Original article
Evaluation of the safety and tolerability of rasagiline in the treatment of the early stages of Parkinson’s disease

François Viallet
Centre Hospitalier du Pays d’Aix, Aix-en-Provence, France
Séverine Pitel
Qualissima, Marseille, France
Sylvie Lancrenon
Sylia Stat, Bourg La Reine, France
Olivier Blin
CHU Timone Hospital, Marseille, France

Address for correspondence:
Séverine Pitel, Qualissima, 10 rue Clapier, 13001 Marseille, France.
Tel.: +33 491504039; Fax: +33 488151440
severine.pitel@qualissima.com

Keywords:
Parkinson’s disease – Pramipexole – Rasagiline – Safety

Abstract
Objective:
Rasagiline is a second-generation, irreversible MAO-B inhibitor (MAOB-I) previously shown to be efficacious and well-tolerated compared to placebo in the treatment of early Parkinson’s disease (PD). ACTOR (ACceptabilite TOlerance Rasagiline) was a 15-week, multi-center, randomized, double-blind study aimed to assess the safety and tolerability of rasagiline compared to the dopaminergic agonist pramipexole in the treatment of early PD.

Methods:
Patients with early, untreated idiopathic PD were randomized to receive 1 mg rasagiline (n=53) or 1.5 mg pramipexole (n=56) daily. The primary outcome was the number of patients experiencing a ‘clinically important adverse event’ (classified as a serious adverse event, an event leading to withdrawal or severe according to the patient). Safety outcomes were evaluated by the investigator and the patient. Analysis of the primary criterion was a comparative analysis using the chi-squared test. The Wilcoxon Mann–Whitney test was conducted to test the severity of patient-reported adverse events. Other tests performed include a covariance analysis and Student’s t-tests.

Results:
Mean disease duration was 3.4 months, and mean age was 62.6 years. Of patients taking pramipexole, 44.6% reported at least one ‘clinically important’ adverse event compared to 32.1% of patients taking rasagiline; non-inferiority of rasagiline was reached, with a difference in proportions of −12.6% [confidence interval of −27.8%; 2.6%]. There were no significant differences in clinical effectiveness between the treatments, measured by clinical and patient global impression of improvement (CGI-I, PGI-I) and PDQ-8 scales. A significant decrease in the incidence of gastrointestinal symptoms (p=0.015) and sleep disorders (p=0.027) was reported by physicians in the rasagiline group compared to the pramipexole group; the propensity to sleepiness improved significantly in the rasagiline group (p=0.015) and worsened in the pramipexole group (p=0.042).

Limitations:
Limitations of this study include the limited sample size due to the lower than anticipated recruitment and the accidental inclusion of a patient who had taken contraindicated medication.

Conclusions:
In this study, the safety profile of rasagiline had clinically favorable differences in gastrointestinal and sleep adverse events compared to pramipexole, whilst showing comparable clinician and patient-rated clinical effectiveness as a monotherapy for the treatment of early idiopathic PD.
**Introduction**

Rasagiline is a second-generation, potent, irreversible MAOB-I which has previously been demonstrated to be efficacious and well-tolerated, compared to placebo, in early Parkinson’s disease (PD)\(^1\,^2\). Rasagiline has also been shown to significantly delay the need for additional symptomatic antiparkinsonian drugs in previous clinical trials\(^3\), with 46% of patients remaining on rasagiline monotherapy after 2 years\(^4\). Pramipexole is a dopaminergic agonist, which has also been demonstrated to be effective compared to placebo and levodopa in previous randomized controlled trials, with a lower incidence of dyskinesia and ‘wearing-off’ compared to levodopa\(^5\).

Patient perception of the treatment regime in terms of balancing both effectiveness and tolerability is an important factor to consider when initiating treatment in early PD. Non-adherence is a frequent occurrence in clinical practice, often related to the patient’s personal experiences, expectations and beliefs about a treatment\(^6\,^8\). Varying adherence and persistence has been demonstrated across different PD therapies, with the adherence rate for rasagiline found to be significantly higher than for other drugs\(^8\). Therefore, it is important to consider patient-reported effectiveness and adverse-event data, in order to assess whether the clinical outcomes reflect the views of the patients.

In a 15-week, comparative, randomized trial we aimed to evaluate the safety and tolerability of rasagiline compared to pramipexole as a monotherapy in the treatment of idiopathic early PD, and the ‘clinical usefulness’ of rasagiline and pramipexole, including both clinician and patient perceptions of the treatment regimen in terms of effectiveness and acceptability.

