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Descemet membrane endothelial keratoplasty: graft rejection, failure and survival

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**Descemet Membrane
Endothelial Keratoplasty:
graft rejection, failure, and survival**

Lamis Baydoun

Descemet Membrane Endothelial Keratoplasty: graft rejection, failure, and survival

Thesis, Leiden University Medical Center, The Netherlands

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Descemet Membrane Endothelial Keratoplasty: graft rejection, failure, and survival

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For my Family

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PREFACE

PREFACE

The eye is a beautiful and precious sensory organ that collects information from our environment to analyze and process our surroundings. In metaphors, such as 'I will guard it as my eyeball' or 'the eye is the mirror of our soul', we express the eyes' value and importance and describe their ability to reflect emotions, our mood, and feelings in a non-verbal manner. Our eyes are pivotal for human interactions, especially in an increasingly digital and 'viral' world where 'real-world' interactions are diminishing or limited by face masks. Further, our 'eyes cannot lie' and may reveal health conditions and extraocular diseases to an ophthalmologist long before they become visible to doctors from other specialties. Ophthalmologists save eyes and only sporadically lives; it is fortunate that with medical and surgical skills, many eyes can be saved from blindness, though visual impairment caused by diseases of the lens or cornea can more often be reversed or treated than those of the macula and optic nerve.

The *cornea* will be the focus of this thesis. It is the transparent and most anterior structure of the eyeball, also referred to as 'the window of the eye' because it is clear as glass to allow rays of light to enter and produce an image on the retina, our ocular 'film'. The cornea consists of five layers, and when diseased, it often loses transparency and becomes cloudy as does the image that is transferred. To restore vision in such cases, for more than 100 years we have replaced all layers by a full thickness transplant, referred to as penetrating keratoplasty (PK), regardless of which layers were still healthy and functioning. In medicine, this unselective approach was the earliest and, so far, most successful form of transplantation, owing to the unique corneal immune privilege, that, in contrast to other organs, lack vessels to maintain transparency and to allow acceptance of the foreign donor tissue.

I vividly remember my fascination while assisting my first PK during my early residency at the University of Bonn, Germany. Back then, I was not aware of the evolving, even more fascinating innovative lamellar keratoplasty techniques that targeted the isolated replacement of only the diseased corneal layer(s). About a decade later I moved to Rotterdam, the Netherlands to stay for almost 7 years - instead of the originally intended 6 months - to specialize in these techniques with emphasis on Descemet membrane endothelial keratoplasty (DMEK), that selectively replaces the two posterior corneal layers (Descemet membrane and endothelium) with the same healthy layers from a donor cornea. In the past years, DMEK has revolutionized corneal transplantation all over the globe.

However, new keratoplasty techniques will only be established in the long-term if complications can be reduced and clinical outcomes improved, while graft longevity is equal or better than in earlier techniques.

In this thesis, I will investigate rejection, failure, and survival of the DMEK graft, topics that could not be closer linked to our daily life.

