YOUNGER AGE AND CLINICAL OUTCOMES IN PATIENTS WITH UNRESECTABLE HEPATOCELLULAR CARCINOMA TREATED WITH CAMRELIZUMAB + RIVOCERANIB VS SORAFENIB (CARES-310)

Presented at the International Liver Cancer (ILCA) 2026 Annual Conference

Poster #P-106

Arndt Vogel[1], Kristin Ryan[2], Xianzhang Meng[2], Amarachi Umez-Eronini[2], Richard Kim[3], Stephen L. Chan[4]

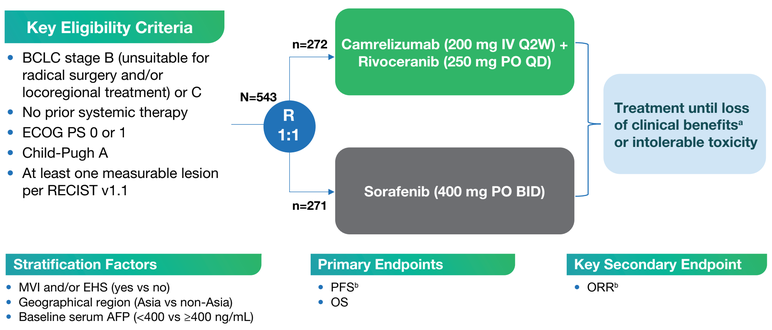
[1]Division of Gastroenterology and Hepatology, Toronto General Hospital, Medical Oncology, UHN-Princess Margaret Cancer Centre, Toronto General Hospital Research Institute, Schwartz Reisman Liver Research Centre Institute for Medical Science, Toronto, Canada; [2]Elevar Therapeutics, Fort Lee, NJ, USA; [3]Moffitt Cancer Center, Tampa, FL, USA; [4]State Key Laboratory of Translational Oncology, Department of Clinical Oncology, Hong Kong Cancer Institute, The Chinese University of Hong Kong, Hong Kong Special Administrative Region, China

BACKGROUND

- CARES-310 (NCT03764293) compared the combination of the anti-programmed cell death protein 1 (PD-1) antibody camrelizumab plus the vascular endothelial growth factor receptor 2 (VEGFR2)-targeted tyrosine kinase inhibitor rivoceranib versus sorafenib for the treatment of unresectable hepatocellular carcinoma.[1, 2]
  - In the CARES-310 final analysis, camrelizumab plus rivoceranib showed clinically relevant improvement in median overall survival (mOS) and median progression-free survival (mPFS) compared with sorafenib (mOS 23.8 months vs 15.2 months; HR 0.64 [95% CI, 0.52-0.79]; mPFS 5.6 months vs 3.7 months; HR 0.54 [95% CI, 0.44-0.67]).[2]
  - The most common ≥5% grade 3-4 treatment-related adverse events (TRAEs) for camrelizumab plus rivoceranib were hypertension (38%) and increased aspartate aminotransferase (AST; 17%) versus palmar-plantar erythrodysesthesia syndrome (16%) for sorafenib.[2]
- We conducted a post hoc exploratory analysis of the CARES-310 study to evaluate survival outcomes and safety in younger patients (<50 years), with outcomes also assessed in patients ≥50 years.

METHODS

CARES-310 Study Design and Endpoints[1]



[a]Treatment beyond progression allowed if there was evidence of clinical benefits per investigator. [b]By BIRC per RECIST v1.1.
AFP, alpha-fetoprotein; BCLC, Barcelona Clinic Liver Cancer; BID, twice daily; BIRC, blinded independent review committee; ECOG PS, Eastern Cooperative Oncology Group performance status; EHS, extrahepatic spread; IV, intravenous; MVI, macrovascular invasion; ORR, overall response rate; OS, overall survival; PFS, progression-free survival; PO, by mouth; Q2W, every 2 weeks; QD, once daily; R, randomization; RECIST v1.1, Response Evaluation Criteria in Solid Tumors version 1.1.

