Canadian liver transplant allocation for hepatocellular carcinoma

To the Editor:

We read with great interest the recent review by Tschuor *et al.*[1] reviewing the allocation policies of liver grafts worldwide. The authors should be congratulated on their hard work on this very important document. However, the description of allocation policies for liver cancer in liver transplantation in Canada and the number of liver transplants performed are not completely accurate and as such, we would like to clarify the details.

In Canada, there are 7 transplant programs in 5 different provinces each based out of university institutions: University of British Columbia (Vancouver, British Columbia), University of Alberta (Edmonton, Alberta), Western University (London, Ontario), University of Toronto (Toronto, Ontario), McGill University (Montreal Quebec), Université de Montréal (Montreal, Quebec) and Dalhousie University (Halifax, Nova Scotia). In 2017, 530 adult liver transplants were performed in Canada; 53 (10%) coming from donors after cardiac death and 43 coming from living donors, corresponding to a rate of 14.5 donors/million population;[2] these are significantly higher than reported in Table 1 of their manuscript.[1]

Each province has a slightly different policy for listing patients with liver cancer and the award of exception points, which include using Milan,[3] total tumour volume and alpha-fetoprotein,[4] USCF[5] and placing a cap on the maximum points awarded. All programs permit downstaging of HCC. We summarize the Canadian policies below (Table 1).

We agree with the authors that unfortunately there is significant regional heterogeneity in listing criteria for HCC in Canada, although there are generally more similarities than differences. Work is being carried out to establish a national consensus for allocation criteria nationwide, which should include regular evaluation of the impact of the exception points awarded and criteria used. We support this initiative to try and help ensure more equitable care for patients throughout Canada.

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The authors declare no conflicts of interest that pertain to this work.

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Authors' contributions

Letter concept and design (Brahmania, Burak, Congly); Acquisition and analysis of data (Brahmania, Marquez, Bhat, Marleau, Wong, Peletekian, Congly); Drafting of the manuscript (Brahmania, Kneteman, Wong, Congly).

Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jhep.2019.07.016.

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Author names in bold designate shared co-first authorship

[1] **Tschuor C**, **Ferrarese A**, **Kümmerli C**, **Dutkowski P**, **Burra P**, **Clavien P-A**, et al. Allocation of liver grafts worldwide is there a best system? J Hepatol 2019;71:707–718. https://doi.org/10.1016/j.jhep.2019.05.025.

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Table 1. Canadian Criteria for HCC listing and exception points.

Province	Listing criteria	Criteria for exception points	Exception points awarded	Downstaging	Delisting criteria	Cap on exception points
British Columbia	Milan criteria	Lesion >2 cm	Start at 15, increase by 3 points every 3 months	Acceptable if in Milan criteria before listing	Exceeds UCSF criteria or TTV OR Extrahepatic spread OR Vascular invasion	Yes 30
Alberta	TTV <115 cm^3 AND AFP <400 ng/ml	Lesion >2 cm OR Multiple lesions OR Recurrence of lesion after ablation	Natural MELD-Na for 6 months, then 26 points; increase by 2 points every 3 months	Acceptable if TTV <250 cm^3 and AFP ≤400 ng/ml for 6 months	TTV >115 cm^3 OR AFP >400 ng/ml OR Extrahepatic spread OR Vascular invasion	No
Ontario	TTV <145 cm^3 AND AFP <1,000 ng/ml	Lesion >2 cm OR Multiple lesions >1 cm OR Recurrence of lesion after ablation	Start at 22, increase by 3 points every 3 months	Acceptable if TTV <145 cm^3 and AFP <1,000 ng/ml for 3 months	TTV >145 cm^3 OR AFP >1,000 ng/ml OR Extrahepatic spread OR Vascular invasion	No
Quebec	Milan criteria OR TTV ≤115 cm^3 AND AFP ≤400 ng/ml	If ≥1 tumour >2 cm, 16–25 points depending on HCC characteristics[6] OR 25 points if TTV ≤115 cm^3 and AFP ≤400 ng/ml		Acceptable if in Milan criteria before listing	TTP >115 cm^3 OR AFP >400 ng/ml OR Extrahepatic spread OR Vascular invasion	No
Nova Scotia	TTV <115 cm^3 AND AFP <400 ng/ml	Lesion >2 cm OR Multiple lesions	Natural MELD-Na OR Assign 22 points	Acceptable if TTV <250 cm^3 and AFP <400 ng/ml for 3 months	TTV >115 cm^3 OR AFP >400 ng/ml OR Extrahepatic spread OR Vascular invasion OR ECOG performance score >3[7]	No

Milan[3] = 1 tumour <5 cm or 3 tumours <3 cm.
UCSF[5] = Maximum tumour size <6.5 cm, maximum of 3 total tumors with none >4.5 cm, and cumulative tumor size <8 cm).
ECOG >3[7] = Completely disabled; cannot carry on any selfcare; totally confined to bed or chair.
AFP, alpha-fetoprotein; ECOG, Eastern Cooperative Oncology Group; MELD, model for end-stage liver disease; TTV, total tumor volume; UCSF, University of California, San Francisco.

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Reply to: "Canadian liver transplant allocation for hepatocellular carcinoma"

To the Editor:
We read with interest the letter by Congly *et al.* regarding our original article,[1] and thank the authors for providing further details on allocation of liver grafts in Canada, including the total number of adult transplants performed in 2017, as well as donation after cardiac death rates and living liver donations. Their comments fit well with the spirit of our worldwide initiative to stimulate a conversation with the aim of arriving at a consensus on the allocation of deceased liver grafts for malignant and non-malignant diseases. Their comments on additional listing parameters for hepatocellular carcinoma, based on total tumor volume, alpha-fetoprotein and Milan criteria, nicely illustrate the different policies of the listing criteria in the 7 transplant programs of the 5 provinces in Canada.

The data provided in our article originated from the CIHI (Canadian Institute for Health Information) as well as from the OPO (the office of the procurement ombudsman located in Toronto) and did not include living donor liver transplantation, as for all countries mentioned in our article. Of note, living donor liver transplantation in Canada accounts for around 8% of liver transplantations performed. We endorse the message of Congly *et al.* that even in the same country, heterogenic policies for liver transplantation for the same tumor entity should be solved through consensus mechanisms.

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Reference
[1] Tschuor C, Ferrarese A, Kümmerli C, Dutkowski P, Burra P, Clavien P-A, et al. Allocation of liver grafts worldwide is there a best system?. J Hepatol 2019;71:707–718. https://doi.org/10.1016/j.jhep.2019.05.025.

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