

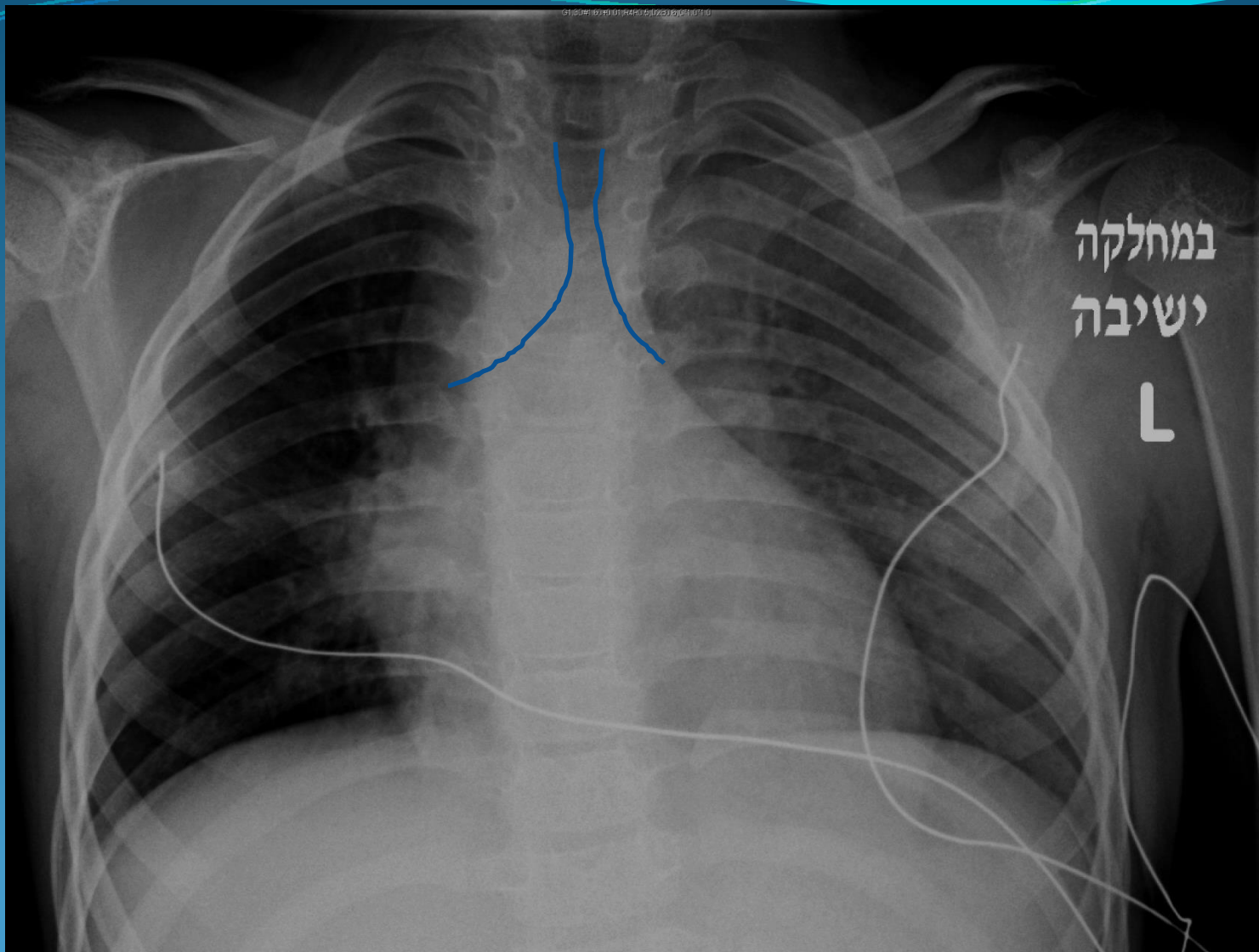
# CTA Vs MRA

## להדמיית כלי הדם בבית החזה בילדים

ד"ר שלי שירן  
דימות ילדים



Tel Aviv Sourasky  
Medical Center







MRA



CTA

*Non*  
*Ionizing*  
*Radiation*

*Ionizing*  
*Radiation*



**Table L - Radiation Dose Comparison**

<b>Diagnostic Procedure</b>	<b>Typical Effective Dose (mSv)<sup>1</sup></b>	<b>Number of Chest X rays (PA film) for Equivalent Effective Dose<sup>2</sup></b>	<b>Time Period for Equivalent Effective Dose from Natural Background Radiation<sup>3</sup></b>
-----------------------------	---	---	--

Chest x ray (PA film)

0.02

1

2.4 days

CT chest

2.0 (<6.0)