Post Hoc Analysis

- This post hoc analysis of the CARES-310 final dataset evaluated survival outcomes in the intention-to-treat population and safety outcomes by age group (<50 and ≥50 years). Outcomes were also explored in patients aged <40 years.
- mOS and mPFS were estimated using the Kaplan-Meier method, with 95% CIs calculated using the Brookmeyer-Crowley method. Stratified HRs and corresponding 95% CIs were estimated using macrovascular invasion and/or extrahepatic metastasis, geographic region, and baseline alpha-fetoprotein as stratification factors. One-sided *P* values were calculated using the log-rank test.

RESULTS

Table 1: Baseline Characteristics by Age Subgroup (Safety Population) (<50 and ≥50 Years Old)

	Age Group <50 Years Old		Age Group ≥50 Years Old	
	Camrelizumab + Rivoceranib (n=78)	Sorafenib (n=79)	Camrelizumab + Rivoceranib (n=194)	Sorafenib (n=190)
Median age, years (range)	45 (23-49)	42 (23-49)	63 (50-83)	61 (50-82)
Male sex, n (%)	68 (87.2)	69 (87.3)	159 (82.0)	161 (84.7)
Geographic region, n (%)				
Asia[a]	76 (97.4)	76 (96.2)	149 (76.8)	147 (77.4)
Non-Asia[b]	2 (2.6)	3 (3.8)	45 (23.2)	43 (22.6)
ECOG PS, n (%)				
0	43 (55.1)	34 (43.0)	77 (39.7)	81 (42.6)
1	35 (44.9)	45 (57.0)	117 (60.3)	109 (57.4)
BCLC stage, n (%)				
B (middle stage)	8 (10.3)	9 (11.4)	30 (15.5)	30 (15.8)
C (advanced stage)	70 (89.7)	70 (88.6)	164 (84.5)	160 (84.2)
Child-Pugh score, n (%)				
A5	70 (89.7)	68 (86.1)	166 (85.6)	160 (84.2)
A6	8 (10.3)	11 (13.9)	28 (14.4)	30 (15.8)
ALBI grade, n (%)				
Grade 1	63 (80.8)	67 (84.8)	137 (70.6)	139 (73.2)
Grade 2	15 (19.2)	12 (15.2)	57 (29.4)	51 (26.8)
MVI, n (%)				
Presence	11 (14.1)	17 (21.5)	29 (14.9)	34 (17.9)
EHS, n (%)				
Presence	56 (71.8)	53 (67.1)	119 (61.3)	126 (66.3)
AFP, n (%)				
<400 ng/mL	40 (51.3)	37 (46.8)	136 (70.1)	132 (69.5)
≥400 ng/mL	38 (48.7)	42 (53.2)	58 (29.9)	58 (30.5)
HCC etiology, n (%)				
HBV	76 (97.4)	74 (93.7)	132 (68.0)	123 (64.7)
HCV	0	0	22 (11.3)	27 (14.2)
Non-viral	2 (2.6)	5 (6.3)	40 (20.6)	40 (21.1)

[a]Includes mainland China, Hong Kong, Taiwan, and South Korea. [b]Includes Belgium, Italy, Germany, Poland, Russia, Spain, Turkey, Ukraine, and USA.
AFP, alpha-fetoprotein; ALBI, albumin-bilirubin; BCLC, Barcelona Clinic Liver Cancer; ECOG PS, Eastern Cooperative Oncology Group performance status; EHS, extrahepatic spread; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; MVI, macrovascular invasion.

Table 2: Baseline Characteristics by Age Subgroup (Safety Population) (<40 and ≥40 Years Old)

