

Logged

OFFICE MEMORANDUM

713023

TO : DISTRIBUTION

DATE: November 22, 1978

FROM : H. Amols *H.A.*  
SUBJECT : STATUS OF DYNAMIC TREATMENTS  
SYMBOL : MP-3  
MAIL STOP: 844

REPOSITORY LANL/ARC  
COLLECTION MP-DO  
BOX No. A-91-011  
FOLDER 85-10

We have set January 1979 as a goal for doing the first dynamic treatments. This might be possible, provided that these treatments are simple, and that safety backups and error recoveries are as elementary as possible, consistent with patient safety.

As a first iteration, I propose the following scheme. Initial dynamic treatments will consist only of x-y couch translations with different range shifter functions for different values of couch x-y. No provisions will be made for scanning in z,  $\theta$ , or  $\phi$ . Treatment monitoring will be done by the 11/45, and will provide only for verification by the 11/45 of the following:

1. the couch reaches each predetermined position as set forth by the treatment plan, and the monitor chamber,
2. the range shifter is cycling properly immediately after each couch translation,
3. the 11/45 will check the range shifter once and only once at each position of couch x-y.

If the treatment plan is not being properly executed we would have the option of having the 11/45 either pull the target (through the software interlock chain), or issue a warning message to the operator. Different errors will therefore be detected in different ways. For example:

ERROR

DETECTION

11/03 fails to move couch properly  
11/03 fails to change to proper range-shifter function after a couch translation, and range-shifter continues to cycle incorrect function

11/45 pulls target and/or issues warning message. Error detection is immediate.

11/03 crash, or couch or range-shifter hardware error

11/45 pulls target and/or issues warning message when either couch or rangeshifter fails to execute next scheduled move. Or beeper goes off in control room due to range shifter remaining static (may be caused by either range shifter malfunction or 11/03 crash)

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FILE BARCODE



00133452

1088087

ERROR

DETECTION

11/45 crash

software interlock chain automatically broken, and target pulled immediately.

Error recovery (and completion of treatment) after a crash can be initiated after rebooting and/or correcting the hardware malfunction by inputting to the 11/45 the reading of the monitor chamber (which worked independently of the computer) at the time of the crash/malfunction. The 11/45 would then calculate a new, temporary treatment table, and treatment could proceed according to the new table. The new table would essentially consist of only those sections of the original treatment table which were not executed prior to the crash/malfunction. After completion of treatment, the temporary file would become useless except for possible archival value.

At the end of treatment, the computer could create a file containing all the relevant information for that treatment, similar to the TRT1 program. In the event of a crash during the middle of treatment, and subsequent error recovery, the data prior to the crash, other than the monitor chamber reading, might be lost.

Needless to say, the treatment planners will have to provide a table which parameterizes each dynamic treatment. For treatment planning purposes, this table need consist only of x-y values (in cm) for the couch translations, and range shifter functions (cm thickness vs time), for each value of couch x-y. x-y values would be given in cm, using the channel (and dosimetry) coordinates system; i.e.,

- (0,0) = geometric center of channel
- + x = south
- + y = west

A translator program will then convert all values of x,y and range shifter thickness into a format compatible for use with the 11/03.

Treatment setup would consist of lining up the patient tattoo cross hairs with the lasers at channel coordinates (0,0). The computer could then execute a patient treatment.

With regard to the January 1979 goal, it must be emphasized that:

1. a good deal of the software for even this simplest of dynamic treatments has not yet been written, and
2. virtually none of it has been fully debugged,
3. the transfer of J. Helland leaves only Richard Kittell in MP-3 who is intimately familiar with the system,
4. access to the couch and treatment room is essential for testing and debugging purposes.

Equally important is the fact that dynamic treatments will require some kind of dynamic dosimetry, and a good deal of work remains to be done on this as well.

I also need some feedback regarding my criteria for such things as "simple dynamic treatment," "minimum monitoring requirements," "patient safety," etc.

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Status of Dynamic Treatments

11/22/78

Distribution:

J. Bradbury	MP-3	
M. Paciotti	MP-3	MS 809
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