

# Interventional Oncology in the Management of Metastatic Colorectal Cancer

Citation for published version (APA):

Kurilova, I. (2020). *Interventional Oncology in the Management of Metastatic Colorectal Cancer*. [Doctoral Thesis, Maastricht University]. Gildeprint en Universitaire Pers Maastricht. <https://doi.org/10.26481/dis.20200707ik>

## Document status and date:

Published: 01/01/2020

## DOI:

[10.26481/dis.20200707ik](https://doi.org/10.26481/dis.20200707ik)

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

## General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

[www.umlib.nl/taverne-license](http://www.umlib.nl/taverne-license)

## Take down policy

If you believe that this document breaches copyright please contact us at:

[repository@maastrichtuniversity.nl](mailto:repository@maastrichtuniversity.nl)

providing details and we will investigate your claim.



Valorization

Colorectal cancer (CRC) is one of the deadliest cancers, with metastatic disease being the most common cause of death in these patients [1]. Netherlands is among top ten countries in the world with the highest CRC prevalence [2]. On a daily basis around 37 patients receive CRC diagnosis and 14 patients die from CRC in the Netherlands [3]. The incidence of CRC is expected to rise even further because of the implementation of nationwide screening program [4] growing incidence in rectal cancer among young patients [5-7] and ageing population.

To date, the awareness of general population, patients and referring physicians about the field of interventional oncology and what it has to offer for the patients with CRC is low [8]. Thus active participation of those in the field is crucial to help to educate the public about many potential benefits interventional radiology may offer.

## RELEVANCE

With this thesis, we aimed to provide an overview about the expanding role of interventional oncology in the management of the patients with metastatic CRC. We provided the data on oncological outcomes following the most common as well as emerging interventional oncology procedures. These procedures included thermal ablation (in the liver and lungs) and <sup>90</sup>Y radioembolization approaches. Notably, we analyzed predictive and prognostic factors for local tumor control, safety and survival following these therapies.

The research presented in this thesis was performed within the collaborative research project between the Netherlands Cancer Institute and Memorial Sloan Kettering Cancer Center (New York, USA). Memorial Sloan Kettering Cancer Center performs one of the largest numbers of interventional oncology procedures in the world, which enables to conduct large scale laboratory and clinical research. This collaboration was formed in order to profit from the expertise which is present there in the area of most modern minimally invasive approaches for the treatment of metastatic colorectal cancer and transfer this knowledge to the Netherlands.

## TARGET POPULATION

This thesis has a wide target population. It includes **interventional radiologists** who are utilizing these procedures in their daily practice and who could benefit from applying

the techniques described here to achieve better tumor control, increase procedure safety and improve patient selection. It is also very important to increase awareness about interventional radiology procedures among **medical oncologists** and **other medical specialists** involved in the management of the patients with metastatic colorectal cancer so that the patients could be more often referred to interventional radiology. Minimally invasive procedures have many advantages over traditional treatments, including lower morbidity and mortality, also sometimes representing the patients an only viable treatment option.

**Colorectal cancer patients** with metastatic disease could benefit from this thesis in multiple ways. Currently there is a lack of awareness among the patients about interventional radiology [8]. This may result in patients favoring traditional therapies over unfamiliar minimally invasive procedures despite lower complication rates, faster recovery time and a better quality of life. There is evidence that the patients referred for an interventional radiology procedure largely do not know very much if anything about the field, even if they had undergone an interventional radiology procedure in the past [8]. Efforts to increase public awareness about this field could improve patient access to these procedures and empower patients with the information they need to make the best healthcare decisions themselves.

The patients with **other types of oligometastatic cancer** also could benefit from our research as the interventional radiology procedures we described are used for multiple types of oligometastatic cancer.

**Researchers**, conducting clinical and fundamental research in interventional radiology, colorectal cancer as well as in other local therapies could also find this thesis useful. Multidisciplinary and combinational treatments are very important to maximize treatment outcomes in the patients with metastatic CRC.

## INNOVATION AND FUTURE

The results of this thesis demonstrated that it is possible to achieve **better local tumor control** with thermal ablation while creating a sufficient minimal ablation margin [9]. We also **identified complications risk factors** following thermal ablation and provided recommendation on how to approach high-risk patients [10]. In terms of <sup>90</sup>Y radioembolization approaches, we developed a prognostic tool aimed **at improving patient selection** [11] as well as proposed a modified <sup>90</sup>Y resin microspheres infusion

technique to **improve the procedure safety** [12]. We also **filled in the knowledge gap** on radiation segmentectomy for the patients with liver metastatic disease and limited treatment options, demonstrating that it has a potential to safely achieve high tumor response and local tumor control rate.

