Durable Effects of iGlarLixi Up to 52 Weeks in Type 2 Diabetes: The LixiLan-G Extension Study

Lawrence Blonde,[1] Julio Rosenstock,[2] Juan Frias,[3] Andreas L. Birkenfeld,[4,5] Elisabeth Niemoeller,[6] Elisabeth Souhami,[7] Chen Ji,[8] Stefano Del Prato,[9] and Vanita R. Aroda[10,11]

OBJECTIVE

In the LixiLan-G trial, switching to iGlarLixi, a once-daily titratable fixed-ratio combination of insulin glargine 100 units/mL and the glucagon-like peptide 1 receptor agonist (GLP-1 RA) lixisenatide, improved glucose control in type 2 diabetes uncontrolled with GLP-1 RAs over 26 weeks versus continuing prior GLP-1 RA. A prespecified, 26-week, single-arm extension of LixiLan-G aimed to determine the durability of iGlarLixi efficacy and safety over 52 weeks.

RESEARCH DESIGN AND METHODS

Participants with type 2 diabetes uncontrolled by GLP-1 RAs (glycated hemoglobin [HbA$_{1c}$] 7–9% [53–75 mmol/mol]) were initially randomized to switch to iGlarLixi or continue prior GLP-1 RA. Those randomized to iGlarLixi who completed the 26-week primary end point period could continue iGlarLixi open-label treatment over a 26-week extension to assess durability of efficacy and safety.

RESULTS

Glycemic control achieved with iGlarLixi at week 26 (mean HbA$_{1c}$ 6.7% [50 mmol/mol]) was maintained at week 52 (mean HbA$_{1c}$ 6.7% [50 mmol/mol]; mean ± SD change from baseline at week 52: −1.0 ± 0.9% [11 ± 10 mmol/mol]). Proportions of participants reaching HbA$_{1c}$ <7% (53 mmol/mol) with iGlarLixi were similar at week 26 (62%) and 52 (64%), as were those reaching this target without documented symptomatic (<3.0 mmol/L) hypoglycemia (57% and 58%). Safety of iGlarLixi was similar at weeks 26 and 52, with low rates of documented symptomatic hypoglycemia and gastrointestinal events.

CONCLUSIONS

The efficacy and safety of iGlarLixi at the end of the 26-week randomized treatment period was maintained over the 26-week extension period in the LixiLan-G trial.

[1]Frank Riddick Diabetes Institute, Department of Endocrinology, Ochsner Medical Center, New Orleans, LA
[2]Dallas Diabetes Research Center, Dallas, TX
[3]National Research Institute, Los Angeles, CA
[4]Medical Clinic IV, Department of Endocrinology, Diabetology, Angiology and Nephrology, University Hospital Tübingen, Tübingen, Germany
[5]German Center for Diabetes Research and Institute for Diabetes Research and Metabolic Diseases of the Helmholtz Centre Munich at the University of Tübingen, Tübingen, Germany
[6]Sanofi, Frankfurt, Germany
[7]Sanofi, Paris, France
[8]Sanofi, Beijing, China
[9]School of Medicine, University of Pisa, Pisa, Italy
[10]MedStar Health Research Institute, Hyattsville, MD
[11]Brigham and Women's Hospital, Boston, MA

Corresponding author: Lawrence Blonde, lblonde@ochsner.org

iGlarLixi is a once-daily titratable fixed-ratio combination of basal insulin glargine 100 units/mL (iGlar) and the glucagon-like peptide 1 receptor agonist (GLP-1 RA) lixisenatide (Lixi) (1,2). The LixiLan-G trial investigated the efficacy and safety of treatment intensification by switching from GLP-1 RA therapy to iGlarLixi in adults with type 2 diabetes inadequately controlled by a GLP-1 RA plus oral antihyperglycemic drugs (OADs) and was the first to test such a fixed-ratio combination versus continuing weekly GLP-1 RAs (3). This study design reflects current guideline recommendations of treatment intensification with insulin therapy for those with inadequate glycemic control while on GLP-1 RAs (4,5). In the LixiLan-G trial, iGlarLixi was well tolerated and meaningfully improved glycemic control with a glycated hemoglobin (HbA$_{1c}$)

reduction from 7.8 to 6.7%, allowing significantly more participants to reach target HbA$_{1c}$ levels (<7% [53 mmol/mol]) over 26 weeks, compared with those continuing their previous GLP-1 RA regimen (62% in the iGlarLixi group vs. 26% in the GLP-1 RA group; $P < 0.0001$) (3).

