Customer Information Bulletin

Title

Using the External Axial Extension

Scope

All versions of Oncentra MasterPlan and OTP

Target Group

Users of Oncentra MasterPlan Dose Base

Users of OTP Dose Base

Nucletron Application Specialists

Table Of Contents

1 Document History

Revision	Who	Reason for Change	Changes
00	LPN	FPR237717	Not applicable

2 Where To Include

Nucletron strongly advises you to insert this bulletin in any printed copy of the user manual.

3 Related Documents

Reference	Revision	Description
192.729ENG	*	Oncentra MasterPlan User Manual

* Latest version (available via the Nucletron Extranet)

4 Subject

As indicated in the sections of the user manual about beam modeling and plan evaluation, the user is warned about the need to check that the volume extensions are “clinically correct”, because otherwise the dose calculation could be incorrect.

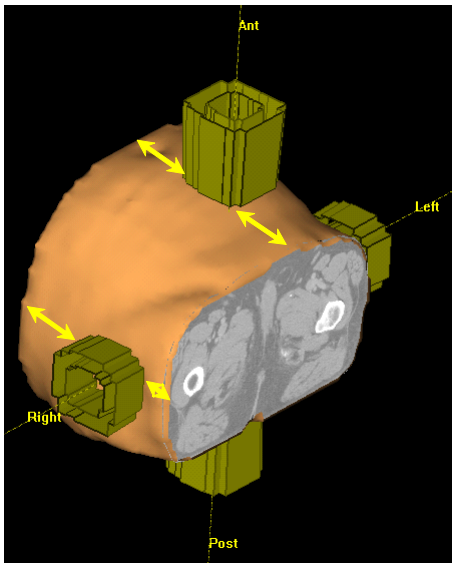
After an issue was reported, we have decided to inform you again about defining the volume extension of the patient before a dose calculation.

4.1 Philosophy of 3D Dose Calculation in Oncentra MasterPlan

Oncentra MasterPlan is a 3D treatment planning system that calculates dose based on volumetric information represented by the patient anatomy. This anatomy, generally acquired from CT scanner slices, is usually limited to the treatment region.

During dose calculation, due to the 3D nature of the algorithms, the scattered component coming from the surrounding volume is contributing to the dose in all calculation grid points and simulates as best as possible the physical mechanism of dose deposition.

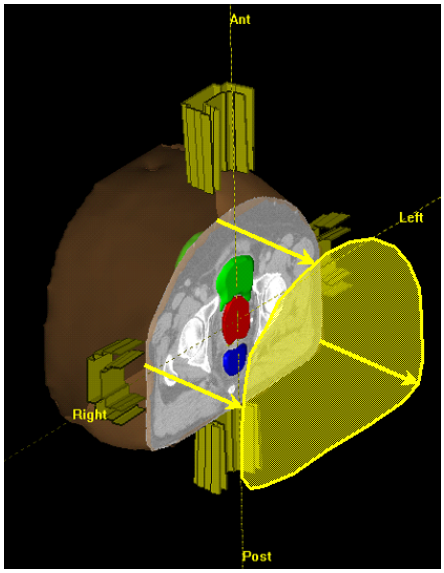
For this reason and to properly take into account the scattered dose, the patient 3D volume (and thus the total number of CT slices) must extend far beyond the beam dimensions:

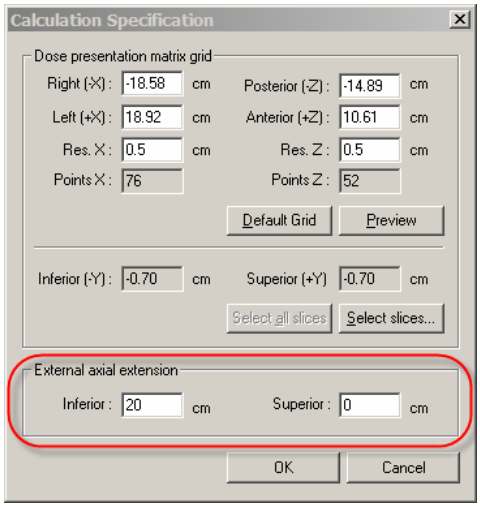


Unless of course if there is no real anatomical information in a direction, as for the top of the head. In this case, the extension in this direction will be zero.