Currently minimal ablation margin assessment is not performed universally and uniformly among interventional radiologists immediately post-procedure. Ablative dose radioembolization approaches, such as radiation segmentectomy are emerging, but are also not yet utilized in multiple centers due to the limited evidence available to date. There is a lack of prognostic tools for physicians to use during pre-procedure patient visit to help decision-making. Our research tried to address all these limitations; however larger prospective trials, aiming at externally validating our retrospective study results are warranted.

In addition, despite expanding evidence regarding the value of interventional oncology procedures to provide local disease control, data on the effect of these procedures on patients' overall survival is lacking. Prospective studies comparing different locoregional modalities to surgery are also limited. Future research should also focus on the identification of the patients with curable oligometastatic CRC disease, systemic effects of interventional radiology procedures and immunomodulation. As interventional oncology techniques strive to take additional roles in the management of the patients with metastatic CRC, progress will ultimately depend on the ability to produce substantial prospective trial-based evidence.

## REFERENCES

1. Araghi, M. *et al.* Global trends in colorectal cancer mortality: projections to the year 2035. *International journal of cancer* **144**, 2992-3000, doi:10.1002/ijc.32055 (2019).
2. Bray, F. *et al.* Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: a cancer journal for clinicians* **68**, 394-424, doi:10.3322/caac.21492 (2018).
3. *KWF Kanker Bestrijding. Darmkanker*, <<https://www.kwf.nl/kanker/darmkanker>> (2019).
4. Cress, R. D., Morris, C., Ellison, G. L. & Goodman, M. T. Secular changes in colorectal cancer incidence by subsite, stage at diagnosis, and race/ethnicity, 1992-2001. *Cancer* **107**, 1142-1152, doi:10.1002/cncr.22011 (2006).
5. Tricoli, J. V. *et al.* Biologic and clinical characteristics of adolescent and young adult cancers: Acute lymphoblastic leukemia, colorectal cancer, breast cancer, melanoma, and sarcoma. *Cancer* **122**, 1017-1028, doi:10.1002/cncr.29871 (2016).
6. Siegel, R. L., Jemal, A. & Ward, E. M. Increase in incidence of colorectal cancer among young men and women in the United States. *Cancer epidemiology, biomarkers & prevention: a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* **18**, 1695-1698, doi:10.1158/1055-9965.Epi-09-0186 (2009).
7. O'Connell, J. B. *et al.* Rates of colon and rectal cancers are increasing in young adults. *The American surgeon* **69**, 866-872 (2003).
8. Baerlocher, M. O. *et al.* Awareness of interventional radiology among patients referred to the interventional radiology department: a survey of patients in a large Canadian community hospital. *Journal of vascular and interventional radiology : JVIR* **18**, 633-637, doi:10.1016/j.jvir.2007.02.034 (2007).
9. Kurilova, I. *et al.* Microwave Ablation in the Management of Colorectal Cancer Pulmonary Metastases. *Cardiovascular and interventional radiology* **41**, 1530-1544, doi:10.1007/s00270-018-2000-6 (2018).
10. I. Kurilova, E. K., F. Boas, H. Yarmohammadi, M. Gonen, E. Petre, N. Kemeny, S. Solomon, R. Beets-Tan, C. Sofocleous. Review of complications following thermal ablation of colorectal cancer liver metastases. *JVIR*, <https://doi.org/10.1016/j.jvir.2018.01.377> (2018).
11. Kurilova, I. *et al.* Factors Affecting Oncologic Outcomes of 90Y Radioembolization of Heavily Pre-Treated Patients With Colon Cancer Liver Metastases. *Clinical colorectal cancer* **18**, 8-18, doi:10.1016/j.clcc.2018.08.004 (2019).
12. Kurilova, I. *et al.* (90)Y Resin Microspheres Radioembolization for Colon Cancer Liver Metastases Using Full-Strength Contrast Material. *Cardiovascular and interventional radiology* **41**, 1419-1427, doi:10.1007/s00270-018-1985-1 (2018).