In this study, we report the results of the prespecified, 26-week, single-arm extension of the LixiLan-G trial, which aimed to determine the durability of the efficacy and safety of iGlarLixi over 52 weeks. We also report an exploratory analysis of the efficacy of iGlarLixi over the 52-week period stratified by baseline 30-min preprandial C-peptide levels to assess durability of treatment efficacy by endogenous β-cell reserve.

RESEARCH DESIGN AND METHODS

Study Design
The design of the LixiLan-G trial has been described previously (3) (Supplementary Fig. 1). Briefly, LixiLan-G was an open-label, active-controlled, parallel-group trial in adults with type 2 diabetes and suboptimal glycemic control (HbA$_{1c}$ ≥7% and ≤9% [53–75 mmol/mol]) despite maximum tolerated doses of a once/twice-daily or once-weekly GLP-1 RA plus metformin (with/without pioglitazone and/or sodium–glucose cotransporter 2 inhibitor). Concomitant sulfonylurea use was not permitted. Participants were randomized to switch to iGlarLixi or continue their GLP-1 RA regimen for 26 weeks while continuing their previous OADs. The objective of the 26-week randomized treatment period was to compare the efficacy and safety of switching to iGlarLixi with continuing treatment with prior GLP-1 RA regimen in this patient population.

At the end of the 26-week randomized treatment period, participants who completed 26 weeks of iGlarLixi treatment and did not receive rescue therapy or who received rescue therapy but had an HbA$_{1c}$ ≤8% (64 mmol/mol) could continue to receive iGlarLixi in a prespecified 26-week, single-arm extension period. The objective of the 26-week extension period was to determine the durability of the efficacy and safety of iGlarLixi over 52 weeks.

End Points and Analyses
The prespecified end points for the 26-week extension period were the same as those assessed at the end of

the 26-week randomized treatment period. The primary end point was change in HbA$_{1c}$ from baseline. Secondary end points included the proportion of participants achieving HbA$_{1c}$ <7% (<53 mmol/mol), change from baseline in fasting plasma glucose (FPG), 2-h postprandial plasma glucose (PPG), 2-h plasma glucose excursion, body weight, and iGlarLixi dose. Safety assessments included documented symptomatic hypoglycemia and adverse events (AEs), with gastrointestinal (GI) AEs being of particular interest. Additional assessments included the composite end point of the proportion of participants achieving HbA$_{1c}$ <7% (53 mmol/mol) without documented symptomatic (<3.0 mmol/L) hypoglycemia.

An exploratory analysis was also undertaken to determine the efficacy of iGlarLixi over the 52-week period in subgroups of participants defined by baseline (week −1) 30-min preprandial C-peptide level (quartile 1: >1.21 nmol/L; quartile 2: ≤1.21 to >0.94 nmol/L; quartile 3: ≤0.94 to >0.73 nmol/L; and quartile 4: ≤0.73 nmol/L), for participants with available data.

Statistical Methods
For the 26-week randomized treatment period, study end points were compared between the iGlarLixi and GLP-1 RA groups using least-squares means (3). For the 26-week single-arm extension period, efficacy and safety data for iGlarLixi are summarized descriptively. Efficacy analyses over the 52-week period were conducted in those in the modified intent-to-treat (mITT) population who entered the extension period. The mITT population included all participants initially randomized to iGlarLixi who had a baseline assessment and at least one postbaseline assessment for any primary or secondary efficacy end point. Safety analyses over the 52-week period were conducted in those in the safety population who entered the extension period. The safety population included all participants who were randomized to and received at least one dose of iGlarLixi.

RESULTS

Participant Disposition and Baseline Characteristics
In total, 514 participants were randomized into the 26-week treatment period of the study, 257 to each treatment group

(iGlarLixi and GLP-1 RA) (Supplementary Fig. 2). Of those randomized to receive iGlarLixi, 255 participants received treatment, and 230 completed the 26-week randomized treatment period. Of the 230 participants randomized to iGlarLixi who completed the 26-week randomized treatment period, 18 chose not to participate in the 26-week extension period and 6 were ineligible to participate due to receiving rescue therapy and having HbA$_{1c}$ >8% (64 mmol/mol) at week 22. Therefore, 206 participants entered the 26-week extension period, which was completed by the majority ($n = 197$; 95.6%). Five participants who entered the 26-week extension period had received rescue therapy during the main treatment period and had an HbA$_{1c}$ ≤8% (64 mmol/mol) at week 22 (Supplementary Fig. 2).

Participant baseline demographics and disease characteristics were similar between treatment groups in the 26-week randomized treatment period and in those receiving iGlarLixi in the extension period (Table 1). Approximately 60% of participants were taking once- or twice-daily GLP-1 RAs, primarily once-daily liraglutide, and ~40% were taking a once-weekly GLP-1 RA, primarily either dulaglutide or exenatide extended release.