**Patients and methods**

**Trial design**

ACTOR (ACceptabilité TOlérance Rasagiline) was a phase IV, multicenter, comparative, randomized, parallel-group, double-blind trial with a total duration of 15 weeks. Patients between the ages of 18 and 70 years with idiopathic PD, diagnosed using conventional criteria, with a Hoehn and Yahr score ≤3 were recruited between December 2008 and March 2010 by 29 neurologists in France. Patients were randomized in a 1:1 ratio to receive 1 mg rasagiline once daily (plus placebo twice daily) or pramipexole three times daily, titrated from 0.375 mg/day in week 1, 0.75 mg/day in week 2 to a maximum dose of 1.5 mg/day in week 3 in accordance with the recommended daily dose.

To be included in the trial, patients must have never received anti-Parkinson treatment or had received levodopa for less than 12 weeks at a dose less than 200 mg; patients discontinued all anti-Parkinson treatment other than the study drugs as part of the study protocol. Twenty patients who had been treated with a dopaminergic agonist other than pramipexole were also included, on the condition that the patient was still in the titration phase at the time of inclusion, or that treatment was given for less than 6 weeks and had not been given for 2 weeks before the time of inclusion.

Exclusion criteria included pregnant or breastfeeding women, or women of a childbearing age without sterilization or a reliable birth control method; patients with liver disease; patients with a concomitant disease considered to be significant by the investigator; patients treated with cerebral stimulation and patients with skin lesions not assessed by a dermatologist. Patients treated with fluoxetine during the 5 weeks preceding inclusion, those treated with fluvoxamine, pethidine, selegiline or any other MAOB-I during the 2 weeks preceding inclusion and patients likely to receive dextromethorphan or a sympathomimetic drug during the trial were also excluded.

The protocol was approved by the local ethics committee and regulatory authority (Agence Française de Sécurité Sanitaire des Produits de Santé). The trial was conducted in accordance with the Declaration of Helsinki, and all patients gave written informed consent before participation.

**Assessments**

The primary outcome of the trial was the frequency of clinically important adverse events up to week 15, defined as the patient satisfying one or more of the following criteria; a serious adverse event (SAE), adverse events requiring a decision by the investigator of therapy or dose reduction, an adverse event considered moderate or severe by the patient (AEs whose intensity has not been assessed are considered moderate to severe). The criteria for clinically important adverse events were adapted from a previous study assessing tolerability of analgesics\(^9\).

Serious adverse events were defined as cases causing patient death, hospitalization or prolongation of hospitalization, any adverse event leading to significant incapacity or disability, or cancer, any event that could be considered life-threatening but which did not cause death or hospitalization or prolongation of hospitalization or any overdose (of trial or other treatment). At each visit the investigator collected information relating to adverse events, and each patient completed a self-assessment questionnaire, which included a checklist of symptoms, a specific questionnaire about the quality of sleep and space for any comments from the patient.

Secondary safety outcomes were the percentage of patients with sleep disorders and the Epworth Sleepiness...
Scale (ESS), based on the patient’s self-assessment of the likelihood of daytime drowsiness in common real-life situations.

Secondary effectiveness outcomes were assessed using the Clinical Global Impression of Improvement (CGI-I) scale and the Patient Global Impression of Improvement (PGI-I) scale at each visit. Quality of life outcomes were assessed using the PDQ-8 scale and utility values were assessed using the EQ-5D and EQ-VAS questionnaires.

Statistical analysis

The study was initially designed to test the superiority of rasagiline compared to pramipexole for the primary outcome. A sample size of 240 patients needed was based on the hypothesis that there would be a 15% difference in clinically important adverse events between groups, with a type 1 risk (α) of 5% and a type 2 risk (β) of 20%. However, due to a decreased number of recruited patients compared to the initial expected sample size the protocol was amended, after approval by the ethics committee, such that the primary outcome was tested for the non-inferiority of rasagiline compared to pramipexole. In the amended protocol, 112 subjects included were sufficient to reach a non-inferiority boundary of 10%. If the non-inferiority of rasagiline compared to pramipexole was demonstrated, all primary and secondary outcomes would subsequently be tested for superiority as defined in the initial protocol.

