



Universiteit
Leiden
The Netherlands

The immune compartment at the maternal-fetal interface throughout human pregnancy

Zwan, A. van der

Citation

Zwan, A. van der. (2020, February 6). *The immune compartment at the maternal-fetal interface throughout human pregnancy*. Retrieved from <https://hdl.handle.net/1887/84689>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/84689>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/84689> holds various files of this Leiden University dissertation.

Author: Zwan, A. van der

Title: The immune compartment at the maternal-fetal interface throughout human pregnancy

Issue Date: 2020-02-06

**The immune compartment
at the maternal-fetal interface
throughout human pregnancy**

Anita van der Zwan

© 2020 Anita van der Zwan, Leiden, the Netherlands

The immune compartment at the maternal-fetal interface throughout human pregnancy

All rights reserved. No part of this thesis may be reproduced or transmitted in any form, by any means, electronic or mechanical without prior permission of the author, or where appropriate, of the publisher of the articles.

The research presented in this thesis was performed at:

The Department of Stem Cell and Regenerative Biology at Harvard University and the Department of Immunohematology and Blood Transfusion at Leiden University Medical Center.

Financial support for the research conducted at Harvard University was kindly provided by: VSBfonds and Studiefonds Ketel1.

Financial support for the publication of this thesis was kindly provided by:

Stichting Oranjekliniek, National Reference Center for Histocompatibility Testing, GenDx, Fluidigm, CleanAir by Baker, U-CyTech Biosciences, ChipSoft, ABN AMRO, and Pfizer.

Cover design and layout by: Nicolene van der Zwan

Printed by: GVO drukkers & vormgevers B.V.

ISBN: 978-94-6332-603-2

The immune compartment at the maternal-fetal interface throughout human pregnancy

Proefschrift

ter verkrijging van
de graad van Doctor
aan de Universiteit Leiden,
op gezag van Rector Magnificus prof. mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 6 februari 2020,
klokke 11.15 uur

door

Anita van der Zwan

geboren te Pretoria, Zuid Afrika
in 1988

Promotor: Prof. Dr. F.H.J. Claas

Co-promotoren: Dr. S. Heidt
Dr. T. Tilburgs (Cincinnati Children's Hospital, USA)

Leden promotiecommissie: Prof. Dr. J. Borst
Prof. Dr. C. van Kooten
Prof. Dr. A. Moffett (University of Cambridge, UK)
Prof. Dr. S. Saito (University of Toyama, Japan)

“We have not succeeded in answering all our problems—
indeed we sometimes feel we have not completely answered any of them.
The answers we have found have only served to raise a whole set of new questions.
In some ways we feel that we are as confused as ever, but we think we are confused
on a higher level, and about more important things.”

Earl C. Kelley
The Workshop Way of Learning (1951)

Contents

01	General introduction	9
02	Three types of functional regulatory T cells control T cell responses at the human maternal-fetal interface	29
03	Mixed signature of activation and dysfunction allows human decidual CD8 ⁺ T cells to provide both tolerance and immunity	61
04	Cross-reactivity of virus-specific CD8 ⁺ T cells against allogeneic HLA-C: possible implications for pregnancy outcome	91
05	Cytotoxic potential of decidual NK cells and CD8 ⁺ T cells awakened by infections	117
06	Mass cytometry quality control: a crucial step not to be neglected	133
07	Visualizing dynamic changes at the maternal-fetal interface throughout human pregnancy by mass cytometry	145
08	Summarising discussion	183
09	English summary Nederlandse samenvatting List of publications About the author	203

