Assessment of build-up with different bolus methods

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\textbf{Purpose:}
To experimentally quantify the buildup characteristic of six different bolus materials and compare them to equal thickness of Superflab, in order to determine the equivalent thickness of bolus material to provide a buildup effect comparable to a standard thickness of Superflab bolus.

\textbf{Methods:}
All measurements were performed on a Varian 21EX linac using an Advanced Markus chamber and Keithley electrometer. 10 cm solid water was used for uniform backscatter. The SDD was set to 100 cm to front surface of the detector. An isocentric setup was chosen to eliminate the distance effect and characterize dose buildup effect. A 6MV beam with 10x10 field setup and 100 MU was delivered for each material and thickness. The bolus materials of varying thicknesses were placed on the detector to measure charge corresponding to buildup dose. Physical thickness of all the bolus material was measured using a ruler.

\textbf{Results:}
A thickness factor was established for chamois cloth, medium wet towel and wrung out towel compared to 0.5 cm Superflab. The factors for wet gauze, Aquaphor gauze and Super Stuff bolus are within 5% of Superflab buildup dose.

Equivalent thicknesses to 0.5 cm Superflab:
- Chamois cloth, 3 layers (0.6 cm)
- Medium wet towel, 3 layers (0.8 cm)
- Wrung out towel, 6 layers (1.5 cm)
- Wet Gauze, Aquaphor Gauze and Super Stuff are within 5% buildup dose of Superflab

\textbf{Conclusions:}
Alternatives to wet towel bolus should be explored first, as the wet towel bolus method produces highly variable water-equivalent thicknesses. If wet towel bolus is deemed necessary, carefully note the configuration (wet vs. wrung out, number of layers) for the desired bolus effect.