	Age Group <40 Years Old		Age Group ≥40 Years Old	
	Camrelizumab + Rivoceranib (n=23)	Sorafenib (n=29)	Camrelizumab + Rivoceranib (n=249)	Sorafenib (n=240)
Median age, years (range)	34 (23-39)	36 (23-39)	60 (40-83)	57 (40-82)
Male sex, n (%)	15 (65.2)	23 (79.3)	212 (85.1)	207 (86.3)
Geographic region, n (%)				
Asia[a]	22 (95.7)	27 (93.1)	203 (81.5)	196 (81.7)
Non-Asia[b]	1 (4.3)	2 (6.9)	46 (18.5)	44 (18.3)
ECOG PS, n (%)				
0	14 (60.9)	12 (41.4)	106 (42.6)	103 (42.9)
1	9 (39.1)	17 (58.6)	143 (57.4)	137 (57.1)
BCLC stage, n (%)				
B (middle stage)	3 (13.0)	3 (10.3)	35 (14.1)	36 (15.0)
C (advanced stage)	20 (87.0)	26 (89.7)	214 (85.9)	204 (85.0)
Child-Pugh score, n (%)				
A5	22 (95.7)	25 (86.2)	214 (85.9)	203 (84.6)
A6	1 (4.3)	4 (13.8)	35 (14.1)	37 (15.4)
ALBI grade, n (%)				
Grade 1	22 (95.7)	24 (82.8)	178 (71.5)	182 (75.8)
Grade 2	1 (4.3)	5 (17.2)	71 (28.5)	58 (24.2)
MVI, n (%)				
Presence	1 (4.3)	6 (20.7)	39 (15.7)	45 (18.8)
EHS, n (%)				
Presence	19 (82.6)	18 (62.1)	156 (62.7)	161 (67.1)
AFP, n (%)				
<400 ng/mL	11 (47.8)	11 (37.9)	165 (66.3)	158 (65.8)
≥400 ng/mL	12 (52.2)	18 (62.1)	84 (33.7)	82 (34.2)
HCC etiology, n (%)				
HBV	22 (95.7)	26 (89.7)	186 (74.7)	171 (71.3)
HCV	0	0	22 (8.8)	27 (11.3)
Non-viral	1 (4.3)	3 (10.3)	41 (16.5)	42 (17.5)

[a]Includes mainland China, Hong Kong, Taiwan, and South Korea. [b]Includes Belgium, Italy, Germany, Poland, Russia, Spain, Turkey, Ukraine, and USA.
AFP, alpha-fetoprotein; ALBI, albumin-bilirubin; BCLC, Barcelona Clinic Liver Cancer; ECOG PS, Eastern Cooperative Oncology Group performance status; EHS, extrahepatic spread; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; MVI, macrovascular invasion.

Median Overall Survival

- <50 years: 21.5 vs 15.2 mo (HR 0.7 [95% CI, 0.47–1.06]; P=0.0445) (**Figure 1**)
- ≥50 years: 23.9 vs 15.2 mo (HR 0.6 [95% CI, 0.47–0.77]; P<0.0001) (**Figure 2**)
- <40 years: 24.2 vs 15.2 mo (HR 0.82 [95% CI, 0.4–1.72]; P=0.2982) (**Figure 3**)

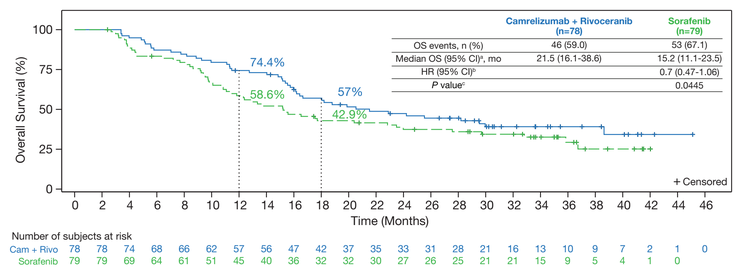
Median Progression-Free Survival

- <50 years: 5.5 vs 2.7 mo (HR 0.53 [95% CI, 0.37–0.77]; P=0.0004) (**Figure 4**)
- ≥50 years: 6.2 vs 3.7 mo (HR 0.56 [95% CI, 0.45–0.72]; P<0.0001) (**Figure 5**)
- <40 years: 5.5 vs 2.2 mo (HR 0.56 [95% CI, 0.29–1.12]; P=0.0485) (**Figure 6**)

Safety

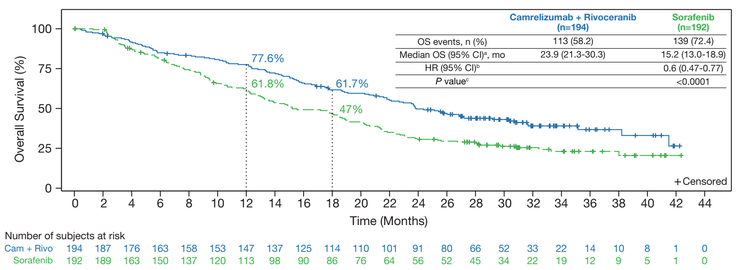
- TRAEs were similar across age subgroups
- Most common grade 3–4 TRAE: hypertension (camrelizumab + rivoceranib) vs palmar-plantar erythrodysesthesia syndrome (sorafenib), regardless of age

