

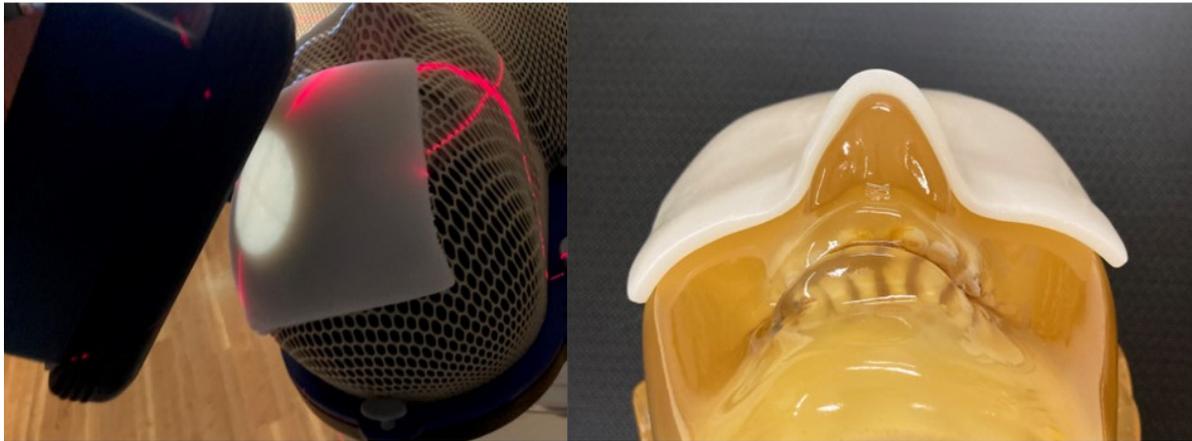
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## **Developed a novel, “Soft Rubber Bolus” for radiation therapy - Easily shapable by hand, leading to high-precision irradiation and more adapted treatment -- Kindai University**

A research group led by Professor Hajime Monzen of Kindai University (Osaka-Sayama City, Osaka) Faculty of Medicine (Department of Radiation Oncology) and Hayakawa Rubber Co. Ltd. jointly developed a new "Soft Rubbers Bolus," for radiation therapy, which can be freely shaped by hand with heating and closely fit on any part of the body. Soft Rubber Bolus enables more precise treatment of superficial tumors and is environmentally friendly as it can be disinfected and reused.

This research was published online in the “Physics in Medicine and Biology”, an international journal publishing researches in the field of biomedical physics, on Wednesday, September 15th, 2021 (5 p.m., Japan time).

<https://iopscience.iop.org/article/10.1088/1361-6560/ac215b/pdf>



(Left) Receiving radiotherapy with Soft Rubber Bolus on the head. (Right) Shaped for treatment.

## 1. Key points

- Enables shape adjustment on site during treatment which was impossible with conventional tools
- Achieves close fitting on uneven parts by shaping easily with heating. Allows for more personalized radiation therapy
- Can be disinfected and reused, and easily utilized at multiple medical institutions

## 2. Overview

X-ray and electron beams in radiation therapy have the property of passing in the forward direction in the body and gradually losing their energy. A bolus

adjusts the radiation dose to the maximum at the affected site by closely fitting the bolus to the skin surface of the treatment area. However, commonly available gel bolus is provided only in a fixed size and hardness. The problem is that precise irradiation cannot be ensured as it is not easy to place the bolus on an irregular and uneven surface like a face. This novel Soft Rubber Bolus developed by the research team can be freely shaped with fingers when heated, and hardens and keeps its shape at room or body temperature; thus, a close fit can be achieved on uneven parts. The research team also achieved a density close to the composition of the human body to prevent the radiation properties from changing with the presence of a bolus. Soft Rubber Bolus has hygienical design, it can be easily disinfected and reused by re-warming.

We applied a patent application on February 5th 2021, and are planning to file an application for regulatory approval to commercialize and introduce the Soft Rubber Bolus to the clinical use.

### **3. About publication**

**Journal name:**

Physics in Medicine and Biology (Impact factor: 3.609~~8~~2020)

**Research paper title:**

A real-time shapeable soft rubber for clinical use as an ideal bolus in electron radiotherapy

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