Original article

LDL-cholesterol target values and actual values in patients with type 2 diabetes (T2D) uncontrolled on oral antidiabetic monotherapy: The lipid results of the French ESCALADE survey

Objectifs et valeurs observées de cholestérol LDL (LDL-c) chez des patients diabétiques de type 2 (DT2) mal équilibrés sous monothérapie antidiabétique orale : résultats de la partie lipides de l’enquête française ESCALADE

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Abstract

Aim. – While new European guidelines have recommended much lower LDL-c target values than current 2005 French HAS guidelines, it appears that even those ones are not widely implemented. This lipid-side of the ESCALADE study was designed to determine the LDL-c target values of GPs, diabetologists (DIABs) and cardiologists (CARDIOs) and the consistency of actual values in patients with type 2 diabetes (T2D) uncontrolled on antidiabetic monotherapy. Methods. – ESCALADE was a national multicentre, observational, descriptive, transversal survey. One thousand and three hundred GPs and 350 specialists (DIABs and CARDIOs) agreed to include respectively three and four patients each. For each patient, the physician had to set the LDL-c target value that was compared to the calculated HAS target value. The actual LDL-c value was recorded and compared to those target values. Results. – A total of 412 GPs, 137 DIABs and 27 CARDIOs included respectively 699, 364 and 66 patients. Among them 19.6% had cardiovascular disease (CVD) and 56.9% were on lipid-lowering therapy (LLT). The physician’s target value was in concordance with HAS value in 37.3% (GPs), 35.4% (DIABs) and 57.4% (CARDIOs) of the cases. Physicians overestimated the risk in respectively 42.7%, 54.1% and 21.3%. However, very high risk was underestimated in respectively 38.1%, 22.0% and 25.6% of the patients and the actual LDL-c value was in the target range (< 100 mg/dL) for only 28% of the very high-risk patients. Conclusion. – Physicians tend to overestimate the CVD risk in patients with T2D and set lower LDL-c target values than HAS calculated values. Nevertheless, patients with a very high risk are largely under-treated.

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Résumé

Objectif. – Alors que selon les nouvelles recommandations européennes, le LDL-c devrait se situer à un niveau bien inférieur aux recommandations actuelles de l’HAS, il semble que celles-ci ne sont pas largement appliquées. Cette partie lipides de l’étude ESCALADE a pour but d’évaluer les objectifs de LDL-c de généralistes (MG), diabétologues (DIAB) et cardiologues (CARDIO) et la cohérence avec les valeurs réelles de LDL-c chez des patients ayant un DT2 mal équilibré sous monothérapie antidiabétique orale. Méthodes. – ESCALADE est une étude nationale, multicentrique, observationnelle, descriptive, transversale. Mille trois cents MG et 350 spécialistes (DIAB et CARDIO) ont accepté d’inclure chacun respectivement trois ou quatre patients. Pour chaque patient, le médecin devait fixer l’objectif de LDL-c qui a été comparé à l’objectif de l’HAS. La valeur observée de LDL-c a ensuite été comparée à ces objectifs. Résultats. – Un total de 412 MG, 137 DIAB et 27 CARDIO ont inclus respectivement 699,
1. Introduction

Cardiovascular disease (CVD) is the first cause of mortality in patients with type 2 diabetes (T2D). In France, the 2005 French health regulatory agency (Haute Autorité de santé [HAS]) guidelines for dyslipidemia management have been used in patients with T2D [1]. Those guidelines recommended LDL-c target values below 190 mg/dL, below 160 mg/dL and below 130 mg/dL when respectively zero, one and two or more additional risk factors were present, the 190 mg/dL target value being applicable only in individuals with no microangiopathy and a duration of diabetes less than 5 years. In diabetic patients considered at very high risk or in secondary prevention, the recommended LDL-c target value was below 100 mg/dL.

