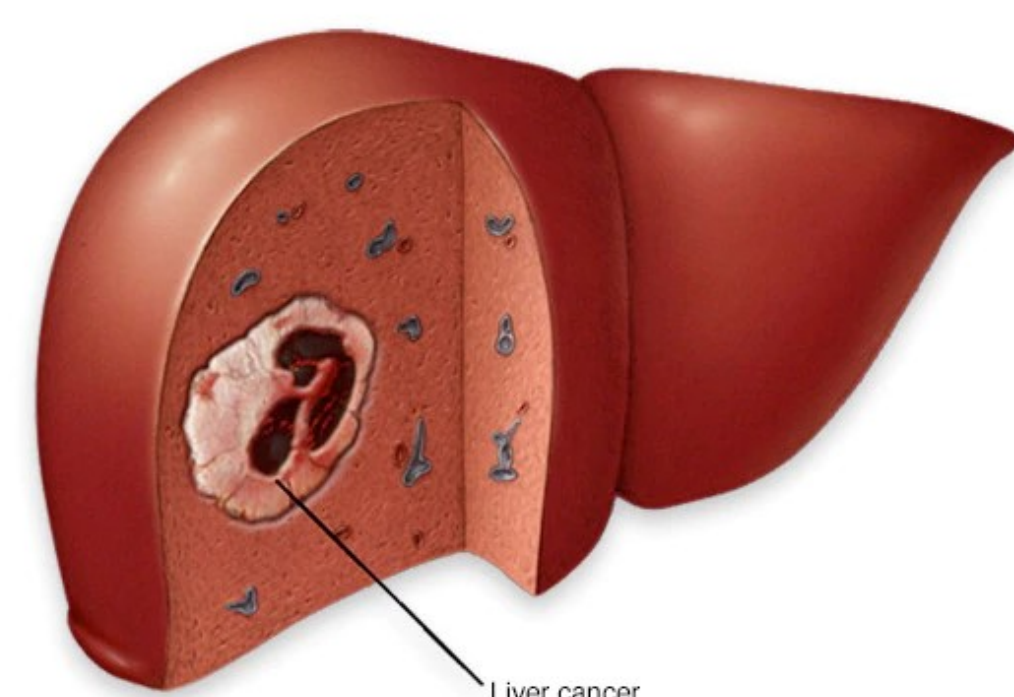


What is Hepatocellular Carcinoma (HCC)?

HCC is the most common liver cancer

- It is the third most common cause of cancer-related death in the world and 7th in the United States
- Diagnosed late due to lack of symptoms until terminal stages
- Most often occurs in people with chronic liver disease



(Mayo, 2019, para. 1)
(Ghouri, 2017, para. 1)
(Daher, 2018, pp. 69-78) (Mayo, 2019, image)

Etiology and Epidemiology

Majority of people with HCC already have Hepatitis B and C

- Hepatitis-B virus - most common in HCC patients
- Hepatitis-C virus - second most common

Alcohol-related Cirrhosis is also common among HCC patients

- Nonalcoholic Fatty Liver Disease (NAFLD) is the third most common disease that occurs mainly in presence of cirrhosis, found to be a cause of HCC.

HCC - most common among males ages 30-50

- Accounts for 65% of all liver cancers in U.S.

(Ghouri, 2017, para. 3-10)

Treatment Options

Different treatment options include:

- Surgical resection
- Liver transplantation
 - Limited due to lack of donors and strict indications
- Radiofrequency ablation therapy
 - Safety is dependent on where the tumor is located
- Chemotherapy
- Radiation therapy
 - Due to the liver's sensitivity to radiation, this is limited and has not been thought of as an effective option
 - Stereotactic Body Radiation Therapy, after recent studies, shows good local control rates for primary and metastatic liver cancers without risk of radiation-induced liver disease
- Targeted drug therapy
- Immunotherapy

(Mayo, 2019, para. 4)
(Zhang, 2018, para. 1)

Stereotactic Body Radiation Therapy (SBRT)

Pros:

- Enables delivery of high dose radiation
- Surrounding healthy tissue dose limited
- Shorter and less treatments make poor performance patients easier to treat

(Kato, 2015, pp. 13101-13112)

