

HP PRO Solution Put to the Test

Stable and reliable immobilization for proton and photon therapy

Reliability and stability – two pillars of safe and effective immobilization for proton/photon therapy. Characteristics that were of the highest importance to us when we designed the [Orfit HP PRO](#) – our proton compatible immobilization solution.

A series of extensive clinical tests by [MAASTRO Clinic](#) (Maastricht, The Netherlands), has now further **confirmed** the reliability and stability of the HP PRO.

Proton compatible immobilization

The Orfit HP PRO Solution is an immobilization device designed for brain, head, and neck proton therapy. As it is a versatile system, it lends itself perfectly to photon therapy as well.

The system has been designed to meet the specific standards that proton therapy demands. It includes a homogeneous low-density immobilization device with a narrow carbon fiber base plate in the head and neck area. Because of its ingenious design, it allows for close range positions of the treatment device.



In addition, the HP PRO System uses the ultra-stable Nanor masks for guaranteed comfort and stability. This innovative thermoplastic material makes use of nanotechnology for improved mechanical properties. Learn more about the Orfit HP PRO system on orfit.com/proton.

Clinical testing

MAASTRO Clinic recently did extensive testing on the Orfit HP PRO as a setup for proton head and neck treatments.

The clinic has been using the Orfit HP PRO system since September 2018 and they apply it for both photon and proton therapy.

In their internal clinical test, MAASTRO verified the efficacy of **two different Orfit HP PRO** set-ups:

HP PRO head immobilization

The first set-up consisted of the following components:

- [3-Points Nanor mask](#)
- [HP PRO carbon fiber base plate](#)
- [T-shaped head, neck and shoulder vacuum bag](#)



HP PRO head, neck and shoulders immobilization

The second set-up consisted of the following components:

- [5-Points Nanor mask](#)
- [HP PRO carbon fiber base plate](#)
- [T-shaped head, neck and shoulder vacuum bag](#)



Method and Results

In both set-up analyses, MAASTRO used extra CBCT imaging before and after treatment to identify residual error and intrafraction movement.

In the **head and neck set-up**, they applied 6D offline matches of 23 patients in total to determine the margins in lateral (x), longitudinal (y), and vertical (z) direction. They found that a **PTV margin of 1 mm** is achievable to treat neuro patients with the HP PRO immobilization system, extended with a biteblock.

In the **head, neck and shoulders set-up**, they applied 4D offline matches of 17 patients to determine the margins in lateral (x), longitudinal (y), and vertical (z) direction. For this set-up, MAASTRO found that a margin of **3 mm CTV-PTV** is suitable to treat the H&N patient.

In conclusion, MAASTRO's findings suggest that the HP PRO system is indeed a **reliable and stable system**, resulting in small margins for CTV-PTV.

>> Review MAASTRO's complete findings on the HP PRO's efficacy in these slides:

[\(click to enlarge\)](#)



Maastrro HP PRO Solution

Background & aim
 The aim is verification of the setup of proton neuro treatments using the Orfit HP PRO immobilization system. Because of uniformity in workflow, this system -consisting of a 3-point Nanor mask, HP PRO carbon fiber base plate, and T-shaped vacuum bag- is also used for photon treatments on a Varian TrueBeamSTx linac with 6DoF couch. We have tested the mask without and with biteblock, for 12 and 11 patients respectively.

Procedure
 Setup analysis is performed using extra CBCT imaging before and after the treatment beams, to identify residual error and intrafraction movement. 6D offline matches of 23 patients in total are applied to determine the margins in lateral (x), longitudinal (y) and vertical (z) direction.

Results
 Neglecting the uncertainty in target contouring, we have found that a PTV margin of 1 mm is achievable to treat the neuro patient with this immobilization system, extended with a biteblock.

Translational intrafraction movement

| | x(mm) | y(mm) | z(mm) |
|----------------|-------|-------|-------|
| μ | 0.09 | 0.04 | 0.08 |
| Σ | 0.21 | 0.34 | 0.20 |
| σ | 0.35 | 0.37 | 0.42 |
| σ_{RMS} | 0.43 | 0.44 | 0.50 |
| margins | 0.83 | 1.15 | 0.85 |

Without biteblock

| | x(mm) | y(mm) | z(mm) |
|----------------|-------|-------|-------|
| μ | 0.12 | 0.19 | 0.17 |
| Σ | 0.20 | 0.30 | 0.22 |
| σ | 0.22 | 0.35 | 0.38 |
| σ_{RMS} | 0.31 | 0.39 | 0.43 |
| margins | 0.71 | 1.02 | 0.85 |

With biteblock

Maastrro

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Rob has over 10 years of experience as a Radiation Therapist in a clinical and research environment.

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