Local Laser Thermoablation of Liver Metastases from Colorectal Cancer
A Monocentric Case Series

Dioscoridi L, Breschi L, Bechi P
Department of Surgery and Translational Medicine, Careggi Hospital, Florence, Italy
Digestive and Intervventional Endoscopy Unit, Niguarda-Ca’ Granda Hospital, Milan
Elesta Srl, Florence, Italy

Background
Colorectal cancer (CRC) is the most common malignant tumour and the third leading cause of cancer deaths in USA [1]. For advanced CRC, the liver is the first site of metastatic disease; approximately 50% of patients with CRC will develop liver metastases either synchronously or metachronously [1]. Hepatic resection (HR) is the only curative option, but only 15-20% of patients with liver metastases from CRC (CRLMs) are suitable for surgical standard treatment [1]. In patients with unresectable CRLMs downsizing chemotherapy can improve resectability [1]. Modern systemic chemotherapy represents the only significant treatment for unresectable CRLMs. However several loco-regional treatments have been developed included radiofrequency, microwaves and HIFU [2, 3].

The laser thermoablation has been already used for hepatic cholangiocarcinomas with a considerable success rate and is used for many surgical applications [4, 5].

Aim of the Study
The aim of this study was to verify the efficacy and feasibility of laser ablation on liver metastases from CRC, based on the good results on cholangiocarcinoma.

Methods
We have treated 6 patients with liver metastases from CRC between July and December 2016. The thermoablation was performed with a ND-YAG laser 1064 nm at constant fluence. The setting was at 5W for 6 minutes twice or three times on the base of the metastases’ dimensions. We obtained an energy release of 1600J for each application. A new introducing technique was used without needle: we perform a gradual introduction of the fiber directly through the coagulated tissue till we have reached the application point. The treatment was performed on the surgical specimens immediately after the hepatic resection after taking away a small part to have a histological diagnosis of the surgical specimen. The metastases’ dimensions range from 2 to 5 cm. We have treated one metastasis for each patient. We always used a single fiber. If one application was considered enough, we perform the thermoablation about 1 cm before the deeper edge of the metastasis. On the other hand, if a second application was needed due to the metastasis’ dimensions, we performed this second thermoablation, retrieving the fiber 1 cm proximally. We always check the right position of the fiber using ultrasound with linear probe. After the treatment, all the specimens were analyzed microscopically.

Results
The results are resumed in Table 1

*Corresponding author: Dioscoridi L, Departement of Surgery and Translational Medicine, Careggi Hospital, Florence, Italy. E-mail: dioscoridi.lorenzo@virgilio.it
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We recorded the complete destruction of the specimen in 4 cases. In the other 2 cases, we obtained a 80% necrosis of the tumoural tissue: in these cases, the metastases were 4 and 5 centimetres respectively. We needed two application in 5/6 cases: this was due to the dimensions of the metastasis. The mean collateral damage of thermoablation was 0,1 mm around the tumoural tissue. This is an advantage in terms of saving healthy tissue, but it can be also a disadvantage for traditional oncological radicality based on resections’ margins. The procedure is fast: since the position of thermoablation is reached, it takes maximum 6 minutes. This is a first pilot study about laser thermoablation on liver metastases.

**Conclusions**

Laser thermoablation of CRC liver metastases is safe and feasible in experts hands. Complete destruction can be achieved until 3 cm of liver metastases. Longer follow-up (without surgery on the laser-treated metastases) and further studies are needed to confirm our results.

**References**