Efficacy of iGlarLixi Over 52 Weeks
The reduction in HbA$_{1c}$ from baseline at week 26 with iGlarLixi was maintained over the 26-week extension period (Fig. 1A and Table 2). Mean HbA$_{1c}$ was 6.7% (50 mmol/mol) at week 26 in the iGlarLixi group and 6.7% (50 mmol/mol) at week 52 in participants in the extension period (mean change ± SD from baseline at week 52: −1.0 ± 0.9% [−11 ± 10 mmol/mol]). Reductions in HbA$_{1c}$ from baseline to week 52 were consistent across C-peptide subgroups, as were absolute HbA$_{1c}$ values at week 52 (Table 3).

The proportions of participants who reached HbA$_{1c}$ <7% (53 mmol/mol) were similar in the iGlarLixi group at week 26 (61.9%) and in participants in the extension period at week 52 (64.1%) (Table 2). The proportion of participants in the iGlarLixi group who reached the composite end point of HbA$_{1c}$ <7% (53 mmol/mol) without documented symptomatic (<3.0 mmol/L) hypoglycemia at week 26 (56.7%) was also sustained at week 52 in participants in the extension period (57.8%) (Fig. 1B).

Table 1—Demographics and baseline disease characteristics at screening or baseline

	Participants randomized to initial 26-week treatment period		Participants who entered 26-week extension period
	GLP-1 RA (n = 257)	iGlarLixi (n = 257)	iGlarLixi (n = 206)
Age (years)	60.0 ± 10.3	59.2 ± 9.6	59.8 ± 9.1
Female	113 (44.0)	131 (51.0)	106 (51.5)
BMI (kg/m^2)	33.0 ± 4.4	32.8 ± 4.4	32.9 ± 4.4
Duration of diabetes (years)	11.0 ± 6.1	11.2 ± 7.4	11.5 ± 7.7
Duration of GLP-1 RA treatment (years)	1.9 ± 1.9	1.9 ± 1.8	1.9 ± 1.8
HbA$_{1c}$ at screening			
%	7.9 ± 0.5	7.9 ± 0.6	7.8 ± 0.5
mmol/mol	63 ± 5	63 ± 7	62 ± 5
GLP-1 RA use by type at screening			
Once-daily/twice-daily formulation	154 (59.9)	153 (59.5)	126 (61.2)
Liraglutide once daily	145 (56.4)	135 (52.5)	112 (54.4)
Exenatide twice daily	9 (3.5)	18 (7.0)	14 (6.8)
Once-weekly formulation	103 (40.1)	104 (40.5)	80 (38.8)
Dulaglutide	51 (19.8)	54 (21.0)	43 (20.9)
Exenatide ER	48 (18.7)	45 (17.5)	33 (16.0)
Albiglutide	4 (1.6)	5 (1.9)	4 (1.9)
Pioglitazone use at screening	22 (8.6)	12 (4.7)	10 (4.9)
SGLT2 inhibitor use at screening	26 (10.1)	26 (10.1)	19 (9.2)

Data are mean ± SD or n (%). ER, extended release; SGLT2, sodium–glucose cotransporter 2.

iGlarLixi was associated with reductions from baseline at week 26 in FPG (mean change ± SD: −2.1 ± 2.3 mmol/L), 2-h PPG (−3.9 ± 3.8 mmol/L), and 2-h plasma glucose excursion (−1.6 ± 3.2 mmol/L), which were sustained at week 52 (mean change ± SD: −2.3 ± 2.4 mmol/L, −4.3 ± 3.9 mmol/L, and −1.9 ± 2.9 mmol/L, respectively, from baseline to week 52) (Table 2).

In the iGlarLixi group, mean body weight increased by 1.9 kg from baseline to week 26 and by a further 0.9 kg from week 26 to week 52 (2.8 kg from baseline to week 52). Body weight decreased in the GLP-1 RA group (mean change: −1.2 kg at week 26) (Table 2).

The daily dose of iGlarLixi was stable during the extension period. The mean daily dose of iGlar was 44 units at week 26 and 45 units at week 52; and the corresponding Lixi doses were 17 μg and 17 μg, respectively.

