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Replacing the needle and syringe for vaccine administration

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List of Publications

1. **H.J.H.B. Hirschberg**, J.W. Simons, N. Dekker, M.R. Egmond, *Cloning, expression, purification and characterization of patatin, a novel phospholipase A*. Eur J Biochem, 2001. 268(19), p. 5037-44.
2. G.F. Kersten, **H.J.H.B Hirschberg**, *Antigen delivery systems*. Expert Rev Vaccines, 2004. 3(4), p. 453-62.
3. M. Amidi, H.C. Pellikaan, **H.J.H.B. Hirschberg**, A.H. de Boer, D.J. Crommelin, W.E. Hennink, G.F. Kersten, W. Jiskoot, *Diphtheria toxoid-containing microparticulate powder formulations for pulmonary vaccination: preparation, characterization and evaluation in guinea pigs*. Vaccine, 2007. 25(37-38), p. 6818-29.
4. G.F. Kersten, **H.J.H.B Hirschberg**, *Needle-free vaccine delivery*. Expert Opin Drug Deliv, 2007. 4(5): p. 459-74.
5. Z. Ding, M. Bivas-Benita, **H.J.H.B Hirschberg**, G.F. Kersten, W. Jiskoot, J.A. Bouwstra, *Preparation and characterization of diphtheria toxoid-loaded elastic vesicles for transcutaneous immunization*. J Drug Target, 2008. 16(7), p. 555-63.
6. **H.J.H.B. Hirschberg**, G.G.P. van de Wijdeven, A.B. Kelder, G.P.J.M. van den Dobbelaars, G. F. Kersten, *Bioneedles as vaccine carriers*. Vaccine, 2008. 26(19), p. 2389-97.
7. **H.J.H.B. Hirschberg**, G.G.P. van de Wijdeven, H. Kraan, J.P. Amorij, G.F. Kersten, *Bioneedles as alternative delivery system for hepatitis B vaccine*. J Control Release, 2010. 147(2), p. 211-7.

8. **H.J.H.B. Hirschberg**, S. van Kuijk, J. Loch, W. Jiskoot, J. Bouwstra, G.F. Kersten, J.P. Amorij, *A combined approach of vesicle formulations and microneedle arrays for transcutaneous immunization against hepatitis B virus*. Eur J Pharm Sci, 2012. 46(1-2), p. 1-7.

9. M. de Haas, C.P.B. van der Ploeg, P.G. Scheffer, D.A. Verlinden, **H.J.H.B. Hirschberg**, F. Abbink, C.E. van der Schoot, *A nation-wide fetal RHD screening programme for targeted antenatal and postnatal anti-D*, ISBT science series, 2012. 7(1), p. 164-67.

10. **H.J.H.B. Hirschberg**, I.H.J. Ploemen, H. Kraan, A. Zeltner, S. van Kuijk, D.P.K. Lankveld, M. Royals, G.F.A. Kersten, J.P. Amorij, *Minipigs as an animal model for dermal vaccine delivery*. Comp Med, 2014. 64(1), p. 50-4.

11. **H.J.H.B. Hirschberg**, G.G.P. van de Wijdeven, W. Weyers, W. Schalla, *Phase 1 clinical study with Bioneedles, a delivery platform for biopharmaceuticals*. Eur J Pharm Biopharm, 2014. 89, p. 126–133.

12. C.P.B. van der Ploeg, **H. J.H.B Hirschberg**, M. de Haas, F. Abbink, *Prenatale Screening op Infectieziekten en Erytrocytenimmunisatie is uitgebreid met foetale RhD-typing*, Nederlandse Tijdschrift voor Geneeskunde, in press 2015

13. **H.J.H.B. Hirschberg**, E. van Riet, D. Oosterhoff, J. A. Bouwstra, G.F.A. Kersten, *Animal models for cutaneous vaccine delivery*, Eur J Pharm Sci, submitted 2015.

List of Abbreviations

AE	Adverse Events
Al(OH) ₃	Aluminium Hydroxide
AlPO ₄	Aluminium Phosphate
APC	Antigen Presenting Cell
BCG	Bacillus Calmette-Guerin
BSA	Bovine Serum Albumine
CD	Circular Dichroism
CT	Cholera Toxin
CTL	Cytotoxic T-lymphocyte
CDC	Centers for Disease Control and Prevention
DCJI	Disposable Cartridge Jet Injector
DLS	Dynamic Light Scattering
DSJI	Disposable Syringe Jet Injector
ELISA	Enzyme-Linked Immuno Sorbent Assay
EPI	Epidermal Powder Immunization
FDA	Food and Drug Administration
GCP	Good Clinical Practice
GMP	Good Manufacturing Practice
HBsAg	Hepatitis B surface Antigen
HRP	Horse Radish Peroxidase
H ₂ SO ₄	Sulfuric Acid
i.m	Intramuscular
i.d	Intradermal
IgG	Immunoglobuline G
IgG1	Immunoglobuline G subtype 1
IgG2a	Immunoglobuline G subtype 2a
IgM	Immunoglobuline M
L595 vesicle	Vesicle composed of the synthetic surfactants L-595, PEG-8-L and TR70
Lf	Flocculation unit
LT	Heat-labile enterotoxin
MUNJI	Multi-Use Nozzle Jet Injector
MW	Molecular Weight

N&S	Needle and syringe
NVI	Netherlands Vaccine Institute
OD	Optical Density
PAS	Periodic Acid Schiff
PBS	Phosphate Buffer Saline
PDI	Polydispersity Index
PMN	Polymorphonuclear Leucocyte
QC	Quality Control
RIVM	Rijksinstituut voor Volksgezondheid en Milieu
SEC	Size Exclusion Chromatography
SPS	Skin Prep System
sPC vesicle	Vesicle composed of soybean phosphatidylcholine and Span 80
SC	Stratum Corneum
s.c	Subcutaneous
TB	Tuberculosis
TCI	Transcutaneous Immunization
Th1	T-helper 1
Th2	T-helper 2
TMB	3,3',5,5'-Tetramethylbenzidine
TPS	Thermoplastic Starch
TTx	Tetanus Toxoid
WHO	World Health Organization

Curriculum Vitae

Hoang Hirschberg was born in 1972 in Rachgia, Vietnam. In 1979, she was adopted in Belgium. After receiving her European Baccalaureate certificate in 1991 (European School Brussels I), she moved to The Netherlands and studied chemical engineering at the Technical University Eindhoven. She received her master degree in 1996. Between studies, she worked for 6 months as an interagent at Randstad Uitzendburo. In 1998, she received a second master degree at the department of Enzymology and Protein Engineering (University Utrecht). In the same department, she started a PhD project on Patatin, the major protein constituent of potato tubers. After two years, she ended the project prematurely because of a reorganization. From 2001 to 2009, she worked, under supervision of Gideon Kersten at the Netherlands Vaccine Institute (NVI) and its predecessor (the National Institute for Public Health and Environment (RIVM), 2001-2003), first on the development of a meningococcal vaccine and later as projectleader of the project "Alternative vaccine delivery systems". In 2006, she worked in the TIPharma Vaccine delivery project, a consortium with several collaborators including the NVI and the LACDR, Drug Delivery Technology department of Joke Bouwstra. This project was the start of her PhD project "Replacing the Needle and Syringe for Vaccine administration". From 2009 to 2011, she became project leader of the seasonal influenza campaign at the department NVP (National Vaccination Programs) of the NVI. Since 2011 she works at the RIVM, in the department for Vaccine Supply and Prevention Programs, as a project leader of the Prenatal Screening program for Infectious diseases and Erythrocyte immunization (PSIE).

