administer

## VAX-ID® An innovative drug delivery device, allowing injection of viable and functional cells

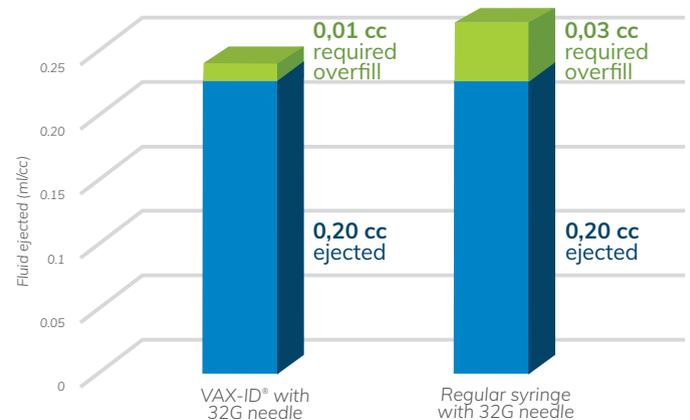
There is increasing evidence that intradermal delivery of tumor-transfected dendritic cells may provoke an effective anti-tumor immune response.



For the treatment to be effective, it is important that viable and functional cells are not damaged by shear stress and reach the site of action without change in cell phenotype.

Recent data by Van Mulder et al. have shown that the VAX-ID® device configured with a needle as small as 30G allows for a proper intradermal injection. Needles ranging from 23G up to 30G showed no increase in shear stress upon ejection of tolerogenic dendritic cells. The four phenotypic markers (CD86, CD80, HLADR, CD40) as well as the cell viability did not show significant differences before and after ejection.

Dendritic cells staying behind in the syringe tip and needle cavity increase the cost of dendritic cell vaccination. Therefore it is important to decrease the overfill or waste of product per injection.



To eject 0,20cc from a vial, VAX-ID® requires only 0,01cc of overfill whereas a regular syringe and needle require 0,03cc. VAX-ID® thus reduces the overfill volume by as much as 66%.

