

# A simple approach for efficient use of compensators in total body irradiation

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## INTRODUCTION

Total body irradiation (TBI) has long been used as a form of systematic therapy for various malignant diseases. To the best of our knowledge there is no commercial treatment planning system (TPS) for TBI. Thus we developed an in-house TPS and we implemented a method to insure efficient use of compensators in the planning process.

## AIM

Development of an in-house TPS for total body irradiation and implementing a simple approach to for efficient use of compensators in the planning process .

## METHOD

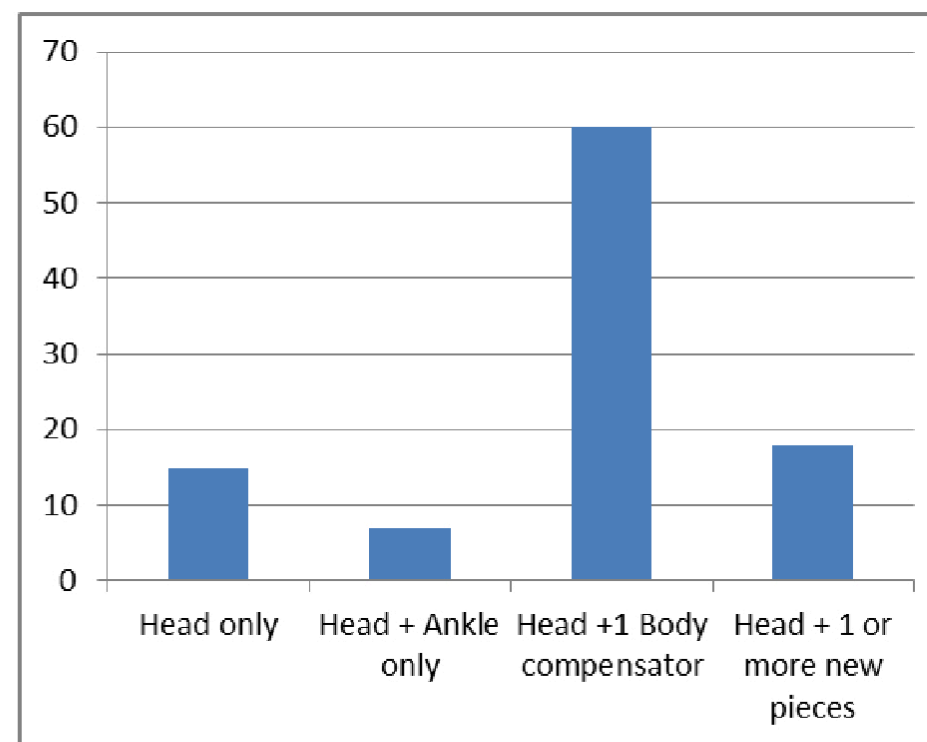
In our institution the TBI bilateral technique is used with patient seated on a couch in a semifetal position. To achieve dose uniformity within  $\pm 10\%$ , patient-specific brass compensators were designed and fabricated.

We also used tissue equivalent materials between patient legs to make it equal in thickness as patient shoulder. In our method, we were able to define a set of unified body compensator shapes that can be used for most patients. We saved them as a library in our in-house TPS and can be called during planning process.

