Deep learning based MR Only Radiotherapy for head-and-neck cancer

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Primary objective: to acquire patient data required to optimize/train a method to generate synthetic CT scans from MRI scans and to determine the suitability of the synthetic CT scans for radiotherapy treatment planning.Secondary objective: To...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON49217

Source
ToetsingOnline

Brief title
Deep MR Only RT

Condition

- Other condition

Synonym
head and neck cancer

Health condition

hoofd-hals kanker

Research involving
Human

Sponsors and support

Primary sponsor: Erasmus MC, Universitair Medisch Centrum Rotterdam
Source(s) of monetary or material Support: EIT Health (EU) projectnummer 19037

Intervention

Keyword: Artificial intelligence (AI), Deep learning, MR only, Radiotherapy

Outcome measures

Primary outcome

Primary: the percentage of patients in the validation cohort for which the dosimetrical accuracy is within tolerance for at least 80% of the organs and targets when the synthetic CT is used for dose calculations.

Secondary outcome

Secondary: the percentage of patients in the validation cohort that meet for 80% of the organs the criteria for contouring accuracy, namely that 80% of the contour points need to be within 2 mm from the gold standard contours.

Study description

Background summary

In the Netherlands about 3000 patients are diagnosed with head-and-neck cancer each year of which the majority is treated with (chemo)-radiotherapy. As part of the preparation of the radiotherapy treatment, both a CT scan and a MRI scan are acquired of the patient in treatment position. The MRI scan is acquired to clearly depict and delineate the tumor while the CT scan is necessary to plan the radiotherapy treatment beams. The current preparation procedure has a couple of disadvantages. First, two patient appointments are required for the CT and MRI scan. Second due to unavoidable slight variations in patient position at the time of the CT and MRI, both scans need to be registered. Any misalignment in registration is at the expense of the treatment accuracy. Third, delineation of the organs at risk is a tedious manual process that can takes hours per patient.

Within a European consortium funded by EIT Health we are developing a special type of MRI sequence that can be used to create a synthetic CT scan. We hypothesize that using this synthetic CT it will no longer be necessary to acquire a separate CT, avoiding the problems stated above. Moreover the consortium develops automated tools for contouring based on deep learning that could be used to automatically delineate organs at risk, possibly saving considerable preparation time.

Study objective

Primary objective: to acquire patient data required to optimize/train a method to generate synthetic CT scans from MRI scans and to determine the suitability of the synthetic CT scans for radiotherapy treatment planning.

Secondary objective: To evaluate if the deep learning based autocontouring can lead to delineations of organs at risk comparable to those delineated by an expert radiation-oncologist.

Study design

Technical feasibility study

Study burden and risks

The burden consists of a 15 minutes longer MRI scan time than used in standard workup: 35 minutes instead of 20 minutes scan time. During the scanning, the patients wear the radiotherapy immobilization mask required for the clinical scans. There are no risks associated with the intervention. The study does not affect the treatment.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

-Patients with head-and-neck cancer.
-Scheduled for primary (chemo)radiotherapy where a MRI scan is part of the standard radiotherapy work up
-Written informed consent.

Exclusion criteria

-Having any physical or mental status that interferes with the informed consent procedure.
-Contraindications for MRI (e.g. claustrophobia, arterial clips in central nervous system)

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	22-04-2020
Enrollment:	60
Type:	Actual

Ethics review

Approved WMO

Date:	09-03-2020
Application type:	First submission
Review commission:	METC Erasmus MC, Universitair Medisch Centrum Rotterdam (Rotterdam)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL71668.078.19
Other	NL8167