

# Inhaltsverzeichnis

List of Abbreviations	15
<b>I. INTRODUCTION</b>	<b>21</b>
A. Overview	21
B. Outline of the dissertation	25
C. Scope of the dissertation	25
<b>II. PHARMACEUTICAL INVENTIONS, INNOVATIONS &amp; PRODUCTS</b>	<b>28</b>
A. Cumulative nature of inventions	28
1. Basic and second generation inventions	29
a) Improvement inventions	30
b) Selection inventions	30
B. Inventions and innovations in pharmaceutical field	32
1. Inventions and patents in pharmaceutical field	32
a) Product invention and the absolute character of its protection	33
b) Hierarchy of pharmaceutical patents	34
2. Innovations in pharmaceutical field	36
a) Invention v. innovation	36
b) NMEs as the core of pharmaceutical innovation	37
C. Second generation inventions and patents in pharmaceuticals	38
1. Product inventions and patents	39
a) Species selection inventions	39
b) Optical isomers	43
c) Crystalline forms	46
d) Metabolites and prodrugs	47
e) Esters and salts	49
f) Dosage forms	49
g) Combinations of active ingredients	50

2. Use inventions	50
a) New Use/New method of treatment	50
b) Dosage regime	52
3. Process inventions	52
a) Process	52
b) Intermediates	53
D. Pharmaceutical products in the market	53
1. New medical entities, new molecular entities	54
2. Similar or equivalent “me-too” products	54
3. Second generation products	56
4. Generic drugs	57
E. Summary	58
 III. SPECIFICITIES IN PHARMACEUTICALS AND RECENT DEVELOPMENTS	 59
A. Innovating and inventing in pharmaceutical industry	59
1. Specificities in the drug development process	59
a) Highly regulated industry	59
b) R&D – a costly and lengthy road to a medicine	60
c) Uncertainties in post-invention development	64
(1) Scientific uncertainty: Unpredictability of substances	64
(2) Regulatory and market uncertainties	65
d) Information rich chemicals	66
2. Specificities in the market for pharmaceuticals	67
a) Imitation with negligible cost and much reduced risk	67
b) Prescription based purchase: A disconnection between choosers and payers	68
c) Information asymmetry and high loyalty to a medicine	69
d) Pricing	70
3. Specificities of the patent protection for pharmaceuticals	72
a) Patent protection for industrial technologies	72
b) Patent protection in the pharmaceutical industry	74
B. Challenges and overcoming efforts	76
1. Decreased R&D productivity	78
2. Dearth of new medical entities	80
a) Significance of NMEs	80
b) Decreased number of NMEs	80

c) Potential reasons for the decrease	83
(1) Decrease in solvable scientific problems	83
(2) Stringent safety regulations	84
(3) Problem of over-disclosure	84
(4) Early and numerous abandonments of potential candidates	85
3. Patent cliffs of blockbuster medications	86
4. Frequent merger and acquisitions (M&As) and in-licensing	86
5. Drastic increase of second generation inventions	88
a) Life cycle management or evergreening	89
b) Drastic increase of this activity supported by the number of second generation patents	91
C. Summary	93
 IV. STANDARDS OF PATENTABILITY FOR PHARMACEUTICAL SELECTION INVENTIONS	 95
A. Novelty and anticipation	96
1. Introduction	96
2. Examination of novelty	98
3. Inherent anticipation and enablement	103
4. Novelty of selection inventions	106
a) Species selection inventions	106
b) Optical isomers	117
c) Crystalline forms	127
d) Metabolite	130
5. Analysis and conclusion	133
B. Inventive step / Non-obviousness	134
1. Inventive step in patentability requirements	135
2. Examination of inventive step	136
3. Inventive step requirement for selection inventions	144
a) Species selection invention	144
b) Optical isomers	150
c) Crystalline forms	157
d) Metabolites	164
4. Analysis and conclusion	164
C. Disclosure requirement	167
1. Written description requirement	168