In 2010, a large meta-analysis [2] including more than 32,000 (19%) patients with diabetes showed a very significant 20% reduction in coronary heart disease (CHD) per \( \sim 40 \text{mg/dL} \) (1 mmol/L) of LDL-c reduction, even when patients with a baseline LDL-c level below \( \sim 80 \text{mg/dL} \) (2.0 mmol/L) were included. In 2011, the European Society of Cardiology (ESC) and the European Atherosclerosis Society (EAS) jointly published recommendations for the management of dyslipidemia [3]. These guidelines, like the American guidelines [4], introduced a LDL-c target value less than 70 mg/dL for patients at “very high level” risk i.e. in secondary prevention, or with diabetic nephropathy, or with chronic kidney disease (CKD) (estimated glomerular filtration rate [eGFR] \(< 60 \text{mL/min/1.73 m}^2 \)) or with a calculated 10-year risk score of fatal CVD greater than or equal to 10%. A target value below 100 mg/dL was recommended for patients at “high risk” including virtually all the other diabetic patients (as it included patients with any markedly elevated single risk factor). Those guidelines are considerably more stringent than the current French guidelines.

However, while some try to implement those new LDL-c targets, it appears that even less strict recommendations are not being followed [5]. It is not clear whether the reason is the lack of knowledge of those guidelines or their non-application by physicians. Some studies have looked at the lipid status of diabetic patients but very few compared the LDL-c target value set by the physicians for their patients and the consistency of the actual LDL-c values.

ESCALADE was an observational study. The primary objective was to report the reasons for the choice of the second antidiabetic agent in patients with uncontrolled T2D despite lifestyle modifications and antidiabetic oral monotherapy [6]. One pre-specified secondary objective was to report the management of dyslipidemia in those patients i.e. if LDL-c targets were in agreement with the HAS guidelines and if actual LDL-c values were consistent with those targets. This article reports the results of the lipid-side of this survey. We chose to focus on LDL-c levels and did not consider triglyceride and/or HDL-c levels as triglyceride levels can be very fluctuant and dependent of glucose control and as therapeutic resources remain quite limited regarding to HDL-c management.

2. Methods

ESCALADE was a national multicentre, observational, descriptive, transversal survey that was performed between January 2009 and March 2010.

2.1. Physicians

A representative list of 10,500 physicians (8000 GPs and 2500 specialists) seeing diabetic patients i.e. diabetologists [DIABs] and cardiologists [CARDIOs] was issued. The first 1300 GPs (78.8%) and 350 specialists (21.2%) agreeing to participate were selected and the consistency of the physicians’ repartition was confirmed using the criteria of the French physician board (Conseil National de l’Ordre des Médecins [CNOM]). Patients were seen as usually, without any change related to their participation to the survey. Each GP and specialist was supposed to include respectively three and four patients with the objective of including 5300 patients: 3900 by the GPs (73.6%), 1400 by the specialists (26.4%).

2.2. Patients

All the patients received an information notice and gave informed consent. The main inclusion criteria were: age above 18 years, uncontrolled T2D despite lifestyle modifications and oral antidiabetic monotherapy requiring treatment intensification with a second antidiabetic agent (oral agent or GLP-1 analog). The main non-inclusion criterion was the requirement of insulin therapy.

The rhythm of inclusion for each physician was left to his/her choice: either the first three or four consecutive patients meeting the inclusion criteria or the first patient meeting the inclusion criteria each week for three or four consecutive weeks.

2.3. Survey

The study was implemented by a service society that followed the current rules of relations with the physicians including the agreement of the CNOM. The clinical reports were performed anonymously and electronically on a secured web site.
2.4. Study objectives

The primary objective of the survey was to report the factors leading to the choice of the second antidiabetic agent. Results were reported elsewhere [6]. The secondary objectives included the time for starting bitherapy and the reasons leading to an eventual delay, the description of the demographic and lab data of the patients with uncontrolled T2D despite lifestyle modifications and antidiabetic monotherapy and the target values determined by the physicians for each patient (HbA1c, BP, LDL-c) according to HAS guidelines. This article focuses on LDL-c targets and their consistency with the HAS guidelines.