Figure 1: Overall Survival (Age Group <50 Years Old)



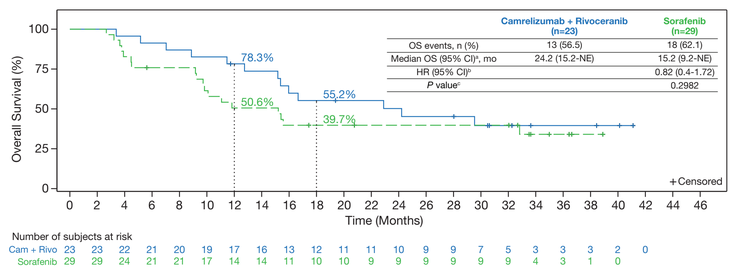
[a]Medians were estimated using the Kaplan-Meier method with CIs calculated using the Brookmeyer-Crowley method.
[b]Hazard ratios and the corresponding 95% CIs were stratified by macrovascular invasion and/or extrahepatic metastasis (presence vs absence), geographical region (Asia vs countries outside of Asia), and baseline AFP (AFP <400 ng/mL vs AFP ≥400 mg/mL) in the interactive response technology system.
[c]*P* value (one-sided) is calculated based on log-rank test.
AFP, alpha-fetoprotein; Cam, camrelizumab; mo, month; OS, overall survival; Rivo, rivoceranib.

Figure 2: Overall Survival (Age Group ≥50 Years Old)



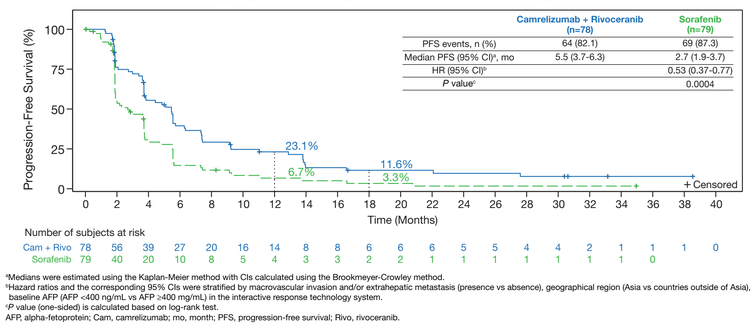
[a]Medians were estimated using the Kaplan-Meier method with CIs calculated using the Brookmeyer-Crowley method.
[b]Hazard ratios and the corresponding 95% CIs were stratified by macrovascular invasion and/or extrahepatic metastasis (presence vs absence), geographical region (Asia vs countries outside of Asia), and baseline AFP (AFP <400 ng/mL vs AFP ≥400 mg/mL) in the interactive response technology system.
[c]*P* value (one-sided) is calculated based on log-rank test.
AFP, alpha-fetoprotein; Cam, camrelizumab; mo, month; OS, overall survival; Rivo, rivoceranib.

Figure 3: Overall Survival (Age Group <40 Years Old)



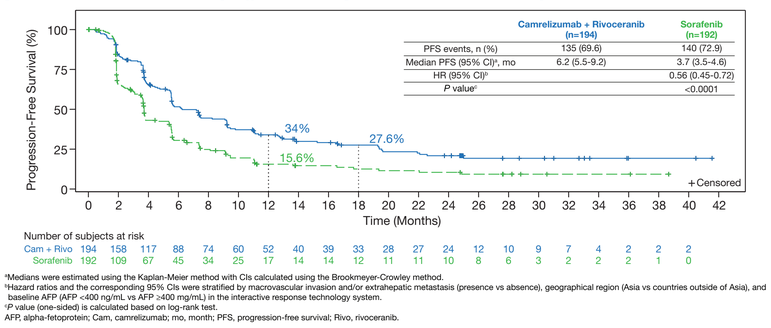
[a]Medians were estimated using the Kaplan-Meier method with CIs calculated using the Brookmeyer-Crowley method.
[b]Hazard ratios and the corresponding 95% CIs were stratified by macrovascular invasion and/or extrahepatic metastasis (presence vs absence), geographical region (Asia vs countries outside of Asia), and baseline AFP (AFP <400 ng/mL vs AFP ≥400 mg/mL) in the interactive response technology system.
[c]*P* value (one-sided) is calculated based on log-rank test.
AFP, alpha-fetoprotein; Cam, camrelizumab; mo, month; NE, not estimable; OS, overall survival; Rivo, rivoceranib.

