

Table of Contents

1. General introduction.....	1
1.1. The autonomic nervous system and its involvement in neurological diseases	1
1.2. Trigonometric regressive spectral analysis and its applications	4
1.2.1. Trigonometric regressive spectral analysis	4
1.2.2. MTRS in the evaluation of cardiovascular autonomic function	7
2. An innovative technique to assess spontaneous baroreflex sensitivity with short data segments: multiple trigonometric regressive spectral analysis	9
2.1. Abstract.....	10
2.2. Introduction	11
2.3. Subjects and Methods.....	12
2.3.1 The EuroBaVar dataset:	12
2.3.2. The MTRS analysis.....	13
2.3.3. Computation of BRS using MTRS.....	14
2.3.4. BRS analyses using varying local and global data segments:.....	18
2.3.5. Statistical analysis	18
2.4. Results	19
2.4.1 Comparisons between BRS obtained using different local and global data segments	19
2.4.2. Correlation analyses between BRS values obtained using different data segment settings	20
2.4.3. Bland-Altman analyses of the BRS values obtained using different parameters.....	20
2.5. Discussion.....	22
3. Subthalamic nucleus stimulation and levodopa modulate cardiovascular autonomic function in Parkinson's disease	26

3.1. Abstract.....	27
3.2. Introduction	28
3.3. Patients and Methods.....	29
3.3.1. Patients.....	29
3.3.2. The STN-DBS surgery	30
3.3.3. Autonomic function examination procedure	30
3.3.4. Spectral and baroreflex analyses by trigonometric regressive spectral (TRS) analysis.....	31
3.3.5. Statistical analysis	32
3.4. Results	33
3.4.1. Study population	33
3.4.2. Influence of STN-DBS and levodopa on cardiovascular autonomic function at rest.....	37
3.4.3. Influence of STN-DBS and levodopa on autonomic function during metronomic deep breathing.....	39
3.4.4. Influence of STN-DBS and levodopa on autonomic function during HUT	41
3.4.5. Difference in response between the OH group and the non-OH group.	44
3.5. Discussion.....	44
4. Autonomic dysfunction in Wilson's disease: a comprehensive evaluation during a three-year follow up	50
4.1. Abstract.....	51
4.2. Introduction	53
4.3. Materials and methods	55
4.3.1. Participants.....	55
4.3.2. Study design	56
4.3.3. UWDRS and autonomic dysfunction questionnaire	56
4.3.4. Cardiovascular autonomic function tests.....	56

4.3.5. Spectral and baroreflex analyses by trigonometric regressive spectral analysis	58
4.3.6. Statistical analysis	59
4.4. Results	59
4.4.1. Study population	59
4.4.2. Questionnaire on autonomic dysfunction symptoms	64
4.4.3. Cardiovascular autonomic function at rest	64
4.4.4. Cardiovascular autonomic function during deep breathing	68
4.4.5. Cardiovascular autonomic function during Valsalva maneuver	71
4.4.6. Cardiovascular autonomic function during isometric handgrip test	72
4.4.7. Cardiovascular autonomic function during HUT test.....	72
4.4.8. Cardiovascular autonomic function during the 24-h blood pressure and heart rate monitoring	73
4.4.9. Correlation analysis	73
4.5. Discussion.....	77
5. Modulation of cardiac autonomic function by fingolimod initiation and predictors for fingolimod induced bradycardia in patients with multiple sclerosis	83
5.1. Abstract.....	84
5.2. Introduction	85
5.3. Methods	87
5.3.1. Participants.....	87
5.3.2. Study procedures.....	88
5.3.3. HRV analysis	88
5.3.4. Statistical analysis	90
5.4. Results.....	91
5.4.1. Study population.....	91
5.4.2. Changes of cardiovascular parameters after fingolimod administration	92

5.4.3. Correlation analysis 95

5.4.4. Decision tree analysis 97

5.5. Discussion..... 98

6. Conclusion 105

7. Summary 107

8. Zusammenfassung 111

9. References 116

List of abbreviations 135

List of figures 137

List of tables 138

Supplementary data 139

Supplementary tables for the STN-DBS study in PD (study 2, chapter 3) 139

Supplementary tables for the study on the autonomic function in Wilson’s disease
(study 3, chapter 4)..... 146

List of publications 159

Journal publications 159

Conference publications 160

Curriculum Vitae 161

Acknowledgements..... 162

Declarations..... 164

Erklärungen zur Eröffnung des Promotionsverfahrens 164

Erklärung zur Einhaltung rechtlicher Vorschriften 166