2.5. HAS cardiovascular disease risk status

HAS CVD risk status was determined according to the number of cardiovascular risk factors (CVRFs). According to the HAS guidelines, CVRFs included age (greater than 50 years old [male] or greater than 60 years old [female]), family history of premature CVD, current smoking (or smoking cessation for less than 3 years), hypertension, diabetes and HDL-c less than 40 mg/dL. For each patient, the number of CVRFs was determined (minus one if the HDL-c value was ≥ 60 mg/dL) and the HAS LDL-c target value was calculated. A very high-risk status with a LDL-c target value below 100 mg/dL was considered in T2D patients in secondary prevention or if two or more of the above CVRFs were present or if one CVRF plus microalbuminuria were present or if renal disease defined by the presence or either proteinuria (> 300 mg/day) or eGFR below 60 mL/min was present. Otherwise, the LDL-c target was calculated according to the number of CVRFs: less than 190 mg/dL if no other CVRF than T2D was present, less than 160 mg/dL if one was present, less than 130 mg/dL if two or more CVRFs were present.

2.6. Statistics

For each data, the number of missing data as well as the mean, the standard error (SE), or the percentage (qualitative data) were calculated. The calculation of the number of physicians and patients to participate to the survey was done assuming that 15% of the clinical report files would not be usable and calculating a power of 90% for the primary criteria.

3. Results

3.1. Physicians

A total of 576 physicians finally completed the physician’s form: 412 GPs (71.5%) and 164 specialists (28.5%) including 137 diabetologists (23.8%) and 27 cardiologists (4.7%). The main demographic characteristics are shown in Table 1. Two thirds of the GPs and almost all the specialists were practicing in urban areas, mainly in private practice.

3.2. Patients

A total of 1677 patients were included: 1082 by the GPs (64.5%) and 595 by the specialists (35.5%); 500 (29.8%) by the DIABs and 95 (5.7%) by the CARDIOs. Among them, 548 had to be excluded: 71 did not have any data reported after the inclusion criteria, 27 were not receiving any oral antidiabetic agent, 54 were already taking an antidiabetic bitherapy and 396 did not receive any additional antidiabetic agent at the survey visit as specified in the inclusion criteria. Finally, 1129 files were analyzed, with a recruitment performed either by the GPs (699 [61.9%]) or by the specialists (430 [38.1%]): DIABs (364 [32.2%]) or CARDIOs (66 [5.8%]). The main baseline demographic characteristics of the patients are reported in Table 2. Most of the patients (85%) were either obese or overweight and half of them were smokers or former smokers.

The duration of diabetes was 6.5 ± 5.8 years and the mean HbA1c 7.7 ± 1.0%. More than half of the patients (53.7%) had at least one complication of diabetes (Table 3). About 20% of the patients had CVD (63.6% of the CARDIOs’ patients). Relatively few patients (5.7%) had diabetic retinopathy while 29.2% had nephropathy (56.3% of the CARDIOs’ patients) and 9.6% neuropathy.

About 13% reported a family history of premature CVD and 685 (60.8%) were considered as being dyslipidemic. More than half (56.9%) of the patients (and 86.7% of the dyslipidemic

Table 1
Main demographic characteristics of the physicians.

<table>
<thead>
<tr>
<th></th>
<th>GPs (n = 412)</th>
<th>DIABs (n = 137)</th>
<th>CARDIOs (n = 27)</th>
<th>Total (n = 576)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>53.5 ± 7.0</td>
<td>49.7 ± 9.7</td>
<td>51.0 ± 9.0</td>
<td>52.5 ± 8.0</td>
</tr>
<tr>
<td>Gender: M (%)</td>
<td>89.3</td>
<td>34.3</td>
<td>96.3</td>
<td>76.6%</td>
</tr>
<tr>
<td>Practice area: Urban (%)</td>
<td>67.7</td>
<td>97.1</td>
<td>96.3</td>
<td>76.0</td>
</tr>
<tr>
<td>Practice: private (%)</td>
<td>100</td>
<td>79.6</td>
<td>77.8</td>
<td>94.1</td>
</tr>
<tr>
<td>Average number of patients with T2D seen per month</td>
<td>40.1 ± 30.2</td>
<td>90.9 ± 50.7</td>
<td>56.3 ± 40.1</td>
<td>52.8 ± 42.3</td>
</tr>
</tbody>
</table>

Results are expressed as mean ± SE or percentage when indicated.
Table 2
Main demographic characteristics of the patients.