Safety of iGlarLixi Over 52 Weeks
Generally, safety results for iGlarLixi over 52 weeks were similar to those seen over 26 weeks (Supplementary Table 1). Over the entire 52-week study period, 72.8% of participants receiving iGlarLixi reported at least one AE and 10.2% reported at least one serious AE. Over the 52-week study period, the most frequently reported system organ classes

with a serious AE were neoplasms benign, malignant, and unspecified (including cysts and polyps; n = 7; 3.4%) and cardiac disorders (n = 6; 2.9%). Few of the serious AEs were experienced by more than one participant: subarachnoid hemorrhage (n = 2; 1.0%), congestive cardiac failure (n = 2; 1.0%), coronary artery disease (n = 2; 1.0%), and fall (n = 2; 1.0%). Only one serious AE was considered related to the treatment (unconsciousness due to hypoglycemia). GI disorders were reported in 24.8% of participants receiving iGlarLixi, including nausea in 9.2%, diarrhea in 7.3%, and vomiting in 3.9%. All nausea, diarrhea, and vomiting AEs were of mild or moderate intensity, and none were considered serious. In participants reporting these events, most reported them during the 26-week randomized treatment period (n/N: nausea, 16/19; diarrhea, 12/15; and vomiting, 6/8). During the 26-week randomized treatment period, nausea led to the discontinuation of iGlarLixi in three participants and vomiting in one participant; no participants discontinued iGlarLixi due to nausea, diarrhea, or vomiting in the 26-week extension period.

Documented symptomatic (<3.0 mmol/L) hypoglycemia with iGlarLixi was reported in 18.0% of participants over 52 weeks (rate 0.24 per participant-year, compared with

0.25 per participant-year over weeks 0–26) (Supplementary Table 1). A single severe symptomatic hypoglycemic event was reported over the entire study duration; this event occurred during the 26-week randomized treatment period.

CONCLUSIONS
In people with type 2 diabetes inadequately controlled despite receiving the maximum tolerated dose of GLP-1 RAs plus OADs in the LixiLan-G trial, iGlarLixi significantly improved overall glycemic control after 26 weeks, allowing more participants to reach HbA$_{1c}$ <7% (53 mmol/mol) and also significantly reducing FPG, 2-h PPG, and 2-h plasma glucose excursion, compared with continuing previous GLP-1 RAs (3). For participants in the iGlarLixi group who entered the 26-week single-arm extension period, iGlarLixi efficacy was sustained at week 52 with results similar to those observed at week 26. Furthermore, glucose control at week 52 was generally consistent across the subgroups defined by C-peptide levels, suggesting persistent efficacy of iGlarLixi across a wide range of residual β-cell function. This finding may seem to be unexpected given the contribution of decreasing β-cell function to type 2 diabetes progression. However, it may be likely that the combination of insulin and a GLP-1 RA exerts
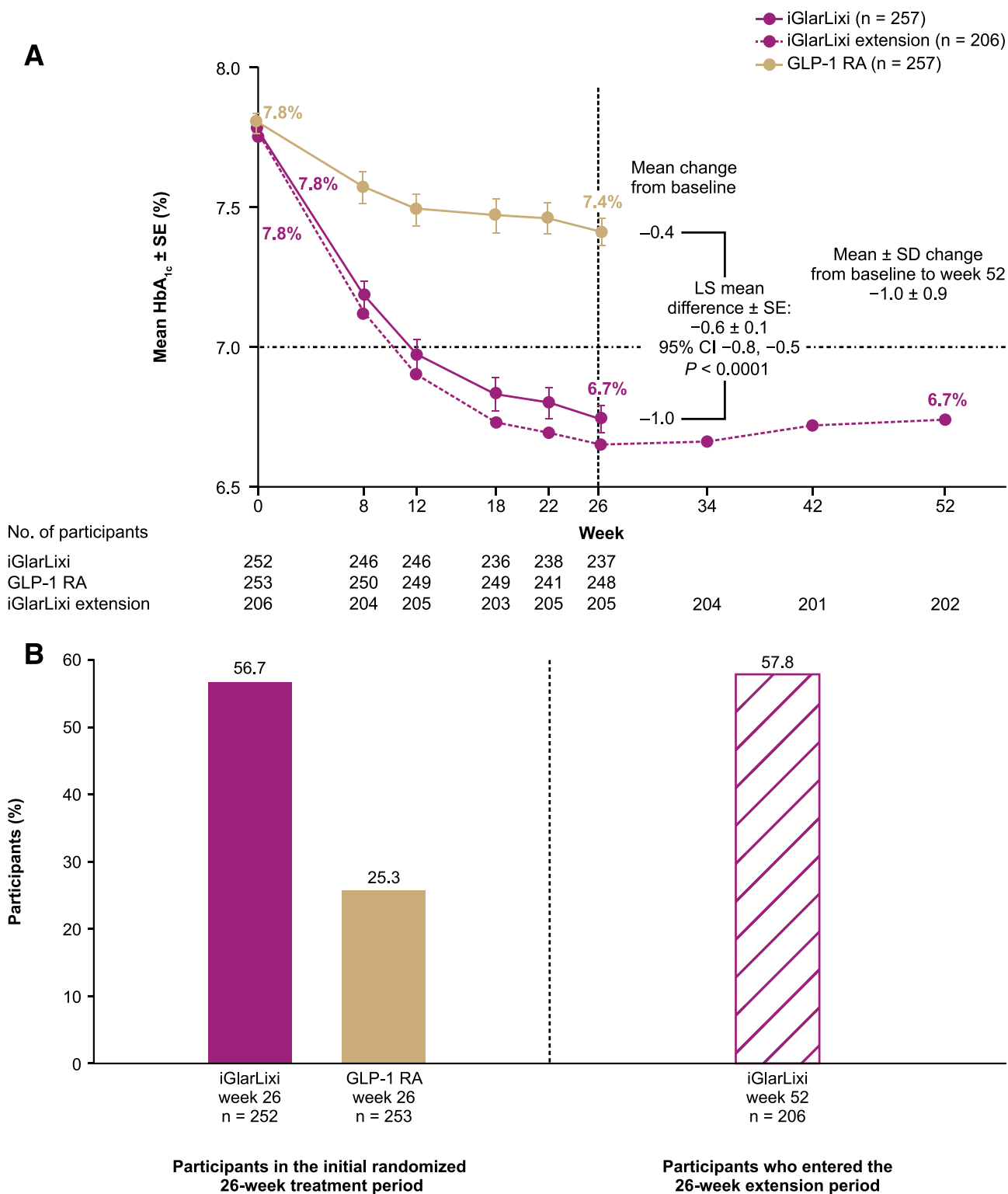
A