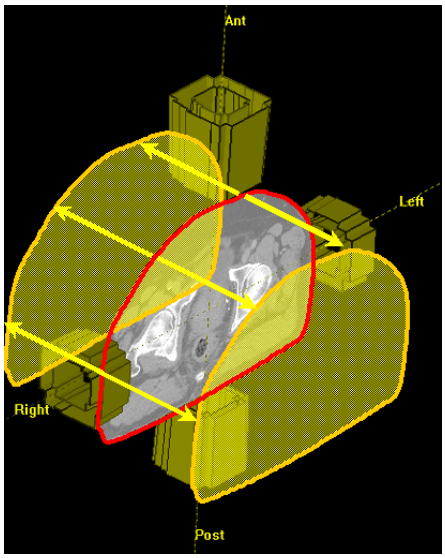
If there is not enough CT scanner information (this may correspond to one single slice or a limited number of slices without sufficient extension), one part of the beam will irradiate air instead of tissue and thus not generate any scattered dose.

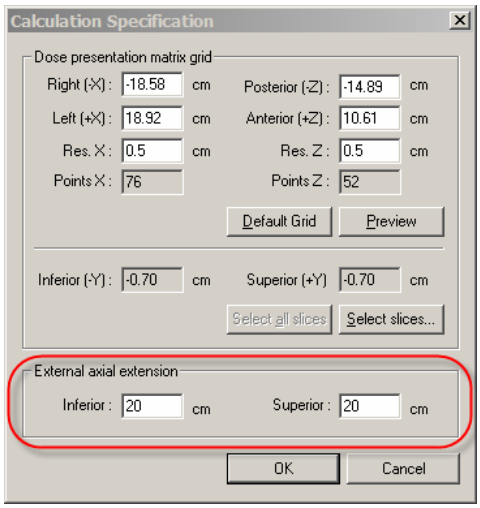
So it is necessary to extend the volume in the direction of the missing scattering volume (e.g. by 10 cm or 20 cm):





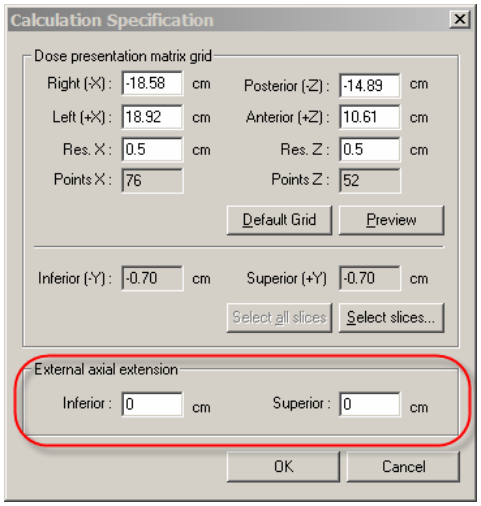
In the case of one single slice (or a thin slab regarding the dimensions of the beam), the extension has to be done in both directions (towards head and feet) by a sufficient value (e.g. 20 cm):