<table>
<thead>
<tr>
<th></th>
<th>GPs (n = 699)</th>
<th>DIA Bs (n = 364)</th>
<th>CARDIOs (n = 66)</th>
<th>Total (n = 1129)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>62.1 ± 10.1</td>
<td>57.8 ± 12.0</td>
<td>64.0 ± 9.8</td>
<td>60.8 ± 10.9</td>
</tr>
<tr>
<td>Gender: M (%)</td>
<td>67.1</td>
<td>45.6</td>
<td>60.6</td>
<td>59.8</td>
</tr>
<tr>
<td>Overweight/obesity (%)</td>
<td>44.9/40.5</td>
<td>33.2/51.6</td>
<td>40.9/40.9</td>
<td>40.9/44.1</td>
</tr>
<tr>
<td>Smoking: current/ex (%)</td>
<td>13.6/41.5</td>
<td>12.4/28.6</td>
<td>12.1/42.4</td>
<td>13.1/37.4</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>134.3 ± 11.8</td>
<td>132.8 ± 13.3</td>
<td>141.7 ± 16.0</td>
<td>134.3 ± 12.7</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>78.7 ± 8.3</td>
<td>77.2 ± 8.5</td>
<td>80.8 ± 10.2</td>
<td>78.3 ± 8.5</td>
</tr>
<tr>
<td>Duration of diabetes (years)</td>
<td>6.9 ± 5.8</td>
<td>6.0 ± 5.8</td>
<td>6.0 ± 5.8</td>
<td>6.5 ± 5.8</td>
</tr>
<tr>
<td>Last HbA1c value (%)</td>
<td>7.7 ± 0.8</td>
<td>7.8 ± 1.2</td>
<td>7.9 ± 1.1</td>
<td>7.7 ± 1.0</td>
</tr>
<tr>
<td>Family history of early CVD: yes (%)</td>
<td>13.3</td>
<td>11.3</td>
<td>22.7</td>
<td>13.2</td>
</tr>
<tr>
<td>Patients considered as dyslipidemic (%)</td>
<td>57.5</td>
<td>64.6</td>
<td>74.2</td>
<td>60.8</td>
</tr>
<tr>
<td>At least one LLT (%)</td>
<td>58.5</td>
<td>50</td>
<td>77.3</td>
<td>56.9</td>
</tr>
<tr>
<td>Statin (%)</td>
<td>51.4</td>
<td>39.3</td>
<td>66.7</td>
<td>48.4</td>
</tr>
<tr>
<td>Fibrate (%)</td>
<td>5.3</td>
<td>10.4</td>
<td>4.5</td>
<td>6.9</td>
</tr>
<tr>
<td>Ezetimibe (%)</td>
<td>2.1</td>
<td>1.9</td>
<td>3.0</td>
<td>2.1</td>
</tr>
</tbody>
</table>

BP: blood pressure; LLT: lipid-lowering therapy. Overweight was defined by a BMI ≥ 25 and < 30 kg/m², obesity by a BMI ≥ 30 kg/m². Former smokers had stopped smoking for more than 3 years.

Table 3
Rates of reported diabetic complications (%).