No. of participants

	Week								
	0	8	12	18	22	26	34	42	52
iGlarLixi	252	246	246	236	238	237			
GLP-1 RA	253	250	249	249	241	248			
iGlarLixi extension	206	204	205	203	205	205	204	201	202

B

Figure 1—Glycemic target: HbA$_{1c}$ change from baseline to week 52 (*A*) and proportion of participants achieving HbA$_{1c}$ <7% (53 mmol/mol) (*B*) without documented symptomatic (<3.0 mmol/L) hypoglycemia. LS, least squares; No., number.

complementary mechanisms of action that can, at least to some extent, counteract the effects of progressive loss of β-cell function. These include the known effect on slowing gastric emptying and,

possibly, the inhibition of glucagon secretion (6).

The safety profile of iGlarLixi at week 52 reflected those of its components (iGlar and Lixi) as previously observed

(3,7,8) and was consistent with that seen at week 26. The rate of documented symptomatic (<3.0 mmol/L) hypoglycemia was low overall and consistent over 26 and 52 weeks. The proportion of

Table 2—Secondary efficacy end points from baseline to week 26 and week 52 (mITT population)

	\multicolumn{4}{}{Participants in initial randomized 26-week treatment period}		Participants in the 26-week extension period	
	GLP-1 RA (n = 253)		iGlarLixi (n = 252)		iGlarLixi* (n = 206)	
Time period	n	Weeks 0–26	n	Weeks 0–26	n	Weeks 0–52
HbA$_{1c}$, %						
Baseline	253	7.8 ± 0.6	252	7.8 ± 0.6	206	7.8 ± 0.6
Week 26 or 52†	248	7.4 ± 0.8	237	6.7 ± 0.8	202	6.7 ± 0.8
Change	248	−0.4 ± 0.8	237	−1.0 ± 0.9	202	−1.0 ± 0.9
Difference iGlarLixi vs. GLP-1 RA				−0.6 ± 0.1		
95% CI				−0.8, −0.5		
P value				<0.0001		
HbA$_{1c}$, mmol/mol						
Baseline	253	62 ± 7	252	62 ± 7	206	62 ± 7
Week 26 or 52†	248	57 ± 9	237	50 ± 9	202	50 ± 9
Change	248	−4 ± 9	237	−11 ± 10	202	−11 ± 10
Difference iGlarLixi vs. GLP-1 RA				−7 ± 1		
95% CI				−9, −5		
P value				<0.0001		
HbA$_{1c}$ <7% (53 mmol/mol)						
Week 26 or 52†	253	65 (25.7)	252	156 (61.9)	206	132 (64.1)
Difference iGlarLixi vs. GLP-1 RA (%)				36.1		
95% CI				28.1, 44.0		
P value				<0.0001		
FPG, mmol/L						
Baseline	253	9.5 ± 1.9	252	9.1 ± 2.1	206	9.0 ± 2.2
Week 26 or 52†	227	8.7 ± 2.0	228	6.9 ± 1.7	196	6.8 ± 1.7
Change	227	−0.8 ± 2.5	228	−2.1 ± 2.3	196	−2.3 ± 2.4
Difference iGlarLixi vs. GLP-1 RA				−1.7 ± 0.2		
95% CI				−2.0, −1.3		
P value				<0.0001		
FPG, mg/dL						
Baseline	253	170 ± 34.8	252	163 ± 37.8	206	162 ± 38.7
Week 26 or 52†	227	156 ± 36.2	228	124 ± 30.0	196	122 ± 30.6
Change	227	−13.5 ± 44.5	228	−38.6 ± 41.8	196	−40.9 ± 43.5
Difference iGlarLixi vs. GLP-1 RA				−30.1 ± 3.0		
95% CI				−36.0, −24.2		
P value				<0.0001		
2-h PPG, mmol/L‡						
Baseline	236	13.8 ± 3.2	237	13.7 ± 3.4	193	13.5 ± 3.4