2. Enablement requirement	171
a) Enablement requirement	171
b) Enablement requirements in the patent law	175
(1) Enablement as a requirement for anticipation	175
(2) Basic similarity of the two enablement requirements	176
(3) Differences between the two enablement requirements	177
3. Disclosure requirement of selection inventions	178
a) Species selection invention	178
b) Optical isomers	179
c) Crystalline forms	180
D. Conclusion	180
 V. IMPLICATIONS OF THE PATENTABILITY REQUIREMENTS ON INNOVATION AND COMPETITION IN THE PHARMACEUTICAL INDUSTRY	 184
A. Concerns about lowered patentability	185
1. General concerns about lowered patentability	185
a) Superfluous second generation patents	185
b) Increased patent exclusivities and amplified uncertainties thereof	187
c) Encouraged waste of resources	190
d) Hindrance of pharmaceutical innovation	192
2. Concerns about the novelty requirements	194
a) Language dependent prior art disclosure problem	194
b) Rendering inventive step requirement meaningless	196
c) Potential concerns of “direct and unambiguous” disclosure requirement	198
B. Implications considering the breadth of selection patents	198
1. Scope of the protection	199
2. Scope of selection patents	203
a) Species selection patents	203
b) Optical isomers	203
c) Metabolite	206
d) Polymorphs	208
3. Analysis and conclusion	209

C. Implications considering the length of selection patents	210
1. Patent term and patent term extension	211
a) In Europe	212
b) In the United States	213
c) In Korea	214
2. Patent term extension on selection patents	215
a) Species selection patents	215
b) Optical isomers	215
c) Polymorphs	218
d) Metabolite	218
3. Analysis and conclusion	218
D. Implications on the competition in the pharmaceutical industry	222
1. Introduction	222
2. Quasi-obstacles of generics market entry	225
a) Scope of second generation patents	225
b) Length of second generation patents	227
c) Delayed filing of second generation patent applications	227
3. Real obstacles to generics' market entry	229
a) Automatic thirty-month stay and new list up in the Orange Book in the United States	229
b) Pendency of patent applications: Uncertainty	231
(1) Pendency of patent applications	231
(2) Filing of divisional applications	232
c) Active movement of the market to new products	237
d) Along with very specific patents on the secondary products	240
4. Analysis and conclusion	242
E. Summary and conclusion	243
VI. PROPOSALS	245
A. Introduction	247
B. Nature of selection inventions	249
1. Different natures of selection inventions	249
a) Species selection invention	249
b) Other selection inventions	251
2. Selection inventions from the era of penicillin to the 21th century	251
a) Early medications and the novelty requirement	251

b) “Made available to the public” for the first time	252
3. Analysis and conclusion	254
C. Proposals on the breadth of patents	255
1. Arguments on the breadth of patents	255
a) Arguments for a broader patent scope	256
b) Arguments against a broader patent scope	258
c) Arguments on patent scope with consideration of other relevant factors	260
2. Interim conclusion	261
3. Solutions to the overlapping scope with species selection invention	264
a) Voluntary licensing agreements	265
b) Non-voluntary licenses	266
(1) Compulsory licenses	267
(2) Case law relevant to compulsory licenses	269
c) Reverse doctrine of equivalents	272
d) Conclusion	274
D. Proposals on the length of patents	275
1. Arguments on the length of patents	275
2. Proposals on the length of patents	277
a) Proposal on the length of basic patents	277
(1) Introduction	277
(2) Proposed term of basic patents	278
(3) The basis of the proposal	279
(4) Expected effects	281
b) Proposal on the patent term extension of second generation patents	282
E. Proposals on the patentability requirements	283
1. Introduction: Technology specific patentability standards	283
2. Proposals on the novelty requirement	286
a) Arguments on the novelty requirement	286
b) Proposal on the novelty requirement of species selection invention	287
(1) Meaning of something “made available to the public” in the pharmaceutical industry	287
(2) A patent as a double-edged sword to NMEs	289

(3) Statutory exceptions to the novelty requirement and considerations thereof	290
(4) Proposed novelty requirement for NMEs	291
(5) Appreciation of the Olanzapine decision and its expected results	293
c) Discussion on the novelty requirement of other selection inventions	294
3. Proposals on the inventive step requirement	294
a) Arguments on the inventive step requirement	295
(1) Arguments for a strict inventive step requirement	295
(2) Arguments for a strict inventive step requirement together with broader protection	296
(3) Arguments against a strict inventive step requirement	297
(4) Arguments for the relaxed inventive step requirement in risky and expensive R&D fields	297
b) Proposal on the inventive step of species selection inventions	299
c) Proposal on the inventive step of other selection inventions	300
(1) Introduction	300
(2) Proposed standard to assess the inventive step	301
(3) Basis of the proposal	301
(4) Expected effects	304
4. Discussions on the sufficiency requirement	306
a) Discrepancy between the scope of and the disclosure of a genus claim	306
b) Stringent disclosure requirement of the basic invention	307
c) Conclusion	309
F. Conclusion	309
VII. FINAL CONCLUSIONS	312
List of Statutory Instruments	321
List of Case Laws	323
Bibliography	333