100

243 days

Tc-99m radionuclide bone scan

<6.2

310

753 days

FDG-PET

15

765

1871 days

## Increasing utilization of computed tomography in the pediatric emergency department, 2000–2006

Joshua Broder, Lynn Ansley Fordham, David M. Warshauer



» Look Inside



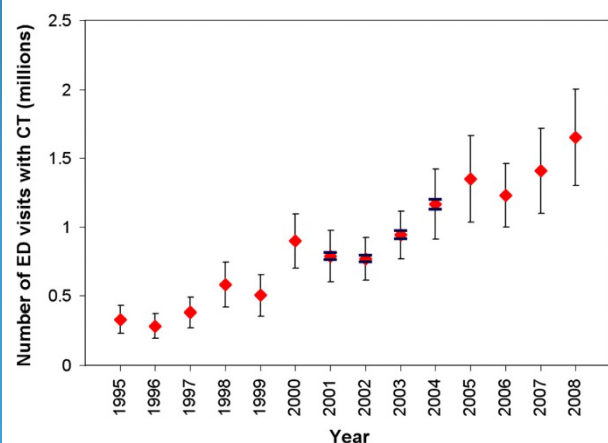
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### Abstract

The objective of this study is to characterize changes in computed tomography (CT) utilization in the pediatric emergency department (ED) over a 6-year period. CT scans ordered on pediatric (ages 0 to 17 years) ED patients from July 2000 to July 2006 were analyzed in five groups: head, cervical spine, chest, abdomen, and miscellaneous. Pediatric ED patient volume and triage acuity scores were determined. There were 6,073 CT scans performed on 4,138 pediatric patients in the ED during the study period. During this same period, 78,932 pediatric patients were evaluated in the ED. From 2000 to 2006, pediatric ED patient volume increased by 2%, while triage acuity remained stable. During this same period, head CT increased by 23%, cervical spine CT by 366%, chest CT by 435%, abdominal CT by 49%, and miscellaneous CT by 96%. Increases in CT utilization were most pronounced in adolescents ages 13 to 17 years. Increases in CT utilization in this age group met or exceeded increases seen in the adult population. In children less than 13 years of age, increases

were sub:  
increased  
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deserves

**Results:** From 1995 to 2008, the number of pediatric ED visits that included CT examination increased from 0.33 to 1.65 million, a fivefold increase, with a compound annual growth rate of 13.2%. The percentage of



## Rising Use of CT in Child Visits to the Emergency Department in the United States, 1995–2008

Expand

David B. Larson, MD, MBA, Lara W. Johnson, MD, MHS, Beverly M. Schnell, PhD, Marilyn J. Goske, MD, Shelia R. Salisbury, PhD and Howard P. Forman, MD, MBA

From the Department of Radiology (D.B.L., M.J.G.) and Division of Biostatistics and Epidemiology (B.M.S., S.R.S.), Cincinnati Children's Hospital Medical Center, 3333 Burnet Ave, MLC 5031, Cincinnati, OH 45229; Robert Wood Johnson Foundation Clinical Scholars Program (L.W.J.) and Department of Diagnostic Radiology (H.P.F.), Yale University School of Medicine, New Haven, Conn.

### Address correspondence to

D.B.L. (e-mail: david.larson@cchmc.org).

**Author contributions:** Guarantor of integrity of entire study, D.B.L.; study concepts/study design or data acquisition or data analysis/interpretation, all authors; manuscript drafting or manuscript revision for important intellectual content, all authors; manuscript final version approval, all authors; literature research, D.B.L., L.W.J., M.J.G.; statistical analysis, D.B.L., L.W.J., B.M.S., S.R.S.; and manuscript editing, all authors

