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An Issue with Proximity: A Clinical Audit of Optic Lens Involvement in CT Head Imaging

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OVERVIEW

- Background
- Radiation Dose Limits to the Lens
- Audit Process
- Re-Audit Results
- Summary



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DECLARATION

I have received no financial support
for this study

I have no conflicts of interest to
declare



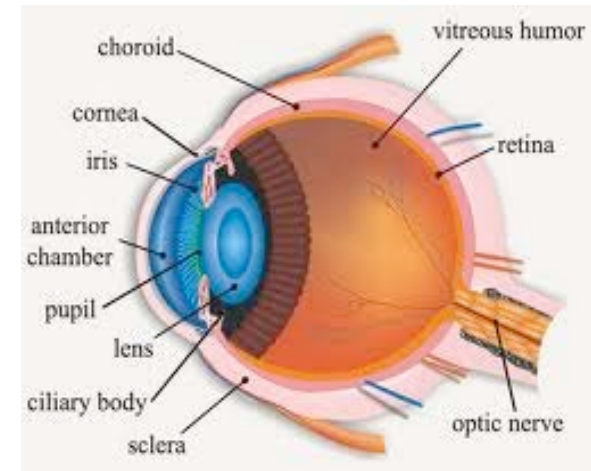
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BACKGROUND

- Computed tomography (CT) is a commonly used imaging modality₁
- Optic lens plays a minuscule role in patient
- Unnecessary exposure of the lens to radiation can result in cataract formation₂





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STRUCTURE RADIO-SENSITIVITIES

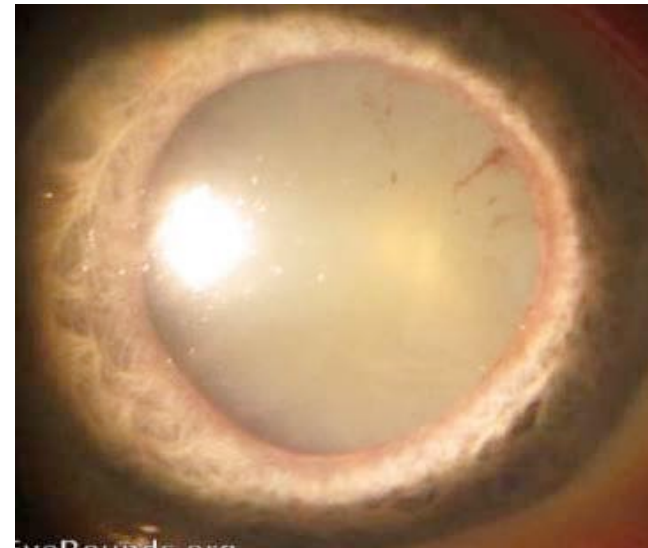
High	Medium	Low
Lymphoid Tissue	Skin	Muscle
Marrow	Vascular endothelium	Bone
GI Epithelium	Lung	Connective tissue
Gonads	Kidney	Cartilage
Embryos	Liver	
	Lens	



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LIMITS OF LENS RADIATION

- The lens is typically exposed to between 25-103mSv of radiation during a CT head study^{3,4}
- The International Commission on Radiological Protection^{5,6} has decreased the radiation threshold for the optic lens to:
 - 500mSv chronic exposure and 500-2000mSv for acute exposure
- For occupationally exposed 20 mSv/y, _____





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Examining Lens Involvement in CT Head Studies at SLMHC



SIoux LOOKOUT

Meno Ya Win

HEALTH CENTRE



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STANDARDS

- No guidelines comment on the avoidance of optic lenses in CT head studies at SLMHC
- The literature suggests that avoidance of the optic lens in CT head studies has benefits to prevent lens pathology^{7,8}



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METHODS

- A retrospective study of all CT head studies between a 4 month period in 2013
- Lens involvement defined as:
 - Partial or complete visualization of either lens
 - Cataract surgery; orbits were involved
- Initial results presented to and discussed with the departmental staff
- Re-audit took place immediately after and occurred over a 2 month period
- Exclusion criteria:
 - Orbits requested
 - Facial trauma



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INITIAL RESULTS

- Of the 101 CT head studies:
 - 78.2% (n=79) cases involved the lens
 - 68.3% (n=69) involved both lens





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RECOMMENDATIONS

- Discussion between DI department staff
- Radiation reduction strategies suggested:
 - Angling the gantry to avoid the primary beam
 - Lens may still be susceptible to scattered X-rays
 - Positioning the patient
 - Cervical spine hyperflexed
- Document issues encountered which prevented usage of the above strategies
 - Trauma
 - Cervical spine mobility