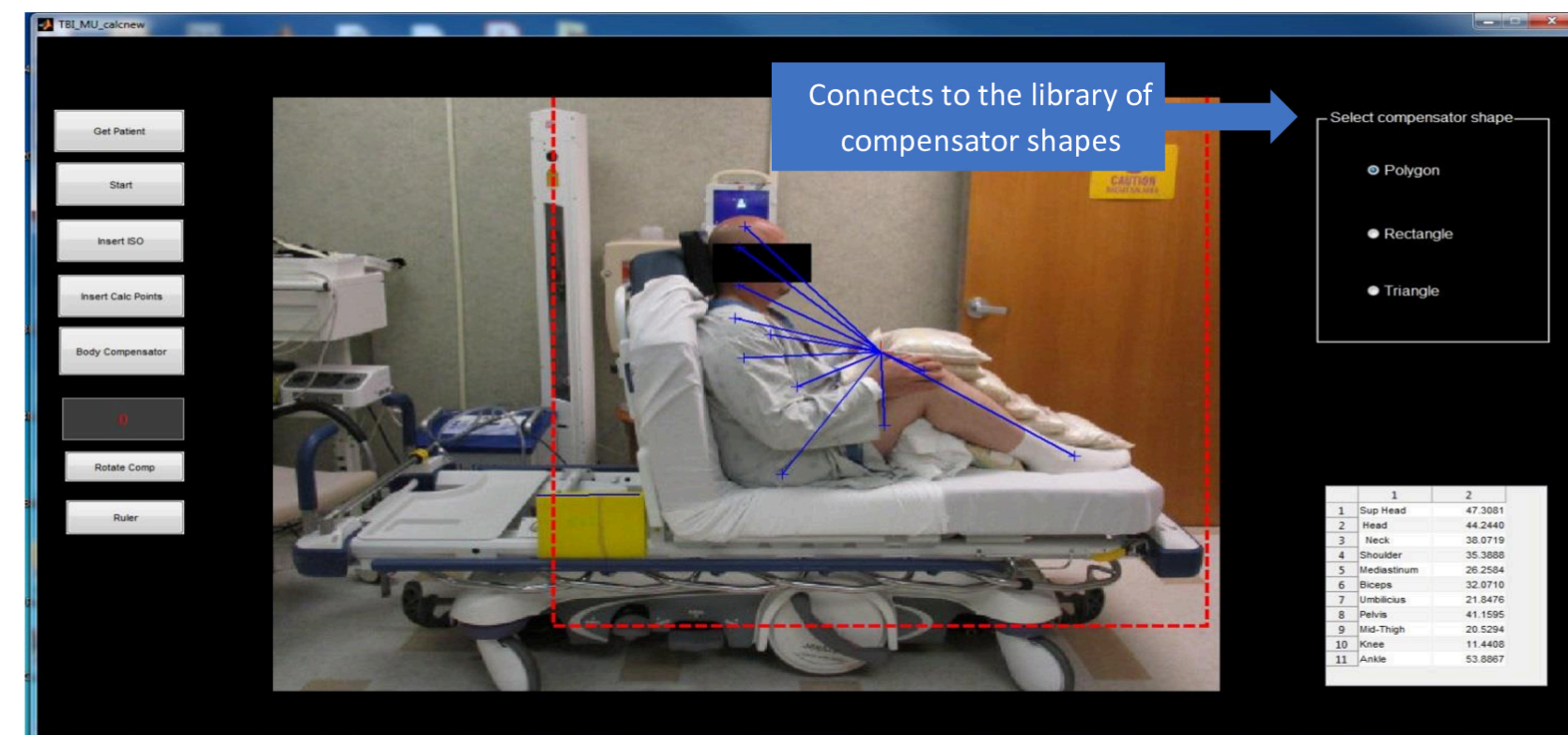
A graphical user interface for our in-house TPS was developed using MATLAB connected with the library of stored compensators.

## RESULTS

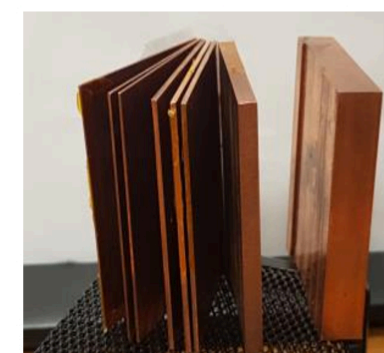
We analyzed TBI treatment plans for 100 patients. All achieved our dose uniformity acceptance criterion of  $\pm 10\%$ . In all cases, in-vivo measurements insured accurate delivery of the prescribed dose. In 15 patients, a head compensator was enough and there was no need for other body compensators. In 60 patients, an additional body compensator was needed, which shared the same geometric shape with different thicknesses. In 7 cases, a simple shaped plate was used to cover the ankle. Our results indicated that a small set of compensators shapes can be stored and reused for TBI treatment planning for more than 80% of patients.



Histogram showing analysis of 100 patients regarding what number of compensators were used



Graphical user interface for TBI treatment planning process



Head Compensators



One of our uniform Body Compensator shapes

## CONCLUSIONS

Our clinical results show that our in-house TPS is an efficient planning tool for TBI with clinically acceptable accuracy based on in-vivo measurement validation.

## REFERENCES

Van Dyke J, Galvin JM, Glasgow GP, Podgorsak EB. The physical aspect of total and half body photon irradiation, AAPM Report No. 17. 1986.

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