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REDEFINING RADIOLOGY

Leveraging 3D CAD Divergent Ray Simulation Tools to Improve Design, Accuracy and Evaluation of a Radiographic Marker that Estimates Head of Bed Angle in Portable Chest X-rays

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Disclosures / Disclaimers

- Raisa Freidlin, Javier Mendez, Marcial Garmendia, Jennifer Chaney, Jeffery Cook, Michael Spivey, Thomas Pohida
 - Nothing to disclose

- Les Folio
 - Research agreement with Philips Health (Cambridge, MA)
 - Government issued diagnostic imaging patents (no royalties)
 - Author royalties (Springer)

Purpose

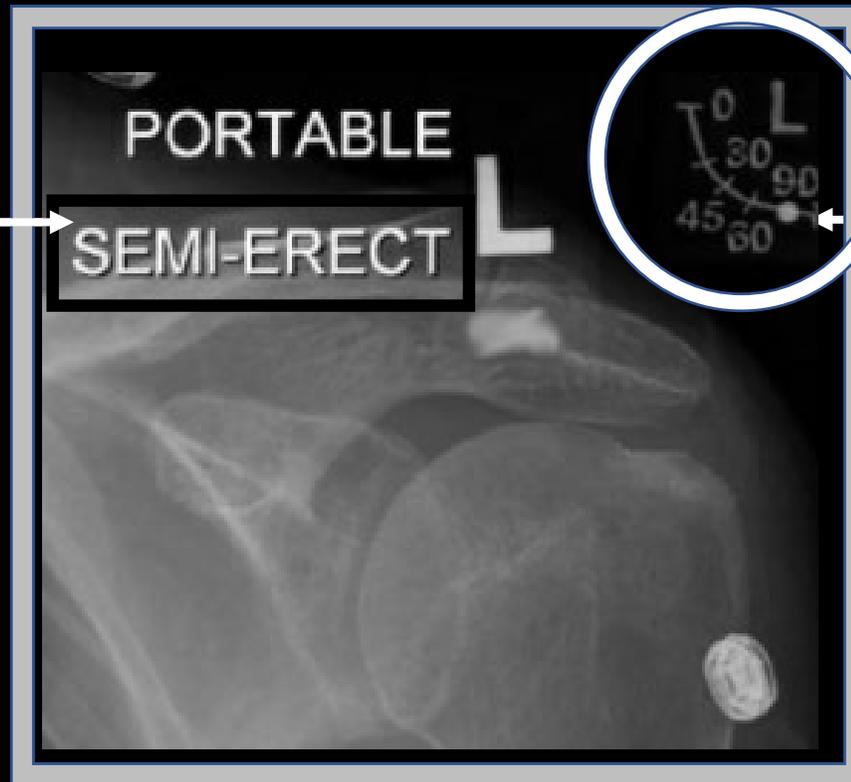
Develop a device to optimize interpretation of portable Chest X-ray (pCXR) images:

- Objectively record head of bed angle (HOBA) on radiographs
- Improve readability of the angular markers on the overexposed radiographs

Purpose: Improve Readability

- Subjective vs objective HOBA recording

Marker placed
Bright Markers
by technologist
(subjective)