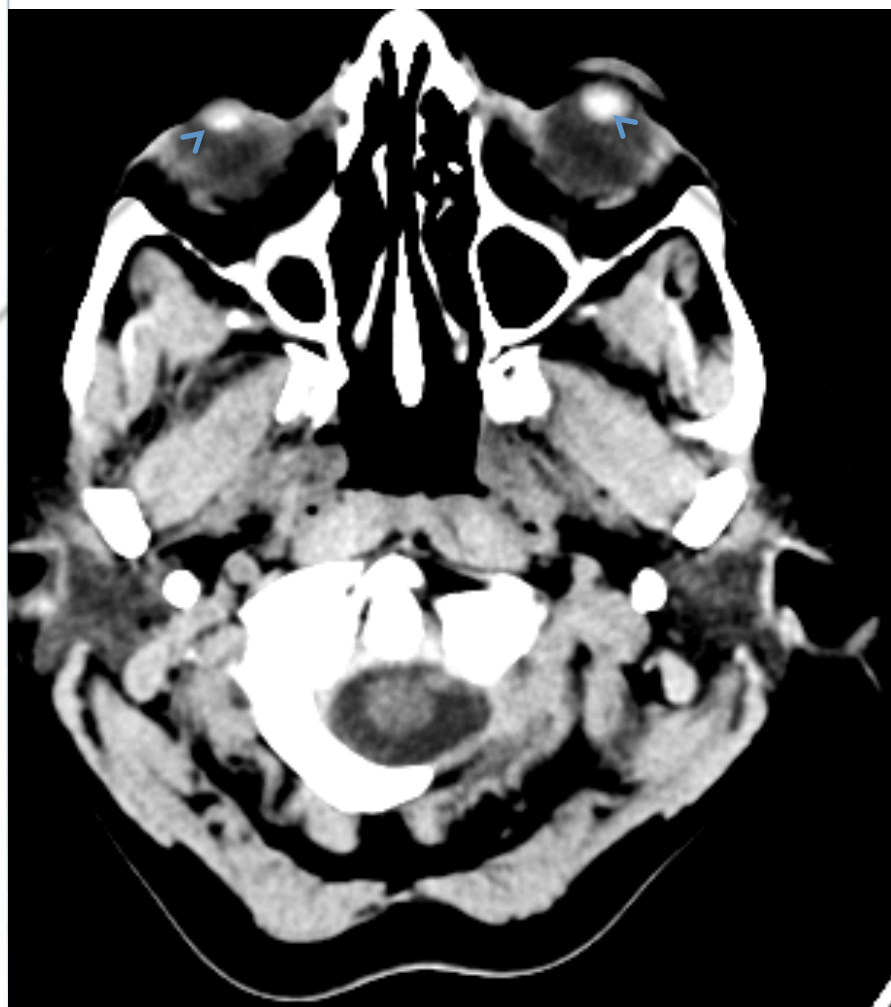


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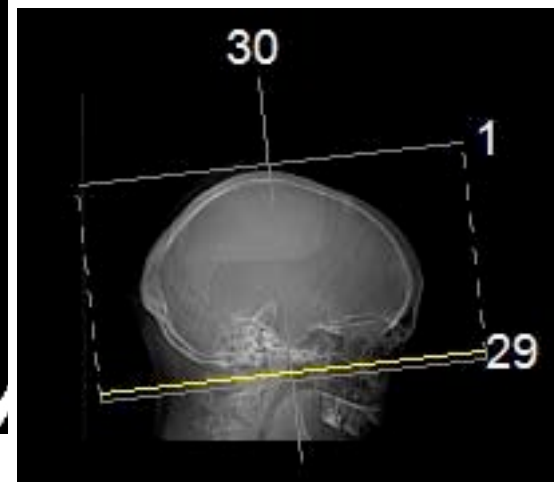
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ANGLING THE GANTRY



Gantry angled
demonstrating lens
involvement in CT
head





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ANGLING THE GANTRY



Angling the gantry above the level of the orbits and “tucked” position, we can effectively minimize the exposure of the lens to radiation in CT head studies

Yellow: Lens involved **Blue:** Lens Avoided



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RE-AUDIT: RESULTS

- A total of 61 cases were studied
- 22.9% (n=14) of the studies involved the lens
- Of the 14 studies with lens involvement, 71.4% (n=10) were documented as trauma or concerns with cervical spine



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LIMITATIONS

- Small sample size
- Technologist experience with CT
 - CT is new to SLMHC and technologists are currently building experience
- Comfort level of technologists
 - Manipulating cervical spine



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SUMMARY

- Unless indicated, we can exclude the lens in image collection by angling the gantry above the orbits and having patients in the tucked position
- Successful reduction of radiation dose to the lens during a CT head study
- Participatory Research is a successful method to initiate change and promote a team-work environment



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QUESTIONS?