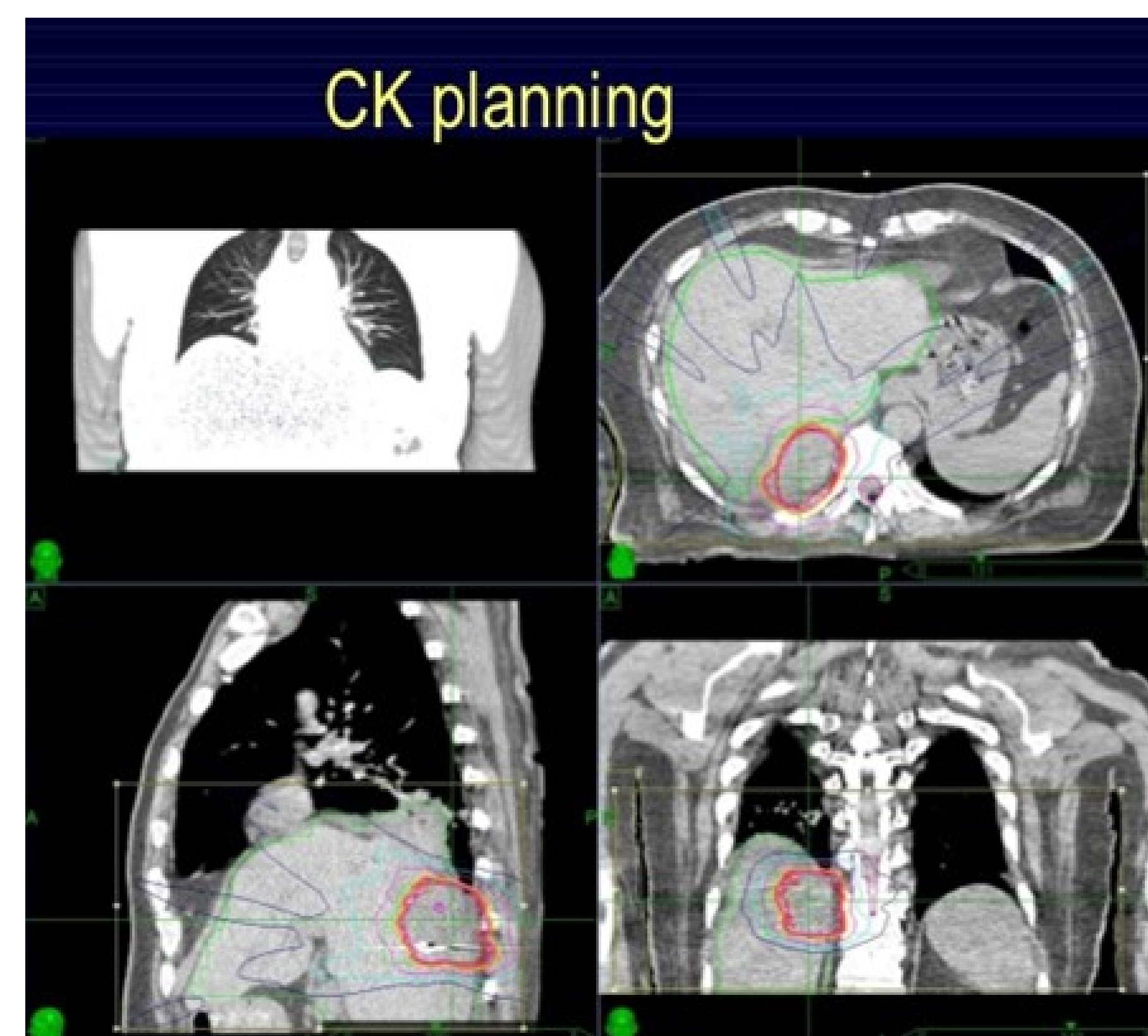
CyberKnife SBRT



(Radiation Therapy News, 2014, image)

- Ability to deliver precise treatments within one millimeter
- More radiation is delivered to precise target area while preserving surrounding healthy tissue
- System combines intra-operative x-rays with previously acquired CT images of lesion to target each beam of radiation
- Real-time tracking accounts for any movement and adjustments are made to ensure dose is delivered to treatment area

(CyberKnife, 2017, p. 7)
(Stanford, 2020, para. 5)



(Duttaradio, 2015, sl. 23)

CyberKnife SBRT for HCC

CyberKnife (CK) is a good treatment option for patients ineligible for other main treatments.

It can be used for:

- pre-surgery therapy to down-stage a tumor
- Preventing tumor growth
- Palliative therapy

It makes radiation therapy treatment delivery extremely precise

- Limits exposure to healthy tissue
- Real-time tumor tracking makes any adjustments for motion

In a study by Que et al., CK SBRT appeared to be a viable treatment option in patients with unresectable HCC

- Low risk of severe toxicity
- 48.7% of patients had complete response
- Overall survival at one and two years was 63.5% and 41.3%, respectively

(Daher, 2018, pp. 69-78)
(Que, 2016, pp. 1-10)

Conclusion

- HCC - most common liver cancer and one of the most common cancer-related deaths worldwide
- CK offers near exact precision with treatment delivery using real-time tumor tracking
- Being precise, makes radiation therapy an effective & safe treatment for patients
- Can be used palliatively, pre-surgically, and to prevent any tumor growth

(Que, 2016, pp. 1-10)
(Daher, 2018, pp. 69-78)