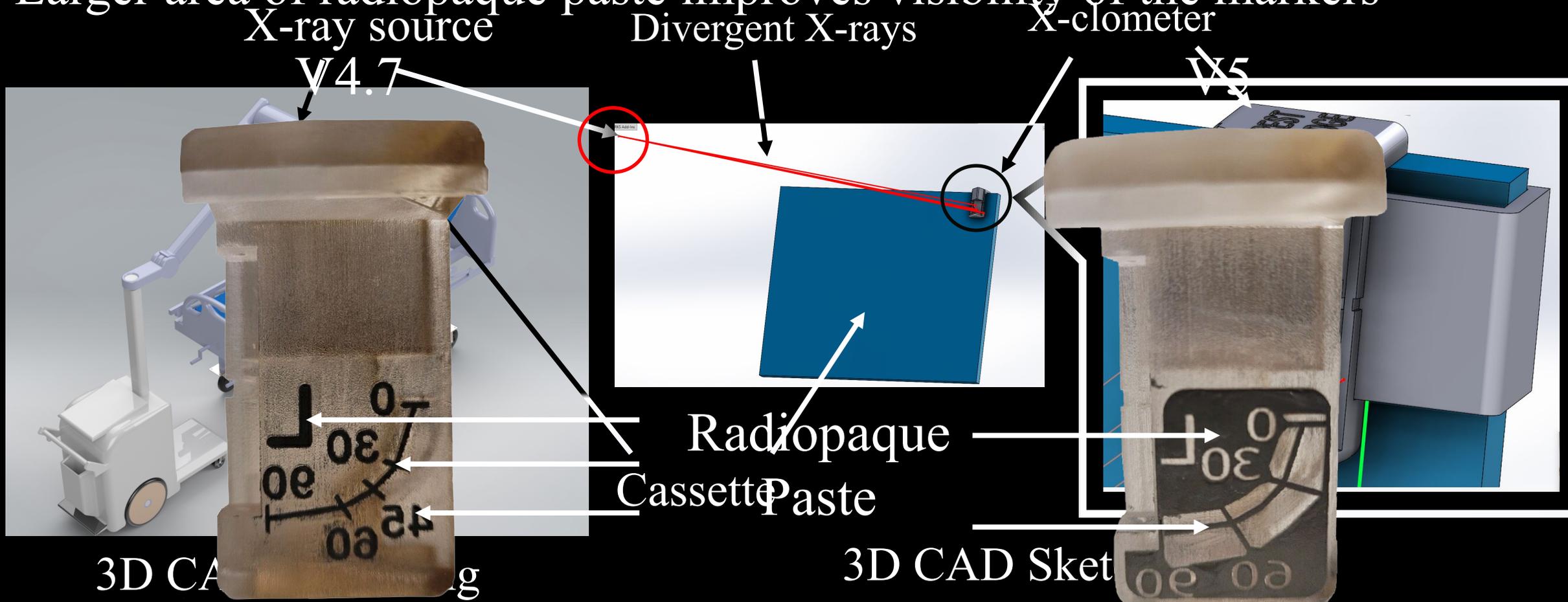
~75° HOBA recorder
by the X-clometer
(objective)

Methods

- Design a pCXR simulation system (pCXRSS) environment with divergent X-rays using 3D CAD software
- Improve angular markers readability on radiographs by increasing area filled with a radiopaque material

Methods: Improve Angular Markers Readability

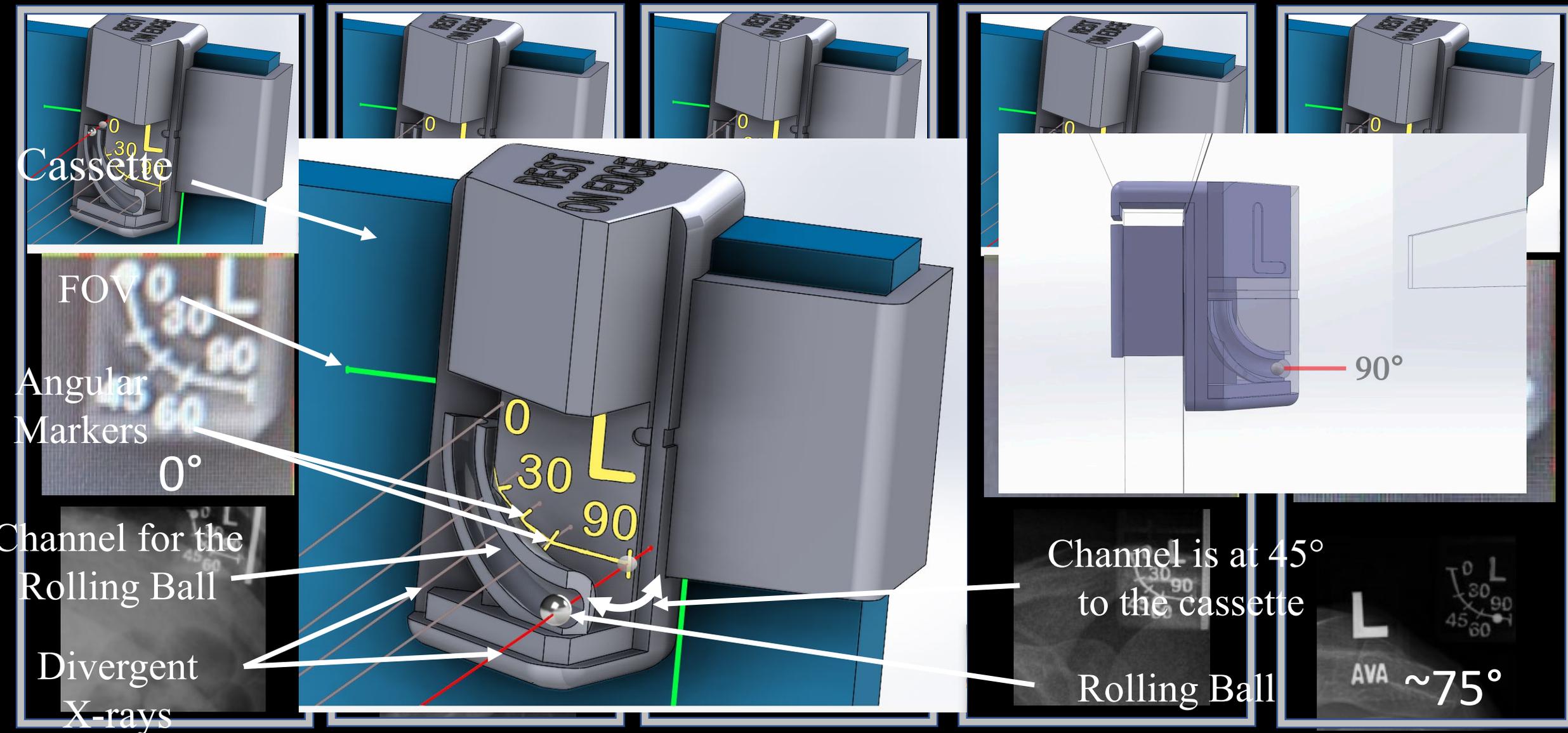
- Angular markers filled with a radiopaque paste at the back of the device
- X-clometer is a device that records HOBA
- Larger area of radiopaque paste improves visibility of the markers