Week 26 or 52†	234	12.6 ± 3.3	226	9.7 ± 3.1	201	9.2 ± 2.9
Change	222	−1.2 ± 3.7	215	−3.9 ± 3.8	192	−4.3 ± 3.9
Difference iGlarLixi vs. GLP-1 RA				−2.9 ± 0.3		
95% CI				−3.4, −2.3		
P value				<0.0001		
2-h PPG, mg/dL‡						
Baseline	236	248 ± 58.3	237	246 ± 61.4	193	242 ± 61.4
Week 26 or 52†	234	227 ± 58.8	226	174 ± 55.8	201	166 ± 52.9
Change	222	−21.5 ± 66.4	215	−70.6 ± 68.6	192	−77.4 ± 71.0
Difference iGlarLixi vs. GLP-1 RA				−51.3 ± 5.2		
95% CI				−61.6, −41.1		
P value				<0.0001		
2-h plasma glucose excursion, mmol/L‡						
Baseline	236	4.2 ± 2.6	237	4.3 ± 2.7	193	4.3 ± 2.7
Week 26 or 52†	232	3.8 ± 2.7	226	2.8 ± 2.8	201	2.5 ± 2.5
Change	220	−0.5 ± 2.8	215	−1.6 ± 3.2	192	−1.9 ± 2.9
Difference iGlarLixi vs. GLP-1 RA				−1.0 ± 0.2		
95% CI				−1.5, −0.5		
P value				<0.0001		
2-h plasma glucose excursion, mg/dL‡						
Baseline	236	75.6 ± 47.2	237	78.0 ± 48.9	193	77.3 ± 48.9
Week 26 or 52†	232	67.8 ± 48.5	226	50.0 ± 49.5	201	44.2 ± 45.1
Change	220	−9.1 ± 50.6	215	−28.0 ± 58.0	192	−33.4 ± 52.1

Table 2—Continued

| Time period | Participants in initial randomized 26-week treatment period | | | | Participants in the 26-week extension period | |
| | GLP-1 RA (n = 253) | | iGlarLixi (n = 252) | | iGlarLixi* (n = 206) | |
	n	Weeks 0–26	n	Weeks 0–26	n	Weeks 0–52
Difference iGlarLixi vs. GLP-1 RA				−17.8 ± 4.4		
95% CI				−26.5, −9.1		
P value				<0.0001		
Body weight, kg						
Baseline	253	95.5 ± 16.9	252	92.9 ± 16.5	206	92.8 ± 16.4
Week 26 or 52†	247	94.5 ± 16.9	237	94.9 ± 16.4	202	95.6 ± 16.5
Change	247	−1.2 ± 3.1	237	1.9 ± 3.9	202	2.8 ± 4.2
Difference iGlarLixi vs. GLP-1 RA				3.0 ± 0.3		
95% CI				2.4, 3.6		

Data are mean ± SD or n (%) unless otherwise stated, except between-treatment difference, which are least-squares mean ± SE. Two-hour PPG and glucose excursion were recorded during a standardized meal test. mITT population was defined as all randomized participants with a baseline assessment and at least one postbaseline assessment for any primary or secondary efficacy variables. *Results presented for the entire 0–52-week study period for those participants who were randomized to receive iGlarLixi, completed the first 26-week randomized treatment period, and entered the single-arm extension period. †Value at week 26 for participants in the initial randomized 26-week treatment period and at week 52 for participants who entered the 26-week extension period. ‡Last observation carried forward.

participants who reached the composite end point of HbA$_{1c}$ <7% (53 mmol/mol) without documented symptomatic (<3.0 mmol/L) hypoglycemia at week 26 with iGlarLixi in LixiLan-G, which was higher than in those continuing their previous GLP-1 RA regimen, was also sustained at week 52.