<table>
<thead>
<tr>
<th></th>
<th>GPs (n = 699)</th>
<th>DIA Bs (n = 364)</th>
<th>CARDIOs (n = 66)</th>
<th>Total (n = 1129)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHD</td>
<td>11.0</td>
<td>9.1</td>
<td>50.0</td>
<td>12.7</td>
</tr>
<tr>
<td>Stroke</td>
<td>2.6</td>
<td>1.9</td>
<td>6.1</td>
<td>2.6</td>
</tr>
<tr>
<td>CHF</td>
<td>3.9</td>
<td>2.2</td>
<td>19.7</td>
<td>4.3</td>
</tr>
<tr>
<td>Peripheral arteriopathy</td>
<td>7.6</td>
<td>3.0</td>
<td>16.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Lower limb amputation</td>
<td>0.3</td>
<td>0.3</td>
<td>4.5</td>
<td>0.5</td>
</tr>
<tr>
<td>At least one manifestation of CVD</td>
<td>18.5</td>
<td>13.8</td>
<td>63.6</td>
<td>19.6</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>5.6</td>
<td>3.8</td>
<td>16.7</td>
<td>5.7</td>
</tr>
<tr>
<td>Microalbuminuria/proteinuria</td>
<td>16.7/4.3</td>
<td>14.8/1.6</td>
<td>43.9/13.6</td>
<td>17.7/4.0</td>
</tr>
<tr>
<td>eGFR ≤ 60 mL/min</td>
<td>19.1</td>
<td>5.9</td>
<td>30.2</td>
<td>15.5</td>
</tr>
<tr>
<td>At least one manifestation of nephropathy</td>
<td>31.5</td>
<td>19.6</td>
<td>56.3</td>
<td>29.2</td>
</tr>
<tr>
<td>Diabetic neuropathy</td>
<td>6.6</td>
<td>10.2</td>
<td>4.5</td>
<td>7.6</td>
</tr>
<tr>
<td>History of non-vascular foot ulcer</td>
<td>2.6</td>
<td>2.3</td>
<td>9.1</td>
<td>2.8</td>
</tr>
<tr>
<td>At least one manifestation of neuropathy</td>
<td>8.5</td>
<td>11.3</td>
<td>12.1</td>
<td>9.6</td>
</tr>
</tbody>
</table>

CHD: coronary heart disease; CVD: cardiovascular disease; CHF: congestive heart failure; eGFR: estimated glomerular filtration rate.

patients) were taking a lipid-lowering therapy (LLT), including a statin in most (about 85%) of the cases. Among the dyslipidemic patients, LDL-c mean value was 122 ± 38 mg/dL, HDL-c was 47 ± 12 mg/dL, triglyceride mean level was 174 ± 84 mg/dL (Table 4).

3.3. LDL-c target values and actual values

When physicians’ LDL-c target values were compared to theoretical LDL-c target values as calculated with the HAS guidelines, concordance was observed in 37.3% (GPs), 35.4%
Fig. 1. Proportion of actual ranges of LDL-c values according to physicians’ LDL target values (n= 944, missing data = 8)

Bars represent the ranges of actual LDL-c values (percentages) according to physicians’ LDL target values.

(DIABs) and 57.4% (CARDIOs) of the cases. The physicians’ target value was lower than the HAS value (overestimation of the risk) for 42.7% (GPs), 54.1% (DIABs) and 21.3% (CARDIOs) and higher (underestimation of the risk) for respectively 18.2%, 9.3% and 21.2% of the patients. Patients considered by the physicians as being at what is now called very high risk (LDL-c target value < 100 mg/dL) were actually really at very high risk in 40.5% (GPs), 33.9% (DIABs) and 72.7% (CARDIOs) while they were at high risk (HAS LDL-c target value < 130 mg/dL) in 46.0% (GPs), 43.4% (DIABs) and 20.5% (CARDIOs) or moderate or low risk (HAS LDL-c target value < 160 or 190 mg/dL) in 13.5% (GPs), 22.8% (DIABs) and 6.8% (CARDIOs). On the other hand, very high-risk patients according to the HAS were not considered as such by 38.1% of the GPs, 22.0% of the DIABs and 25.6% of the CARDIOs.