The analyzed population was defined as the intention-to-treat (ITT) group, which consisted of all included patients who had given their informed consent, and for whom at least one item of post-inclusion safety data was available. The per-protocol population (PP) consisted of patients in the ITT group without any consultation under treatment classified as major protocol deviations. If the patient was classified as a major deviation from visit 2 (V2), they were entirely excluded from the PP analysis. Quantitative variables were described in terms of their mean, standard deviation, median, minimum and maximum. Qualitative variables were described in terms of numbers and the percentage of each condition.

Analysis of the primary criterion was a comparative analysis of the percentage of patients in the two treated groups suffering at least one clinically important adverse event using the chi-squared test. A descriptive analysis of adverse events was given for each group, and further statistical analysis was conducted using the chi-squared test; severity of patient-reported adverse events was evaluated using the Wilcoxon Mann–Whitney test.

Covariance analysis was performed on the secondary outcomes of ESS, CGI-I, PGI-I, PDQ-8, EQ-5D and EQ-VAS to assess the difference between the two treatment groups; Wilcoxon Mann–Whitney and Student t-tests were used to assess the intra-group changes.

Results

Patient characteristics

Of the 112 patients assessed for eligibility, 109 patients were randomized in a 1:1 ratio to receive rasagiline or pramipexole (Figure 1). In the rasagiline group only three patients (5.7%) discontinued due to an adverse event compared to eight patients (14.3%) in the pramipexole group. Of those that discontinued in the rasagiline group, symptoms included nausea, headache, dizziness, hives, and serotonin syndrome. For the pramipexole group, discontinuations were mainly due to malaise (n = 2) and nausea (n = 2), with other reasons being abdominal pain (due to ovarian cancer), fatigue, depression and visual hallucination.

Patients included in the trial had an average age of 62.6 years and were predominantly male (62.4%). The majority of the patients were diagnosed with PD with a Hoehn and Yahr score ≤2 (43% with score 1; 51% with score 2), and an average time since diagnosis of 3.4 months; 81.7% of patients had never received any prior anti-Parkinson treatment. The two treatment groups were similar at baseline with regard to demographic variables (Table 1), with the exception of pain/cramp, which was significantly higher in the pramipexole group (p = 0.027).

The mean duration of exposure to treatment was 102.4 ± 16 days in the rasagiline group and 95.1 ± 29.4 days in the pramipexole group (p-value not significant).

Safety outcomes

Overall, of those patients taking pramipexole, 44.6% reported at least one ‘clinically important adverse event’ compared to 32.1% of patients taking rasagiline. The non-inferiority of rasagiline was reached, with a difference in proportions of −12.6% [confidence interval of −27.8%; 2.6%], which was significantly lower than the pre-defined non-inferiority boundary of 10%. This difference did not reach statistical significance in the superiority analysis.

SAEs were reported in one patient in each treatment group. One patient developed serotonin syndrome after co-administration of fluoxetine and rasagiline, for which concomitant use is not recommended10, following accidental inclusion in the trial due to the patient not declaring concurrent medication. The patient also had alcohol-induced fibrosis of the liver. The second SAE was in a patient in the pramipexole group, who withdrew from the trial after diagnosis of ovarian cancer; this event was not considered to be linked to the treatment.
### Table 1. Patient demographics, baseline characteristics and clinical form.

