## This work is dedicated TO MY WIFE MAHA, MY KIDS ZIAD & SAIF AND MY PARENTS

## ACKNOWLEDGMENTS

To the Almighty God "**ALLAH**" Who have granted me all these graces to fulfill this work and Who blessed and supported me by His power in all my life. To Him I extend my heartfelt thanks.

I wish to express my sincere and deepest heartfelt gratitude to **Prof. Dr. Monika Schäfer-Korting**, chairwoman of the Department of Pharmacology and Toxicology, Institute of Pharmacy, Freie Universität, Berlin for her admirable supervision, continuous encouragement, direct guidance, unfailing advice, enthusiastic discussion and valuable support during my stay in Germany.

I would like to thank **Prof. Dr. Heinz Pertz,** Department of Pharmaceutical Biology, Institute of Pharmacy, Freie Universität, Berlin for his kind acceptance to act as an examiner.

I would also wish to thank **Dr. Annekathrin Haberland,** Department of Pharmacology and Toxicology, Institute of Pharmacy, Freie Universität, Berlin for her valuable comments and suggestions, fruitful discussions, constructive advises and particularly for her revision of this thesis.

My deep thanks to **PD Dr**. **Burkhard Kleuser** for his kindness, valuable support and direct guidance, specially, in the work with the radioactive substances.

I am grateful to **Dr. Wolfgang Mehnert**, Pharmaceutical technology, Institute of Pharmacy, Freie Universität, Berlin for his kind help in the statistical evaluation of the results and his direct guidance in the preparation of the test formulations.

I would like to thank all my friends in the institute who made all the best for me making my life and study in Berlin very joyful, specially our "BMBF group" Sylvia Schreiber, Alex Vuia, Claudia Santos Maia, and Dr. Marita Rübbelke for their nice, friendly talking, cooperation, good working atmosphere, and valuable discussion. I wish to express my deep thanks to Prof. Dr. Hanz Christian Korting, Clinic and Polyclinic of Dermatology and

Allergology, Ludwig-Maximilians Universität, München and **PD Dr. Martin Schaller**, Universität-Dermatology, Clinic of Universität Tübingen, Tübingen, for their kind cooperation and carrying out the histological examinations of the skin models after testosterone permeation. I am deeply indebted to my colleague **Martin Dürrfeld** for helping me to carry out the permeation experiments using estradiol and co-operation at the beginning of my work.

I am extremely grateful for my wife **Maha**, her love, support and comfortable atmosphere during the work of this thesis. To my pretty kids **Ziad** and **Saif** for their lovely smile that can relieve any kinds of tiredness. I am also extremely grateful for my parents, who did all the best to help me in my education, my brothers and my sisters for their love and support.

My special thanks to my adviser friend **Uwe Münster** for his kind friendship, nice advises and together watching football matches in Olympic stadium in Berlin and also to **Corina Schraut** for her kindness and valuable help.

My deepest heartfelt thanks to **Hannelore Gonska** for her kindness, friendly talking during lunches and to the always helpful, **Barbara Brüggener** for her valuable help always in solving computer problems and graphics, **Gabi Roggenbuck-Kosch** for her kindness and helpfulness.

I can not forget to extend my deep thanks to all my other colleages at the Department of Pharmacology and Toxicology, Institute of Pharmacy, Freie Universität, Berlin, Marianti Manggau, Stefanie Hammer, Irina Spika, Lars Ruwisch, Bettina Sauer, Rüdiger Vogler, Chié Nakamura, Jana Stecova, Anja Richartz, Henrik von Wenckstern, Pilar Rivera-Gil, Christina Keller, Christian Braem, Karsten Zimmermann, Melanie Schüppel, Ina Manzer and all the others for their help, friendship, and for the good working atmosphere.

I am thankful to the Egyptian Government, Ministry of Higher Education, Missions Office and the Pharmaceutical Analytical Chemistry Department, Faculty of Pharmacy, Assiut University, Egypt for the financial support during my studies in Germany.

I am also thankful to Central Organization for Registration and Evaluation of Alternative and supplementing methods of Animal Experiments (**ZEBET**), National Institute of Risk Evaluation (**BfR**), Berlin, Germany, and German Ministry of Education and Research

(**BMBF**, BEO 031288-1) for their financial support throughout this work. Also, the European Union and the city of Berlin (**FITE** program No. 89156) are gratefully acknowledged. I would like to thank Mediport Biotechnik GmbH for carrying out the experiments which used the isolated porcine forelimb model.

I am deeply thankful to all staff members, my colleagues and all workers of the Pharmaceutical Analytical Chemistry Department, Faculty of Pharmacy, Assiut University, Egypt for their continuous encouragements. Special thanks to my Master thesis supervisors, Prof. Dr. Salwa El-Shabouri, Prof. Dr. Kamla Emara and Prof. Dr. Pakinaz Khashaba for their recommendations, motivations, kind advices and continuous encouragements.

Finally, I would like to thank all my Egyptian friends in Berlin and in Germany for the nice time and family atmosphere on weekends.