When the physician’s [HAS] LDL-c target value was below 100 mg/dL, the actual LDL-c value was in the target range in 36.9% [26.9%] (GPs), 44.7% [34.3%] (DIABs) and 24.4% [23.1%] (CARDIOs). Those respective values were 49.4% [65.4%] (GPs), 55.9% [70.7%] (DIABs) and 28.6% [50.0%] (CARDIOs) for a LDL-c target below 130 mg/dL; 78.3% [84.8%] (GPs), 83.3% [89.6%] (DIABs) for a LDL-c target below 160 mg/dL and 81.8% [100.0%], (GPs), 80.0% [94.0%] (DIABs) for a LDL-c target value below 190 mg/dL. Almost no CARDIO set a LDL-c target value below 160 mg/dL or below 190 mg/dL for any patient.

An actual LDL-c level greater than or equal to 190 mg/dL was observed in 3.7% of the patients: 2.9% of the GPs’ patients, 4.7% of the DIABs’ patients and 7.0% of the CARDIOs’ patients.

Overall, when the total population was considered, the concordance between the physicians’ [the HAS] LDL-c target value and the actual LDL-c value was 38.5% [28.0%] for a LDL-c target value below 100 mg/dL, 50.5% [66.6%] for a target below 130 mg/dL, 78.5% [87.2%] for a target value below 160 mg/dL and 81.3% [97.4%] for a target value below 190 mg/dL (Figs. 1 and 2).

Fig. 2. Proportion of actual ranges of LDL-c values according to the HAS LDL-c target values.

Bars represent the ranges of actual LDL-c values (percentages) according to HAS LDL target values (n= 944, missing data = 77)
4. Discussion

A gap between the perception of dyslipidemia control and the actual control has already been reported [7] leading to insufficient control. This survey, designed to primarily look at the way French physicians intensify oral therapy in T2D patients uncontrolled with oral antidiabetic monotherapy, also looked at the way GPs, DIA Bs and CARDIOs managed dyslipidemia in those patients. The population of physicians who participated to the survey was representative of French physicians’ repartition. Our population was somehow comparable to the baseline population of the ADVANCE study [8] regarding to baseline HbA1c (7.7% versus 7.5% in ADVANCE), the rate of CHD (12.7% versus 12.0%), the level of LDL-c (122 mg/dL versus 121 mg/dL) although diabetes duration was shorter (6.5 years versus 8.0 years). However, the rate of statin prescription was much higher in our survey (48.4% versus 28%) and actually very comparable to the rate reached at the end of the ADVANCE study (~46% with a mean end-of-the-study LDL-c ~ 102 mg/dL), suggesting that the titration of statin therapy was far less stringent in our population. This raised questions about the adequacy of the LDL-c target value perceived by the physicians in comparison to the theoretical HAS target value and then to the actual LDL-c value reached with LLT.

Only very few studies have looked at the LDL-c target value perceived by the physician compared to the theoretical LDL-c target range. A recent study in a population of T2D Korean patients followed in specialized diabetes care units showed that LDL-c target was perceived as correct by the physicians for 70.6% of the patients whereas it actually was adequate in only 47.4% of the population [9]. In our population, about one third of the GPs and DIABs and half of the CARDIOs had a correct perception of LDL-c target value according to the 2005 HAS guidelines. This proportion increased for very high-risk patients up to 33.9% (DIABs), 40.5% (GPs) and 72.7% (CARDIOs).

About half (one fifth of the CARDIOs) overestimated the risk and about two thirds of the physicians’ LDL-c target values below 100 mg/dL were unjustified (a quarter for CARDIOs). Furthermore, 22.8% of the LDL-c target values set below 100 mg/dL by DIABs (versus 13.5% for GPs and 6.8% for CARDIOs) applied to actually moderate or low risk patients (HAS target value < 160 or 190 mg/dL). Conversely, very high risk was underestimated in 22% (DIABs) to 25.6% (CARDIOs) and 38% (GPs) of the patients.

These results can be compared to a 2006 observational French study that showed that GPs widely used the then recent guidelines for the management of dyslipidemia in patients in primary prevention and without LLT but that the number of individuals at low risk was widely underestimated by GPs compared to the theoretical calculated risk (13% versus 29% respectively) as well as the number of patients with high risk (41% versus 48%) [10]; in our study GPs considered 59.2% of the patients as being at very high risk versus 39.5% according to HAS.