<table>
<thead>
<tr>
<th></th>
<th>Rasagiline group (n=53)</th>
<th>Pramipexole group (n=56)</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>63.2 ± 7.3</td>
<td>62.1 ± 6.2</td>
<td>NS</td>
</tr>
<tr>
<td>Age at onset of disease</td>
<td>62.2 ± 7.3</td>
<td>60.7 ± 6.1</td>
<td>NS</td>
</tr>
<tr>
<td>Female sex, n (%)</td>
<td>16 (30.2%)</td>
<td>25 (44.6%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Time since diagnosis (months)</td>
<td>2.5 ± 3.8</td>
<td>4.3 ± 7.3</td>
<td>NS</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>169.83 ± 9.36</td>
<td>168.80 ± 9.31</td>
<td>NS</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.98 ± 4.17</td>
<td>25.74 ± 4.02</td>
<td>NS</td>
</tr>
<tr>
<td>EQ-5D original score</td>
<td>0.75 ± 0.15</td>
<td>0.67 ± 0.25</td>
<td>NS</td>
</tr>
<tr>
<td>EQ-VAS score</td>
<td>67.48 ± 16.07</td>
<td>63.74 ± 18.76</td>
<td>NS</td>
</tr>
<tr>
<td>PDQ-8</td>
<td>5.45 ± 3.67</td>
<td>6.99 ± 5.23</td>
<td>NS</td>
</tr>
<tr>
<td>Epworth questionnaire (ESS)</td>
<td>6.42 ± 4.34</td>
<td>5.23 ± 3.93</td>
<td>NS</td>
</tr>
<tr>
<td>Previous anti-Parkinson treatment</td>
<td>11 (20.8%)</td>
<td>9 (16.1%)</td>
<td>NS*</td>
</tr>
<tr>
<td>History of depression</td>
<td>13 (24.5%)</td>
<td>20 (35.7%)</td>
<td>NS*</td>
</tr>
<tr>
<td>History of anxiety</td>
<td>26 (49.1%)</td>
<td>24 (42.9%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Antidepressant in the previous 2 years</td>
<td>11 (20.8%)</td>
<td>15 (26.8%)</td>
<td>NS*</td>
</tr>
<tr>
<td>BZD in the previous 2 years</td>
<td>12 (22.6%)</td>
<td>10 (17.9%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Clinical form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tremor</td>
<td>7 (13.2%)</td>
<td>13 (23.2%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Mixed</td>
<td>34 (64.2%)</td>
<td>28 (50.0%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Akinetic hypertonicity</td>
<td>12 (22.6%)</td>
<td>15 (26.8%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Pain, cramp</td>
<td>28 (52.8%)</td>
<td>41 (73.2%)</td>
<td>0.027*</td>
</tr>
<tr>
<td>Sleep disorders</td>
<td>21 (39.6%)</td>
<td>21 (37.5%)</td>
<td>NS*</td>
</tr>
<tr>
<td>CGI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>1 (1.9%)</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Borderline</td>
<td>2 (3.8%)</td>
<td>1 (1.8%)</td>
<td>NS</td>
</tr>
<tr>
<td>Mild</td>
<td>34 (64.2%)</td>
<td>33 (58.9%)</td>
<td>NS</td>
</tr>
<tr>
<td>Moderate</td>
<td>12 (22.6%)</td>
<td>13 (23.2%)</td>
<td>NS</td>
</tr>
<tr>
<td>Obvious</td>
<td>4 (7.5%)</td>
<td>9 (16.1%)</td>
<td>NS</td>
</tr>
</tbody>
</table>

BZD, benzodiazepines; CGI, clinical global impression.

All values reported as mean ± SD or n (%) as appropriate.

All p-values calculated using Wilcoxon Mann–Whitney test except *chi-squared test.
Investigator-reported adverse events

At each visit, the investigator collected information regarding adverse events (AEs). AEs reported by the physician in more than 5% of patients in either treatment group are described in Table 2.

An adverse gastrointestinal event was reported in 12 patients in the rasagiline group (22.6%) compared to 25 patients in the pramipexole group (44.6%, p = 0.015); the incidence of nausea and vomiting was notably higher in the pramipexole group compared to the rasagiline group (28.6 vs. 9.4%, p = 0.011, Table 2). The incidence of rash was significantly higher in the rasagiline group compared to the pramipexole group (9.4 vs. 0%, p = 0.025, Table 2).

At least one form of sleep disorder was reported in nine patients in the rasagiline group (17.0%) compared to 20 patients in the pramipexole group (35.7%, p = 0.027). In the rasagiline group, the number of patients reporting at least one form of sleep disorder reduced from 21 patients (39.6%) at baseline to only nine patients (17%) during the trial; in the pramipexole group the incidence remained similar.

The propensity to sleepiness in both groups was monitored using the Epworth Sleepiness Scale, which was quoted by the investigator at each visit. There was a significant improvement in propensity to sleepiness in the rasagiline group over the entire trial period (mean change from baseline (SD), −0.88 (2.63), p = 0.020) whereas pramipexole significantly worsened the propensity to sleepiness (1.04 (3.63), p = 0.042). Overall, the two groups differed significantly in favor of rasagiline, as validated by covariance analysis (p = 0.007).

Significantly more patients in the rasagiline group reported a weight gain of more than 5 kg over the trial period compared to the pramipexole group (15.4 vs. 3.6%, p = 0.048). However, the number of patients who reported a clinically significant weight gain of more than 7% of their baseline body weight was comparable between the treatment groups.