Figure 4: Progression-Free Survival by BIRC Assessment per RECIST v1.1 (Age Group <50 Years Old)



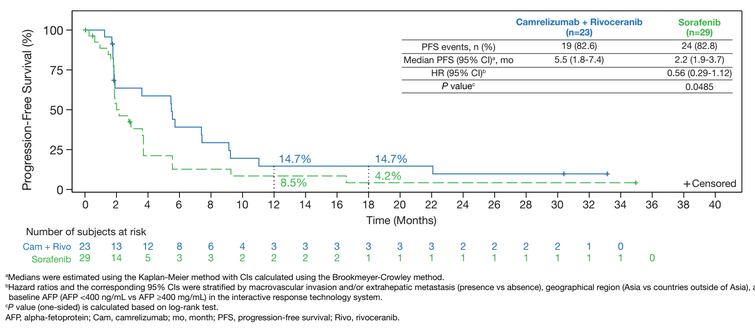
[a]Medians were estimated using the Kaplan-Meier method with CIs calculated using the Brookmeyer-Crowley method.
[b]Hazard ratios and the corresponding 95% CIs were stratified by macrovascular invasion and/or extrahepatic metastasis (presence vs absence), geographical region (Asia vs countries outside of Asia), and baseline AFP (AFP <400 ng/mL vs AFP ≥400 mg/mL) in the interactive response technology system.
[c]*P* value (one-sided) is calculated based on log-rank test.
AFP, alpha-fetoprotein; Cam, camrelizumab; mo, month; PFS, progression-free survival; Rivo, rivoceranib.

Figure 5: Progression-Free Survival by BIRC Assessment per RECIST v1.1 (Age Group ≥50 Years Old)



[a]Medians were estimated using the Kaplan-Meier method with CIs calculated using the Brookmeyer-Crowley method.
[b]Hazard ratios and the corresponding 95% CIs were stratified by macrovascular invasion and/or extrahepatic metastasis (presence vs absence), geographical region (Asia vs countries outside of Asia), and baseline AFP (AFP <400 ng/mL vs AFP ≥400 mg/mL) in the interactive response technology system.
[c]*P* value (one-sided) is calculated based on log-rank test.
AFP, alpha-fetoprotein; Cam, camrelizumab; mo, month; PFS, progression-free survival; Rivo, rivoceranib.

Figure 6: Progression-Free Survival by BIRC Assessment per RECIST v1.1 (Age Group <40 Years Old)



[a]Medians were estimated using the Kaplan-Meier method with CIs calculated using the Brookmeyer-Crowley method.
[b]Hazard ratios and the corresponding 95% CIs were stratified by macrovascular invasion and/or extrahepatic metastasis (presence vs absence), geographical region (Asia vs countries outside of Asia), and baseline AFP (AFP <400 ng/mL vs AFP ≥400 mg/mL) in the interactive response technology system.
[c]*P* value (one-sided) is calculated based on log-rank test.
AFP, alpha-fetoprotein; Cam, camrelizumab; mo, month; PFS, progression-free survival; Rivo, rivoceranib.

Table 3: Safety: Most Common (≥20%) Any Grade or Grade 3-4 (≥5%) TRAEs in Either Treatment Arm by Age Group (<50 and ≥50 Years Old)

