BERLIN 2025 ESMO congress

726O

Prognostic value of the combined analysis of pathologists and artificial intelligence (CAPAI) in high-risk stage II-III colon cancer treated without chemotherapy: Interim report from a nationwide validation

M-C.E. Bakker[1], I.A. Franken[1], M.M. Laclé[2], K. Cyll[3], N. Stathonikos[2], S.D. Raedt[3], O-J. Skrede[3], H.A. Askautrud[3], T.S. Hveem[3], J. Kalsnes[3], M. Koopman[1], L.H. Saal[4], A.B. Storsve[4], T. Furuseth[4], S.G. Elias[5], A. Kleppe[3], J. Roodhart[1]

[1] Department of Medical Oncology, University Medical Center Utrecht, Utrecht, Netherlands, [2] Department of Pathology, University Medical Center Utrecht, Utrecht, Netherlands, [3] Institute for Cancer Genetics and Informatics, Oslo University Hospital, Oslo, Norway, [4] DoMore Diagnostics AS, Oslo, Norway[5] Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht, Netherlands

Background

The recommended treatment of high-risk stage II (pT4) and stage III (pN+) colon cancer (CC) is surgical resection followed by adjuvant chemotherapy (ACT). However, half of patients are cured by surgery alone and may be spared ACT if identified up-front. The Combined Analysis of Pathologists and Artificial Intelligence (CAPAI) was developed and validated to predict cancer-specific survival (CSS) in patients predominantly treated with ACT. The restrictive use of ACT in the Netherlands enables validation of the prognostic value of CAPAI when withholding ACT.

Methods

We identified all patients from the Netherlands Cancer Registry (NCR) with high-risk stage II and III CC with R0 resection between 2015-2019, without (neo)adjuvant treatment, under 70 years of age and with a good performance status (WHO0-1 or ASA1-2). Diagnostic H&E slides were retrieved from the nationwide database (Palga), centrally scanned, and analyzed by the DoMore-v1 deep learning biomarker. The score was combined with pT/pN stage and lymph node count to classify patients into CAPAI risk groups: low-, intermediate-, or high-risk. The primary endpoint was 3-year CSS, defined as death with known recurrence.

Results

This interim analysis includes 453 patients from 65 hospitals, with an overall 3-year CSS of 85.9% (95% CI 82.6-89.2%). CAPAI stratified patients in significantly distinct prognostic groups (log rank p<0.0001) with 3-year CSS of 93.7% (90.5-97.1%; n=215 [47%]) for low-, 87.5% (82.3-93.1; n=156 [34%]) for intermediate- and 60.4% (50.4-72.5; n=82 [18%]) for high-risk. In univariable Cox regression, CAPAI provided a hazard ratio for high- versus low-risk of 7.9 (4.1-15.2; p < 0.001) and for intermediate- versus low-risk of 2.1 (1.0-4.3; p=0.039).

Conclusions

CAPAI successfully stratified patients into distinct prognostic groups, identifying nearly half of patients as low-risk with a 3-year CSS of 93.7% without ACT. A comparison with a balanced cohort of patients who received ACT is ongoing. Prospective use of this readily available and affordable stratification tool could help avoid ACT in low-risk patients and intensify treatment in high-risk patients.

Legal entity responsible for the study

The authors.

Funding

CAPAI is developed thanks to funding by Learning from Deep learning, The Norwegian Research Council (#334862) and Improving diagnosis by utilizing Big Data and software-driven automation of pathology, The Norwegian Research Council (#259204). This public private partnership was sponsored by Health Holland (LSHM#19027).

Disclosure

M.E. Bakker, I.A. Franken: Financial Interests, Institutional, Research Funding: Health Holland. S.D. Raedt: Financial Interests, Personal, Other, SDR report filing of a patent application entitled “Histological image analysis” with International Patent Application Number PCT/EP2020/076090: DoMore Diagnostics AS; Financial Interests, Personal, Stocks/Shares: DoMore Diagnostics AS; Financial Interests, Personal, Full or part-time Employment: DoMore Diagnostics AS. O. Skrede: Financial Interests, Personal, Other, Filing of a patent application entitled “Histological image analysis” with International Patent Application Number PCT/EP2018/080828: DoMore Diagnostics AS; Financial Interests, Personal, Other, filing of a patent application entitled “Histological image analysis” with International Patent Application Number

PCT/EP2020/076090: DoMore Diagnostics AS; Financial Interests, Personal, Stocks/Shares: DoMore Diagnostics AS. T.S. Hveem: Financial Interests, Personal, Stocks/Shares: DoMore Diagnostics AS; Financial Interests, Personal, Other, T.S.H report filing of a patent application entitled “Histological image analysis” with International Patent Application Number PCT/EP2020/076090: DoMore Diagnostics AS. M. Koopman: Financial Interests, Institutional, Advisory Board, advisory board and speaker: Pierre Fabre; Financial Interests, Institutional, Advisory Board: MSD, Bayer; Financial Interests, Institutional, Advisory Board, Advisory Board, speaker: Servier; Financial Interests, Institutional, Invited Speaker: Merck, BMS, IqVIA; Financial Interests, Institutional, Trial Chair: Servier; Financial Interests, Institutional, Research Grant: Servier, Roche, Bayer, Bristol Myers Squibb, Merck, Personal Genomics Diagnostics, Sirtex, Pierre Fabre; Financial Interests, Institutional, Funding: Pierre Fabre, Amgen, Nordic Farma, Novartis, Merck, Servier, BMS; Non-Financial Interests, Other, ESMO faculty member for the Gastro-Intestinal Tumours – colorectal cancer: ESMO; Non-Financial Interests, Leadership Role, chair of RWD & DH working group: ESMO; Other, PI of the Dutch Prospective Colorectal Cancer Cohort study: PLCRC project. T. Furuseth: Financial Interests, Personal, Full or part-time Employment: DoMore Diagnostics AS; Financial Interests, Personal, Stocks/Shares: DoMore Diagnostics. A. Kleppe: Financial Interests, Personal, Other, A.K. report filing of a patent application entitled “Histological image analysis” with International Patent Application Number PCT/EP2020/076090 and having stocks in DoMore Diagnostics AS.: DoMore Diagnostics AS. J. Roodhart: Financial Interests, Institutional, Advisory Board: GSK, Servier, AMGEN, BMS, Incyte, Pierre Fabre; Financial Interests, Institutional, Invited Speaker: servier, Pierre Fabre; Financial Interests, Institutional, Research Grant: GSK, Xilis, Cleara, HUB Organoids BV, Servier, Incyte; Financial Interests, Institutional, Local PI: GSK, Amgen, BMS, Pfizer; Non-Financial Interests, Member of Board of Directors: Board Member Foundation Hubrecht Organoid Biobank; Non-Financial Interests, Advisory Role: ONCODE clinical advisory board, KWF scientific board; Non-Financial Interests, Other, member guideline committee: member national guideline committee lower digestive track Netherlands; Non-Financial Interests, Institutional, Other, organoids: HUB Organoids. All other authors have declared no conflicts of interest.

© European Society for Medical Oncology