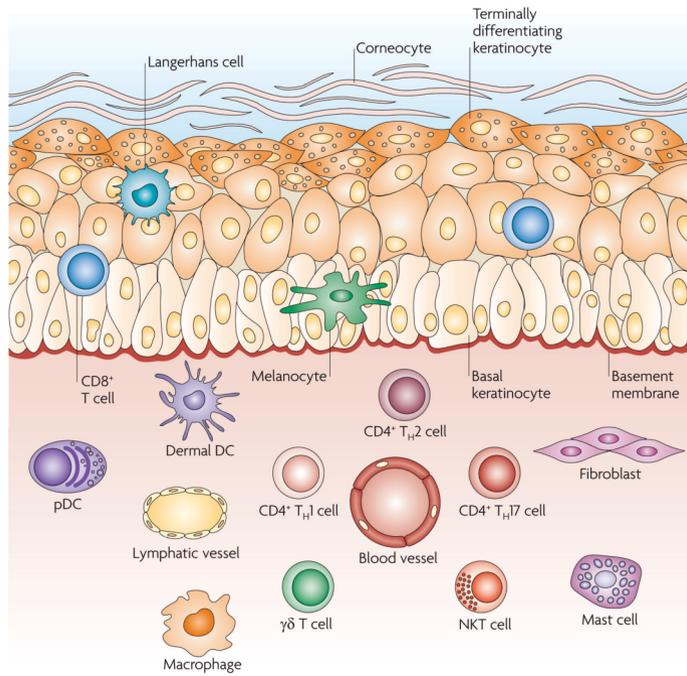
**35%**  
REDUCTION  
NEEDLE  
DIAMETER

*“VAX-ID® in combination with a 30G needle improves patient's comfort.”*

Prof dr Pierre Van Damme

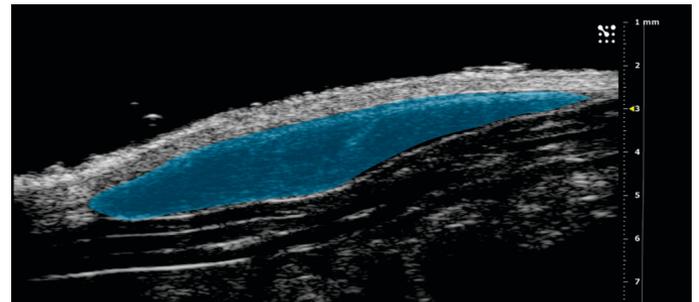
## VAX-ID® An innovative drug delivery device to prevent and treat cancer

Intradermal drug delivery induces an improved immune response compared to intramuscular injection due to the presence of antigen-presenting cells in the dermis and epidermis.



Skin anatomy and cellular effectors, courtesy of Nestle et al.<sup>3</sup>

Intradermal injection is challenging due to the use of the Mantoux technique, which is difficult to standardize. Maximum penetration depth, needle characteristics and injected volume are important factors that influence the quality of accuracy, reliability and usability.



Fluid deposition in dermal layer in rat after injecting 0.1cc with VAX-ID® prototype

Ultrasound images have shown that the VAX-ID® device allows for an excellent penetration depth and fluid deposit in the dermis.

A variant for children, taking into account the skin thicknesses of infants, toddlers, children and adolescents is also available for (pre)clinical evaluation.



ACCURATE  
DOSE DELIVERY



LOW IN  
PAIN

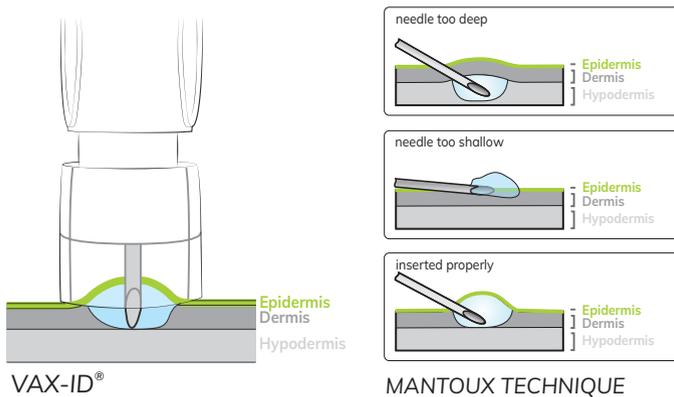
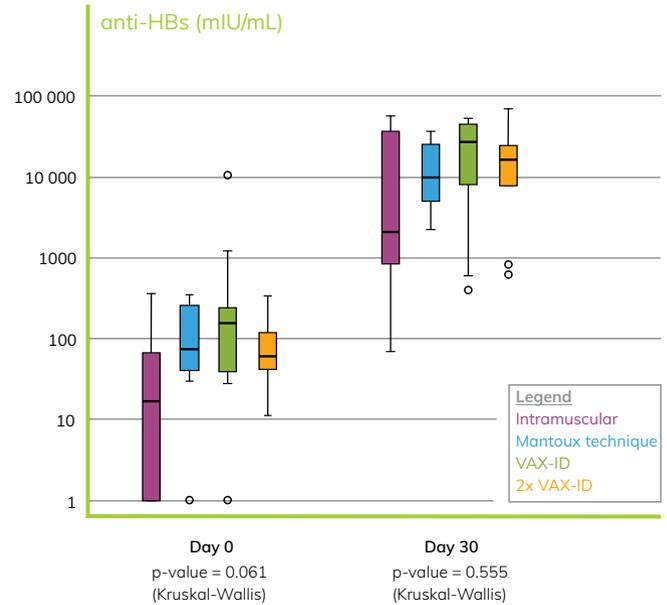


SAFE AND  
EASY TO USE

## VAX-ID® An innovative drug delivery device, allowing for dose reduction

A clinical study by Van Mulder et al.<sup>2</sup> compared immunogenicity and safety of intramuscular injection of Hepatitis B vaccine with intradermal injection by Mantoux technique and by VAX-ID®. For the IM injection 1.0cc was injected. The ID injection required a significantly smaller dose of vaccine, approximately 0.1cc. A total of 48 volunteers were included.