TRAE, n (%)	Age Group <50 Years Old				Age Group ≥50 Years Old			
	Camrelizumab + Rivoceranib (n=78)		Sorafenib (n=79)		Camrelizumab + Rivoceranib (n=194)		Sorafenib (n=190)	
	Any Grade	Grade 3-4	Any Grade	Grade 3-4	Any Grade	Grade 3-4	Any Grade	Grade 3-4
ALT increased	38 (48.7)	9 (11.5)	28 (35.4)	2 (2.5)	92 (47.4)	29 (14.9)	53 (27.9)	6 (3.2)
Alopecia	1 (1.3)	0	24 (30.4)	0	3 (1.5)	0	28 (14.7)	0
AST increased	41 (52.6)	10 (12.8)	30 (38.0)	4 (5.1)	109 (56.2)	38 (19.6)	71 (37.4)	10 (5.3)
Conjugated bilirubin increased	7 (9.0)	2 (2.6)	9 (11.4)	2 (2.5)	39 (20.1)	11 (5.7)	27 (14.2)	6 (3.2)
Blood bilirubin increased	27 (34.6)	3 (3.8)	21 (26.6)	0	90 (46.4)	21 (10.8)	54 (28.4)	4 (2.1)
Diarrhea	19 (24.4)	0	38 (48.1)	6 (7.6)	65 (33.5)	6 (3.1)	68 (35.8)	8 (4.2)
Fatigue	13 (16.7)	1 (1.3)	5 (6.3)	0	43 (22.2)	7 (3.6)	16 (8.4)	1 (0.5)
GGT increased	17 (21.8)	8 (10.3)	17 (21.5)	6 (7.6)	50 (25.8)	21 (10.8)	33 (17.4)	14 (7.4)
Hypertension	57 (73.1)	25 (32.1)	30 (38.0)	8 (10.1)	132 (68.0)	79 (40.7)	87 (45.8)	32 (16.8)
Hypophosphatemia	5 (6.4)	0	11 (13.9)	6 (7.6)	13 (6.7)	2 (1.0)	29 (15.3)	6 (3.2)
Hypothyroidism	16 (20.5)	0	5 (6.3)	0	42 (21.6)	0	12 (6.3)	0
Lipase increased	9 (11.5)	7 (9.0)	2 (2.5)	1 (1.3)	11 (5.7)	6 (3.1)	10 (5.3)	4 (2.1)
Neutrophil count decreased	22 (28.2)	6 (7.7)	12 (15.2)	2 (2.5)	53 (27.3)	11 (5.7)	16 (8.4)	1 (0.5)
Palmar-plantar erythrodysesthesia syndrome	33 (42.3)	6 (7.7)	58 (73.4)	10 (12.7)	69 (35.6)	27 (13.9)	106 (55.8)	33 (17.4)
Platelet count decreased	35 (44.9)	7 (9.0)	28 (35.4)	1 (1.3)	91 (46.9)	26 (13.4)	62 (32.6)	3 (1.6)
Proteinuria	44 (56.4)	3 (3.8)	19 (24.1)	0	91 (46.9)	13 (6.7)	55 (28.9)	5 (2.6)
Rash	13 (16.7)	1 (1.3)	17 (21.5)	1 (1.3)	32 (16.5)	5 (2.6)	33 (17.4)	2 (1.1)
Reactive capillary endothelial proliferation	22 (28.2)	1 (1.3)	0	0	62 (32.0)	7 (3.6)	0	0
White blood cell count decreased	22 (28.2)	4 (5.1)	15 (19.0)	3 (3.8)	53 (27.3)	4 (2.1)	24 (12.6)	1 (0.5)

ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma-glutamyl transferase; TRAE, treatment-related adverse event.

Table 4: Safety: Most Common (≥20%) Any Grade or Grade 3-4 (≥5%) TRAEs in Either Treatment Arm by Age Group (<40 and ≥40 Years Old)