Results

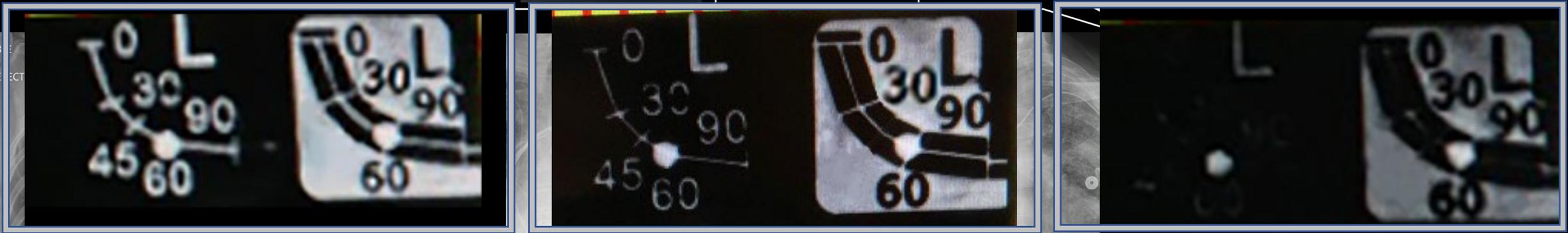
- Improved HOBA accuracy from about 30° to 5°
- Improved readability of the angular markers on the overexposed radiographs

Results: 3D CAD Sketch of the X-clometer V4.7



Results: Improve Readability

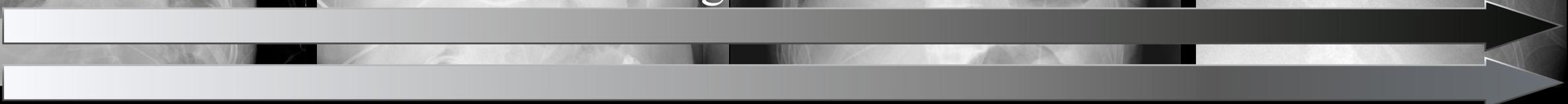
- Angular Markers Visibility (V4.7)



Increasing Contrast

V4.7

V5



Conclusion

- Development of the device (X-clometer) with pCXRSS significantly improves accuracy of the radiographic markers.
- We created a more radiopaque option for centers that may experience over penetration