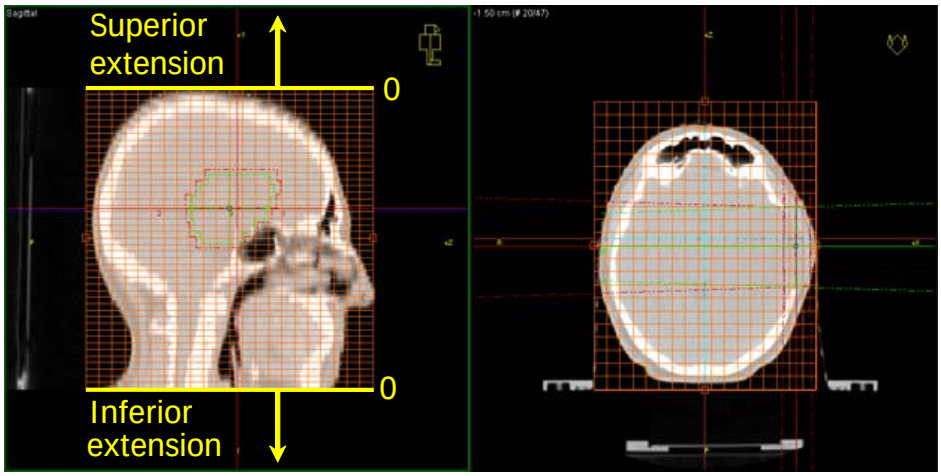


4.2 Defining the Patient Volume Extension

In the Oncentra MasterPlan treatment planning system, the user has to define the “dose presentation matrix” (dose points 3D grid) in the Beam Modeling module before any dose calculation. In the Tools menu, select the Calculation Specification… option. The Calculation Specification window appears:

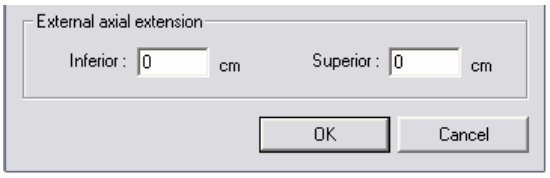


By default, this dose matrix encloses the anatomy contours of the patient in the X and Z directions (in the axial plane). However, the calculation does not assume that the patient anatomy is infinite in the head-feet direction (Y):



The External Axial Extension represents a patient volume extrapolation, in order to obtain a better approximation of the scattered dose from the distant regions.

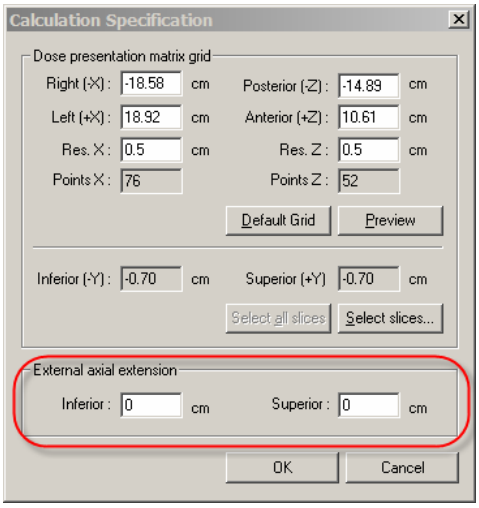
The system considers the extension shape to be identical to the shape in the inferior or superior slice. The default superior and inferior extension values are set to 0 cm:



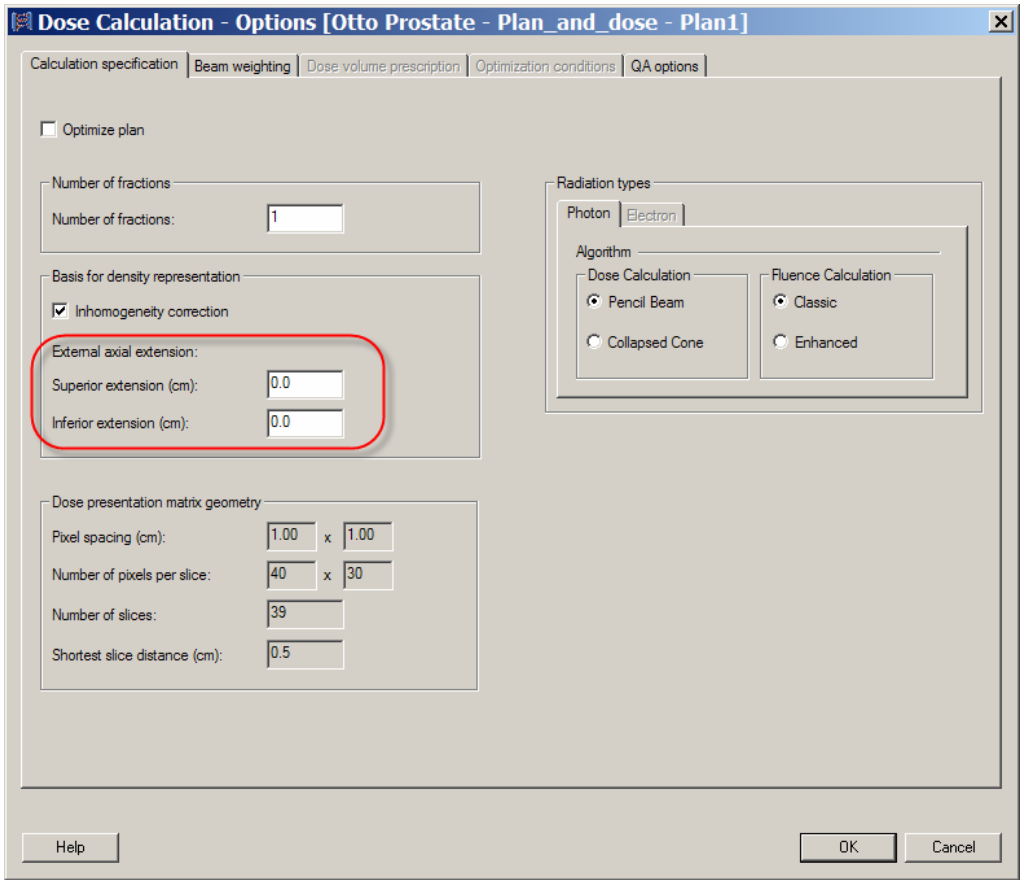
4.3 Additional Remarks

The external extension values can be defined in different places in Oncentra MasterPlan:

- In the Calculation Specification window of the Beam Modellng activity:

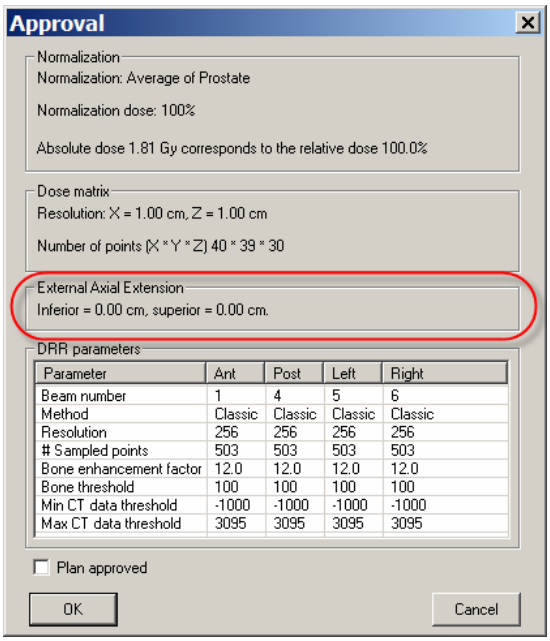


- In the Options window of the Dose Calculation activity:

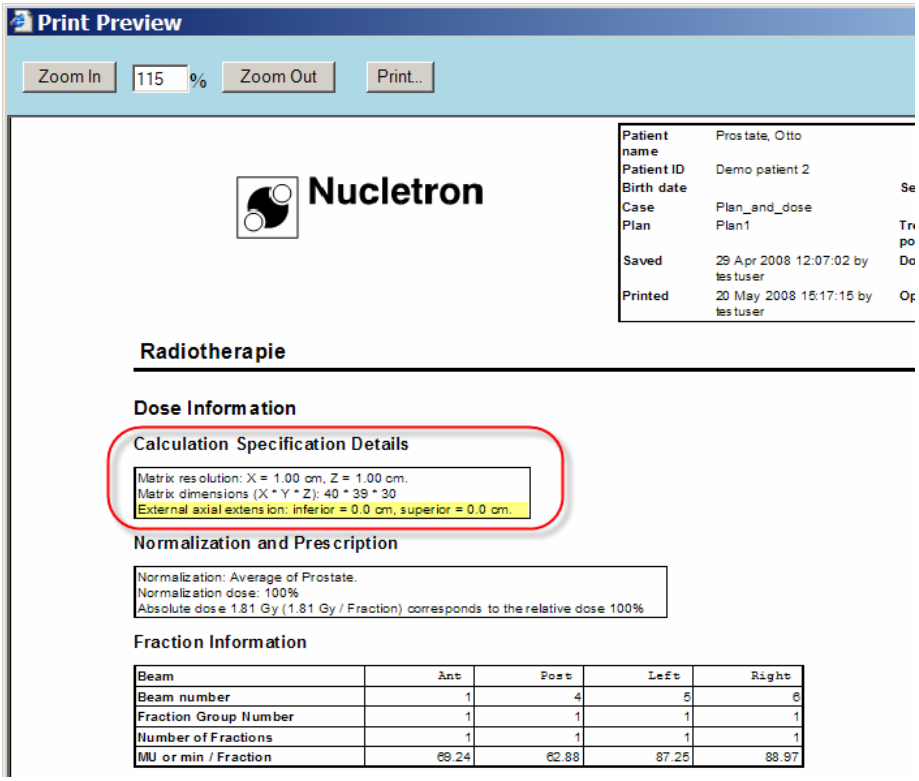


It can also be seen:

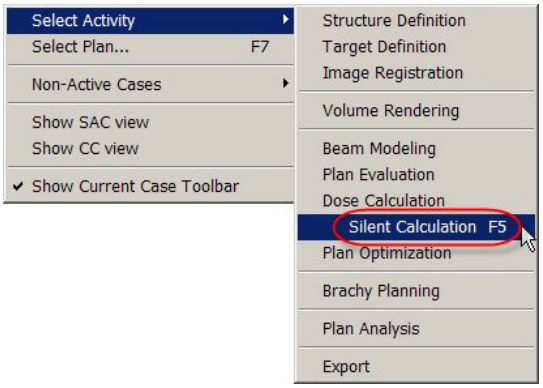
- In the Approval window of the Plan Evaluation activity:



- In the Calculation Specification Details of the treatment protocol printout:



4.4 Remarks About the F5 Key



The F5 key allows the user to launch a “silent dose calculation” when it is unnecessary to modify the default dose calculation parameters (dose calculation algorithm, inhomogeneity correction). In this case, the Options dialog window of the Dose Calculation activity (that includes the external extension values) is not displayed and the calculation job is sent to the calculation queue.

If the default parameters have been modified by the user, then the newly defined parameters will be used the next time the F5 key will be pressed. This functionality has been introduced to improve the ergonomics and avoid too many mouse clicks.

When a dose calculation is launched by using the F5 key, the user must be sure that the default dose calculation parameters are clinically relevant for the patient case.

This recommendation also applies when a dose calculation is launched by clicking the dose module toolbar icon.

5 Identification

This bulletin concerns all versions of Oncentra MasterPlan and OTP.

6 Consequences

Without appropriate specification of the extension limits, the dose distribution as well as the treatment time calculation may not be correct (under-estimation of the calculated dose regarding the expected dose and over-dosage risk).

The magnitude of the potential over-dosage is related to the ratio of the scattered dose to total dose, which may vary depending on the treatment parameters (energy, field size, position, etc.).

7 Limitations & Workarounds

Always check that the external extension values are clinically relevant regarding the position and size of the beams of the plan.

This not only concerns the number of slices, but also the position of the beams regarding the patient anatomical volume (because a beam can – on purpose or not – be positioned at the edge of the patient 3D volume).

Keep in mind that for Oncentra MasterPlan, by default the patient (and thus the scattering volume) is strictly limited between the extreme slices.