TRAE, n (%)	Age Group <40 Years Old				Age Group ≥40 Years Old			
	Camrelizumab + Rivoceranib (n=23)		Sorafenib (n=29)		Camrelizumab + Rivoceranib (n=249)		Sorafenib (n=240)	
	Any Grade	Grade 3-4	Any Grade	Grade 3-4	Any Grade	Grade 3-4	Any Grade	Grade 3-4
ALT increased	10 (43.5)	2 (8.7)	10 (34.5)	0	120 (48.2)	36 (14.5)	71 (29.6)	8 (3.3)
Alopecia	1 (4.3)	0	10 (34.5)	0	3 (1.2)	0	42 (17.5)	0
AST increased	11 (47.8)	2 (8.7)	11 (37.9)	2 (6.9)	139 (55.8)	46 (18.5)	90 (37.5)	12 (5.0)
Conjugated bilirubin increased	0	0	3 (10.3)	1 (3.4)	46 (18.5)	13 (5.2)	33 (13.8)	7 (2.9)
Blood bilirubin increased	7 (30.4)	1 (4.3)	8 (27.6)	0	110 (44.2)	23 (9.2)	67 (27.9)	4 (1.7)
Decreased appetite	2 (8.7)	0	6 (20.7)	1 (3.4)	41 (16.5)	3 (1.2)	28 (11.7)	2 (0.8)
Diarrhea	2 (8.7)	0	15 (51.7)	2 (6.9)	82 (32.9)	6 (2.4)	91 (37.9)	12 (5.0)
Fatigue	1 (4.3)	0	2 (6.9)	0	55 (22.1)	8 (3.2)	19 (7.9)	1 (0.4)
GGT increased	3 (13.0)	1 (4.3)	8 (27.6)	4 (13.8)	64 (25.7)	28 (11.2)	42 (17.5)	16 (6.7)
Hypertension	10 (43.5)	4 (17.4)	8 (27.6)	1 (3.4)	179 (71.9)	100 (40.2)	109 (45.4)	39 (16.3)
Hypophosphatemia	2 (8.7)	0	5 (17.2)	2 (6.9)	16 (6.4)	2 (0.8)	35 (14.6)	10 (4.2)
Hypothyroidism	5 (21.7)	0	1 (3.4)	0	53 (21.3)	0	16 (6.7)	0
Neutrophil count decreased	5 (21.7)	1 (4.3)	5 (17.2)	0	70 (28.1)	16 (6.4)	23 (9.6)	3 (1.3)
Palmar-plantar erythrodysesthesia syndrome	9 (39.1)	3 (13.0)	20 (69.0)	4 (13.8)	93 (37.3)	30 (12.0)	144 (60.0)	39 (16.3)
Platelet count decreased	11 (47.8)	2 (8.7)	10 (34.5)	0	115 (46.2)	31 (12.4)	80 (33.3)	4 (1.7)
Proteinuria	13 (56.5)	2 (8.7)	7 (24.1)	0	122 (49.0)	14 (5.6)	67 (27.9)	5 (2.1)
Pyrexia	1 (4.3)	0	7 (24.1)	0	24 (9.6)	0	9 (3.8)	0
Rash	3 (13.0)	0	8 (27.6)	0	42 (16.9)	6 (2.4)	42 (17.5)	3 (1.3)
Reactive capillary endothelial proliferation	4 (17.4)	1 (4.3)	0	0	80 (32.1)	7 (2.8)	0	0
Weight decreased	2 (8.7)	0	7 (24.1)	1 (3.4)	30 (12.0)	4 (1.6)	33 (13.8)	5 (2.1)
White blood cell count decreased	5 (21.7)	1 (4.3)	6 (20.7)	0	70 (28.1)	7 (2.8)	33 (13.8)	4 (1.7)

ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma-glutamyl transferase; TRAE, treatment-related adverse event.

CONCLUSIONS

- Camrelizumab plus rivoceranib demonstrated a clinically meaningful progression-free survival benefit across all age subgroups, with a numerically favorable overall survival trend in patients <40 years, and manageable safety versus sorafenib in patients with unresectable hepatocellular carcinoma.
- Among younger patients (aged <40 and <50 years), median overall survival exceeded 20 months with camrelizumab plus rivoceranib versus <20 months with sorafenib.
- The most common any-grade TRAEs among younger patients were hypertension, proteinuria, increased AST, and decreased platelet count with camrelizumab plus rivoceranib, and lower rates of palmar-plantar erythrodysesthesia syndrome, diarrhea, and increased AST when compared with sorafenib.

ACKNOWLEDGMENTS

- This study was funded by Jiangsu Hengrui Pharmaceuticals Co., Ltd. and Elevar Therapeutics. The Phillips Group Oncology Communications Inc. provided professional assistance with poster preparation. Financial support for writing and editorial services was provided by Elevar Therapeutics.

REFERENCES

1. Qin S, et al. *Lancet*. 2023;402(10408):1133-1146.
2. Qin S, et al. *Lancet Oncol*. 2025;26(12):1598-1611.