Patient-reported adverse events

Alongside physician assessments, patients also completed a self-assessment questionnaire at each visit to record the presence and severity of adverse events in the previous weeks. Each symptom was considered to be absent if it was not declared during follow-up, and symptoms declared at least once were graded according to severity. If the event was declared multiple times, the severity level retained
was the highest level indicated. Digestive difficulties 
\( p = 0.027 \), nausea \( p = 0.006 \) and vomiting 
\( p = 0.033 \) were significantly less frequent overall in the 
rasagiline group compared to the pramipexole group 
(Figure 2). Red-eye conjunctivitis was significantly more 
frequent in the rasagiline group \( p = 0.009 \) (Figure 2). All 
other symptoms were reported with a frequency and severe-
ity that was comparable between the two groups (data not 
shown).

Changes in behavioral symptoms linked to a lack of 
impulse control were also assessed using the self-
assessment questionnaire completed by patients at each 
visit. There were no significant differences between the 
pramipexole and rasagiline groups in the number of 
patients reporting some behavior modifications, such as 
smoking more than usual (three patients (5.7%) vs. four 
patients (7.7%)), gambling more than usual (two patients 
(3.8%) vs. one patient (1.9%)) and spending more than 
usual (seven patients (13.2%) vs. four patients (7.7%)). 
Significantly more patients in the pramipexole group 
reported hypersexuality (nine patients (17%)) compared 
to the rasagiline group (two patients (3.8%), \( p = 0.028 \)).

Quality of life and efficacy outcomes

Quality of life (QoL) was assessed using the PDQ-8, 
EQ-5D and EQ-5D VAS scales. Mean scores for each mea-
sure over the course of the trial are shown in Figure 3. The 
changes in scores remained stable for all measures in the 
rasagiline group, and significantly improved from baseline 
to endpoint in the pramipexole group \( p < 0.05 \) for all 
scales). However, covariance analysis of EQ-5D and 
EQ-5D VAS did not reveal any significant differences in 
QoL outcomes between the two groups. Covariance anal-
ysis of the PDQ-8 scores was not valid due to an interaction 
between the covariant and the treatment.

At week 15, 71.2% of patients in the rasagiline group 
had a slight, significant, or very significant improvement 
on the CGI-I, compared to 65.5% of the pramipexole group 
(Figure 4). At the same time point, 67.3% of patients in 
the rasagiline group and 75.5% of patients in the pra-
impexole group reported a slight, significant, or very sig-
nificant improvement on the PGI-I scale (Figure 4). There 
was no significant difference in symptom improvement 
together the two groups as measured by the Wilcoxon 
two-sample test.

Discussion

This phase IV, randomized, comparative, double-blind 
clinical trial indicates an improved safety profile of rasagi-
line, with significantly fewer gastrointestinal and sleep 
related events, whilst offering similar clinical effectiveness 
measured by the CGI-I, PGI-I and quality of life assess-
ments. There were fewer clinically important adverse 
events with rasagiline compared to pramipexole, as 
reported by both the physician and the patient; the non-
inferiority of rasagiline was demonstrated for this outcome.

Patient assessment of adverse events also reflected the 
investigator reported outcomes.

In previous studies with rasagiline, adverse events with 
MAOB-I monotherapy in early PD have generally been 
reported as mild and infrequent. In the TEMPO [(TVP-
1012) in Early Monotherapy for Parkinson's Disease 
Outpatients] study involving patients with early PD, 
where rasagiline was compared to placebo in a multi-
center, randomized, controlled trial over 26 weeks, the 
incidence of adverse events in the rasagiline group was 
not found to be any greater than in the placebo group.\(^2\)

Both investigator and patient-reported outcomes indi-
cated that rasagiline had fewer associated gastrointestinal
side-effects than pramipexole. Nausea and vomiting are common side-effects of PD treatment, but can often be mild and manageable. In this study over half of patients taking pramipexole reported nausea, with 23% of patients classifying the events as moderate to severe. Digestive difficulties were also reported with a significantly higher frequency in the pramipexole group, according to both physician and patient assessment.

Sleep disorders are also a very common adverse event associated with PD treatment, including excessive sleepiness, sleep fragmentation and sleep-onset insomnia, with the prevalence of somnolence estimated at approximately 30% of patients treated with dopamine agonists. The MAO-B inhibitor selegiline has previously been associated with increased wakefulness and sleep-onset insomnia due to stimulation from an
amphetamine metabolite. In this study rasagline, which is not metabolized to amphetamines, was shown to significantly improve propensity to sleepiness during the monitoring period, and a decrease from baseline was observed in the number of patients reporting daytime sleepiness.