GLP-1 RAs are highly effective, but, depending on the study population, many individuals may not reach glycemic targets (9–12). A significant number of people with type 2 diabetes on GLP-1 RAs may need to intensify treatment by adding insulin if glycemic control is not attained or maintained (13), as recommended by current international guidelines (4,5).

Recent meta-analyses have demonstrated that the combination of GLP-1 RA and basal insulin results in robust glycemic control without increasing the risk of hypoglycemia versus insulin-based regimens in people with type 2 diabetes (14–16). Moreover, these findings have been shown to translate into the real world, with observational evidence also supporting the efficacy of this combination (13,17). The results of the LixiLan-G study are consistent with those of an observational longitudinal cohort study that demonstrated lower HbA$_{1c}$ levels in individuals with type 2 diabetes receiving GLP-1 RA plus insulin than those receiving GLP-1 RA alone (13). Interestingly, in the cohort study, earlier intensification of GLP-1 RA treatment with insulin was associated with even greater glycemic benefit (13). Furthermore, superior glycemic control and fewer GI AEs were demonstrated with iGlarLixi versus Lixi alone in people with type 2 diabetes inadequately controlled on OADs in the multinational LixiLan-O study and in a recent clinical trial in Japan (LixiLan JP-O1) (8,18). For people with type 2 diabetes inadequately controlled on GLP-1 RA who require treatment intensification, iGlarLixi has an advantage over separate GLP-1 RA and basal insulin therapy by providing both antihyperglycemic therapies in a convenient single daily dose.

The current analysis of the 26-week extension period of the LixiLan-G study has some limitations, including the extension period's single-arm design, the additional eligibility criteria for the extension period (although very few

Table 3—Change in HbA$_{1c}$ from baseline to week 52 in participants receiving iGlarLixi in the extension period by subgroups defined by baseline 30-min preprandial C-peptide (mITT population)

| | Baseline 30-min preprandial C-peptide subgroup | | | | | | | |
| | | Quartile 1 (>1.21 nmol/L) | | Quartile 2 (≤1.21 to >0.94 nmol/L) | | Quartile 3 (≤0.94 to >0.73 nmol/L) | | Quartile 4 (≤0.73 nmol/L) |
	n	(n = 59)	n	(n = 61)	n	(n = 63)	n	(n = 57)
HbA$_{1c}$, %								
Baseline	59	7.8 ± 0.6	61	7.7 ± 0.6	63	7.8 ± 0.6	57	7.8 ± 0.7
Week 52	41	6.8 ± 0.9	51	6.6 ± 0.6	52	6.8 ± 0.8	48	6.7 ± 0.7
Change	41	−1.0 ± 1.1	51	−1.1 ± 0.8	52	−1.0 ± 0.9	48	−1.1 ± 0.9
HbA$_{1c}$, mmol/mol								
Baseline	59	62 ± 7	61	61 ± 7	63	62 ± 7	57	62 ± 8
Week 52	41	51 ± 10	51	49 ± 7	52	51 ± 9	48	50 ± 8
Change	41	−11 ± 12	51	−12 ± 9	52	−11 ± 10	48	−12 ± 10

Data are mean ± SD, unless otherwise stated. mITT population was defined as all randomized participants with a baseline assessment and at least one postbaseline assessment for any primary or secondary efficacy variables.

participants did not meet these criteria; $n = 6$), and the possibility that 1-year data may have been of insufficient duration to fully elucidate the long-term efficacy and safety of iGlarLixi in this population. In addition, the study was not designed or powered to compare efficacy outcomes across C-peptide subgroups.

In conclusion, in the LixiLan-G study, the efficacy and safety of iGlarLixi at the end of the 26-week randomized treatment period were maintained at week 52 in the prespecified 26-week extension period in people with type 2 diabetes inadequately controlled by GLP-1 RAs and OADs; and efficacy was consistent across baseline C-peptide subgroups. These data provide further evidence that in the LixiLan-G trial, iGlarLixi was an effective treatment for adults with type 2 diabetes failing to reach their glycemic target with GLP-1 RA and OADs.