*“Intradermal administration of Hepatitis B vaccine using VAX-ID® resulted in a more efficient and standardized immune response compared to intramuscular administration and the Mantoux technique.”*



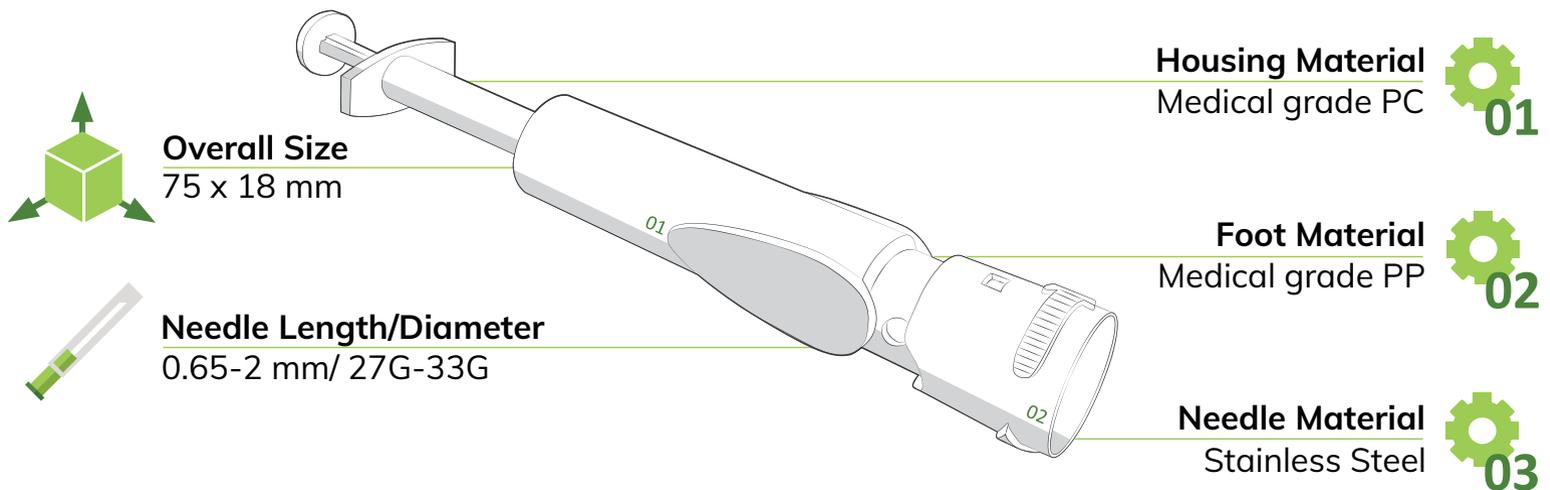
VAX-ID® provides a solution to vaccine leakage and loss of expensive dose, which often occurs with the Mantoux technique. The device offers a highly accurate penetration depth and volume delivery. Furthermore, VAX-ID® is customizable and easy to use, decreasing the risk of user errors in clinical trials and having potential for self-administration.

## VAX-ID® For customized standardized intradermal drug delivery

Novosanis develops customized versions of VAX-ID® for more accurate drug delivery and patient comfort. The unique system allows various needle thicknesses and lengths to be used and permits injection of different volumes through a single or multishot device, offering a solution for a wide range of applications.

vax-ID®

*Successful intradermal  
drug delivery starts with  
standardized injection*



1. WHO. Cancer fact sheet. (2018)

2. Van Mulder et al. Immunogenicity and Safety of intradermal delivery of Hepatitis B vaccine using the novel drug delivery device VAX-ID™. (2018) (submitted)

3. Nestle et al. Skin immune sentinels in health and disease. (2009) Nat Rev Immunol.