Once the LDL-c target value had been set, it was important to see if actual values fitted the goals. About 45.4% and 57.0% of the actual LDL-c values were consistent with physicians’ and HAS target values respectively but only 28% of the very-high risk patients (HAS target) actually had a LDL-c value below 100 mg/dL (23.1% among CARDIOs’). It was reported that in France, among treated very high-risk patients, the LDL-c target value (< 100 mg/dL) was not reached in more than 55% of the patients [11]. A very recent European study looked at the implementation of new guidelines in patients with T2D: 63% of the patients received statins (80% of those in secondary prevention) and only 42% reached the LDL-c target value; the below 70 mg/dL target value being reached by only 13% of the patients [12]. A previous European study reported that 59.5% of the patients on LLT reached the LDL-c target value [13]. A study in Asian patients showed that only 38% of the patients with CHD or diabetes reached the LDL-c target value [14]. In the US, it appeared that only 28.8% of the T2D patients reached the LDL-c goal in the first 6 months of LLT [15] and that in 2007–2008, only 54% and 29% of the diabetic patients reached the respective LDL-c target values of below 100 mg/dL and below 70 mg/dL when applicable [16].

A study reporting that 51.8% of statin-treated patients (53.2% of high risk individuals) reached LDL-c goal according to European guidelines [17] evaluated the factors associated with LDL-c goal achievement: higher statin dose (OR: 0.35), specialist care (OR: 0.74) and combined LLT (0.80). Our survey does not suggest such a difference between GPs and specialists. A recent study showed that cardiologists’ intervention on LLT in high-risk patients improved the proportion of patients reaching LDL-c goal but this percentage increased from less than 40% to only 51.3% [18]. In our survey, the low number of CARDIOs precludes conclusions on their management of dyslipidemia in DT2 patients. Moreover, the primary objective of the study being antidiabetic treatment intensification, the population of CARDIOs might not be very representative of those specialists.

A Canadian study that was performed between 2001 and 2004 in patients in secondary prevention in primary care setting showed that 83% were receiving a statin and that only 19.5% of the patients with cerebrovascular disease and 30.5% of those with CHD reached the LDL-c target value [19].

Thus, about half of our patients and two thirds of those with what is now defined as very-high risk did not reach the target values perceived by the physician or calculated with the HAS guidelines. On the other side about two-thirds of LDL-c physicians’ target values below 100 mg/dL were unjustified as if physicians (and mostly DIABs) had anticipated the new ESC/EAS guidelines recommending an even lower LDL-c target value in those patients.

A limitation of our study could be the representativity of our population. However, our population had characteristics close to those of landmark studies [8]. This study could not be prospective by definition as it looked at the application of guidelines by physicians.

5. Conclusion

In our population, only about one third of the GPs and DIABs had a correct perception of LDL-c target value according to the 2005 HAS guidelines, about half of them overestimating the risk
and mostly very high-risk situations: two thirds of the very low LDL-c target values were unjustified, as if the physicians — and mostly DIABs — had anticipated the current European guidelines. However, only 28% of the very-high risk patients actually had a LDL-c value below 100 mg/dL. Thus, efforts should be made to implement and maybe simplify the current HAS guidelines in France i.e. to accurately estimate the risk status and then to titrate LLT in order to reach an appropriate LDL-c target value, set accordingly to the patient’s CVD risk status.

Disclosure of interest

A.P. is a member of boards of Novartis, Novo Nordisk, Pierre Fabre Medicament, and Sanofi Aventis. He has received payment for the development of educational presentations from Merck Sharp & Dohme. He has had travel and accommodation expenses covered or reimbursed by Merck Sharp & Dohme.

A.B. works within the CRO, RCTs, to which Pierre Fabre Medicament subcontracted the statistical analysis and the writing of the final report of the French ESCALADE survey.

T.C. is employed by Pierre-Fabre Médicament, Castres, France.

S.P. has served as a consultant for Sanofi and is on the speaker bureau for Pierre Fabre Medicament and Solvay.

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