References

1. European Medicines Agency. Suliqua summary of product characteristics, 2019. Accessed 12 February 2020. Available from https://www.ema.europa.eu/en/documents/product-information/suliqua-epar-product-information_en.pdf
2. Sanofi. Soliqua US prescribing information, 2019. Accessed 12 February 2020. Available from https://products.sanofi.us/Soliqua100-33/Soliqua100-33.pdf
3. Blonde L, Rosenstock J, Del Prato S, et al. Switching to iGlarLixi versus continuing daily or weekly GLP-1 RA in type 2 diabetes inadequately controlled by GLP-1 RA and oral antihyperglycemic therapy: the LixiLan-G randomized clinical trial. Diabetes Care 2019;42:2108–2116
4. American Diabetes Association. 9. Pharmacologic approaches to glycemic treatment: Standards of Medical Care in Diabetes—2020. Diabetes Care 2020;43(Suppl. 1):S98–S110
5. Davies MJ, D'Alessio DA, Fradkin J, et al. Management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care 2018;41:2669–2701
6. Hinnen D, Strong J. iGlarLixi: a new once-daily fixed-ratio combination of basal insulin glargine and lixisenatide for the management of type 2 diabetes. Diabetes Spectr 2018;31:145–154
7. Aroda VR, Rosenstock J, Wysham C, et al.; LixiLan-L Trial Investigators. Efficacy and safety of LixiLan, a titratable fixed-ratio combination of insulin glargine plus lixisenatide in type 2 diabetes inadequately controlled on basal insulin and metformin: the LixiLan-L randomized trial [published correction appears in Diabetes Care 2017;40:809]. Diabetes Care 2016;39:1972–1980
8. Rosenstock J, Aronson R, Grunberger G, et al.; LixiLan-O Trial Investigators. Benefits of LixiLan, a titratable fixed-ratio combination of insulin glargine plus lixisenatide, versus insulin glargine and lixisenatide monocomponents in type 2 diabetes inadequately controlled on oral agents: the LixiLan-O randomized trial [published correction appears in Diabetes Care 2017;40:809]. Diabetes Care 2016;39:2026–2035
9. Blonde L, Raccah D, Lew E, et al. Treatment intensification in type 2 diabetes: a real-world study of 2-OAD regimens, GLP-1 RAs, or basal insulin. Diabetes Ther 2018;9:1169–1184
10. Feher M, Vega-Hernandez G, Mocevic E, et al. Effectiveness of liraglutide and lixisenatide in the treatment of type 2 diabetes: real-world evidence from The Health Improvement Network (THIN) database in the United Kingdom. Diabetes Ther 2017;8:417–431
11. Lee WC, Dekoven M, Bouchard J, Massoudi M, Langer J. Improved real-world glycaemic outcomes with liraglutide versus other incretin-based therapies in type 2 diabetes. Diabetes Obes Metab 2014;16:819–826
12. Ostawal A, Mocevic E, Kragh N, Xu W. Clinical effectiveness of liraglutide in type 2 diabetes treatment in the real-world setting: a systematic literature review. Diabetes Ther 2016;7:411–438
13. Montvida O, Klein K, Kumar S, Khunti K, Paul SK. Addition of or switch to insulin therapy in people treated with glucagon-like peptide-1 receptor agonists: a real-world study in 66 583 patients. Diabetes Obes Metab 2017;19:108–117
14. Maiorino MI, Chiodini P, Bellastella G, Capuano A, Esposito K, Giugliano D. Insulin and glucagon-like peptide 1 receptor agonist combination therapy in type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials. Diabetes Care 2017;40:614–624
15. Maiorino MI, Chiodini P, Bellastella G, et al. Free and fixed-ratio combinations of basal insulin and GLP-1 receptor agonists versus basal insulin intensification in type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials. Diabetes Obes Metab 2018;20:2309–2313
16. Maiorino MI, Chiodini P, Bellastella G, et al. The good companions: insulin and glucagon-like peptide-1 receptor agonist in type 2 diabetes. A systematic review and meta-analysis of randomized controlled trials. Diabetes Res Clin Pract 2019;154:101–115
17. Price H, Blüher M, Prager R, Phan TM, Thorsted BL, Schultes B; EXTRA study group. Use and effectiveness of a fixed-ratio combination of insulin degludec/liraglutide (IDegLira) in a real-world population with type 2 diabetes: results from a European, multicentre, retrospective chart review study. Diabetes Obes Metab 2018;20:954–962
18. Watada H, Takami A, Spranger R, Amano A, Hashimoto Y, Niemoeller E. Efficacy and safety of 1:1 fixed-ratio combination of insulin glargine and lixisenatide versus lixisenatide in Japanese patients with type 2 diabetes inadequately controlled on oral antidiabetic drugs: the LixiLan JP-O1 Randomized Clinical Trial. Diabetes Care 2020;43:1249–1257