Compulsive behaviors have previously been reported in patients with PD, including pathologic gambling, hypersexuality, punding and compulsive shopping; the estimated lifetime prevalence of these behaviors is 13.7% in patients taking dopamine agonists such as pramipexole. This was reflected in the results of this study, where more patients in the pramipexole group, compared to the rasagline group, reported gambling and spending more than usual, and significantly more patients reported hypersexuality. These ‘impulse control’ disorders can frequently escape diagnosis, and can have a notable negative impact on quality of life and social functioning. As dopamine is a key neurotransmitter in the reward pathways of the brain, the mechanism for the development of these behaviors is thought to be due to overstimulation of these pathways, particularly through the D3 receptor, although the mechanisms are not well understood. Pramipexole exhibits multiple receptor effects, including activity at the D3 receptor, there is a high risk that it may induce compulsive behaviors in a dose-responsive manner.

The clinical effectiveness of the two treatments was assessed using both the clinician completed CGI- and patient completed PGI-I; a comparison of the scores in the two groups did not reveal any significant differences. Quality of life was assessed using the PDQ-8 and EQ-5D scales, although it was not possible to compare the treatment groups due to interaction between the covariate and the treatment. Intergroup analysis showed that quality of life improved with both treatments from baseline, stabilizing in the rasagline group and continuing to improve in the pramipexole group.

The limitations of the ACTOR study include the limited sample size due to the lower than expected recruitment and the accidental inclusion of a patient who had taken contraindicated medication.

### Conclusion

The results of this 15-week, non-inferiority analyzed, controlled study indicate that rasagline is not inferior to pramipexole with regards to its safety and tolerability profile. However, the profile of rasagline seems favorable, with fewer clinically important adverse events and with comparable effectiveness, as measured by both clinician and patient assessment.

### Transparency

#### Declaration of funding

This study was funded in whole by Qualissima, who received a grant from Lundbeck.

#### Declaration of financial/other relationships

F.V. received honoraria from Qualissima for coordination of clinical centers. S.P., an employee of Qualissima received a grant from Lundbeck to carry out this study. S.L., an employee of Sylvie Stat received payment from Qualissima for statistical analysis. O.B.’s official declaration of interest is available from the French Ministry of Health website www.sante.gouv.fr/declarations-publiques-d-interets.html. In addition, it should be noted that O.B. joined GSK after the study had been completed.

CMRO peer reviewers on this manuscript have no relevant financial relationships to disclose.

#### Acknowledgments

Editorial support was provided by Lisa Yang of Costello Medical Consulting.

#### Acknowledgments to the study investigators for their recruitment (alphabetical order)

Amevigbe Josephine (Beauvais), Arguillé Sophie (Aix-en-Provence), Augustin Jérôme (Bois Guillaume), Bailbe Paripignan), Bensa Patrick (Marseille), Charif Mahmoud (Montpellier), Chassin Olivier (Vichy), Colamarino Renato (Vichy), Couratier Christophe (Aix-en-Provence), Daluzeau Nathalie (Lisieux), De Fauc Pierre (Armentières), Deconbec René (Troyes), Delmer Corinne (Evreux), Denis Beatrice (Marseille), Dujardin Max (Evreux), Fromager Guillaume (Caen), Galletti Patrick (Bastia), Geny Christian (Montpellier), Getenet Jean-Claude (Saint-Etienne), Hadjou Karim (Rodez), Jary Annabelle (Vesoul), Lavermane Gilles (Gap), Le Collon Philippe (Dax), Lemaire Jean-François (Orléans), Maillot-Vinod Marcel (Montluçon), Pichot Du Mezzer Armel (Thionville), Pin Jean-Christophe (Saint Michel), Reis Jacques (Sarreguemines), Remy Pascal (Corbeil Essonnes), Renie Laurent (Aix-en-Provence), Robin Christophe (Roanne), Schmidt Nicolas (Rueil-Malmaison), Seiller Nicolas (Sarreguemines), Trefouret Sylvie (La Seyne-sur-Mer), Viallet Françoise (Aix-en-Provence).

#### Previous presentations

Outcomes of the ACTOR Study have previously been presented as posters at the following congresses:


References

10. Azilect (rasagiline) Summary of Product Characteristics. November 2010