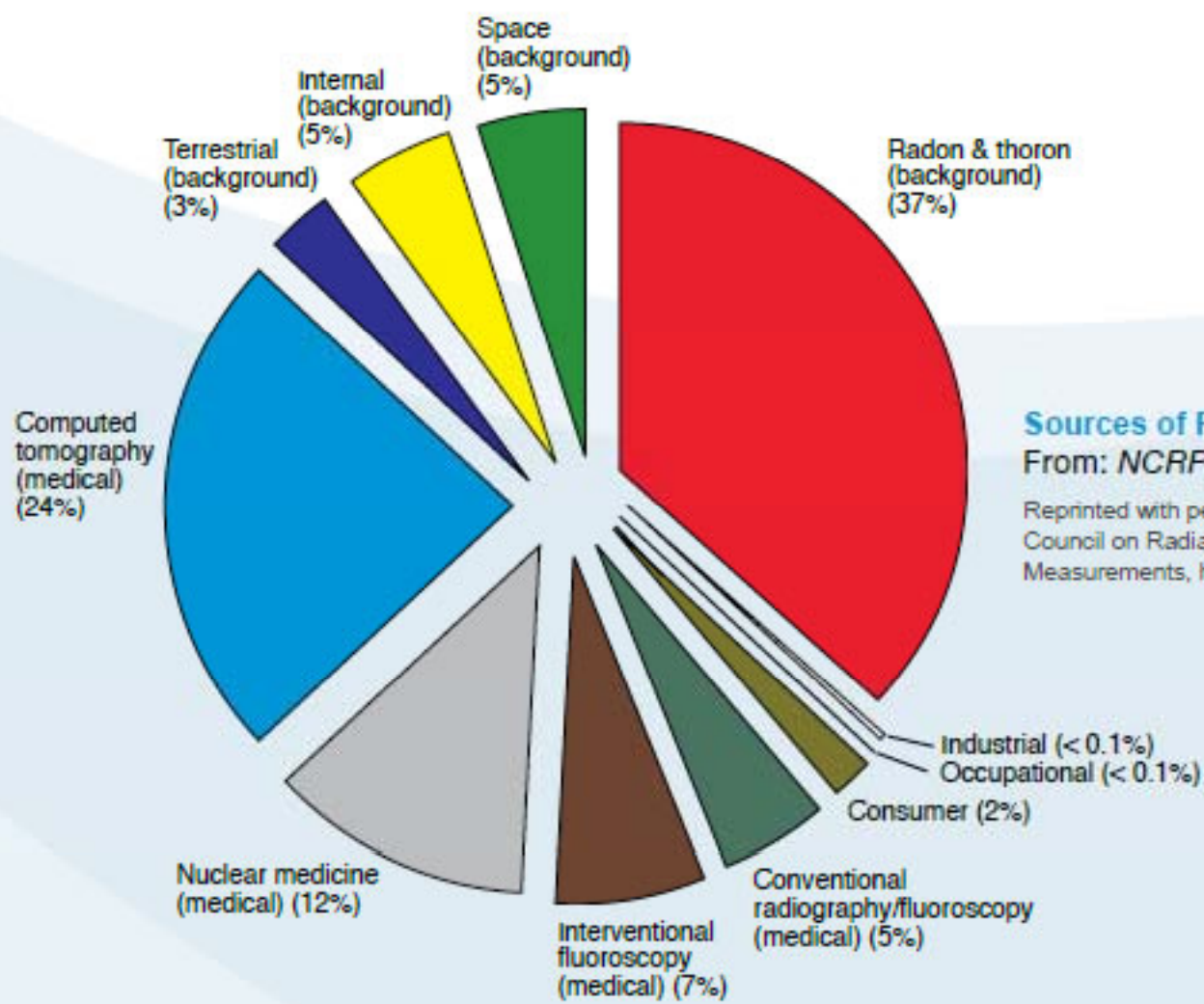
### Abstract

with a compound annual growth rate of 12.8%. The number of visits associated with CT at pediatric-focused and non-pediatric-focused EDs increased from 14 895 and 316 133, respectively, in 1995 to 212 716 and 1 438 413, respectively, in 2008. By the end of the study period, top chief complaints among those undergoing CT included head injury, abdominal pain, and headache.

**Conclusion:** Use of CT in children who visit the ED has increased substantially and occurs primarily at non-pediatric-focused facilities. This underscores the need for special attention to this vulnerable population to ensure that imaging is appropriately ordered, performed, and

vulnerable: vu

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**Sources of Radiation Exposure**  
From: *NCRP Report No. 160*

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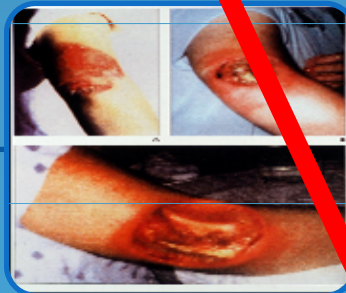
# קרינה

## אפקט דטרמיניסטי

תלוי במינון

קיים גרף סף

טרקט, אובדן שיער, כוויות

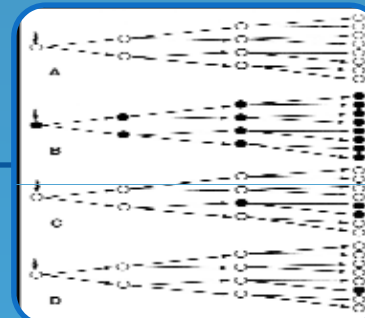


## אפקט סטוקסטי

השפעה על ה-DNA בתא

אין ערך סף ידוע

הופעה של גידול סרטני, הופעה של מוטציות בצאצאים



- Pierce and Preston (2000)
- 50,000 survivors (1988-1994)
- Risk of cancer at low dose
  - 50-150 mSv
- Excess cancer deaths

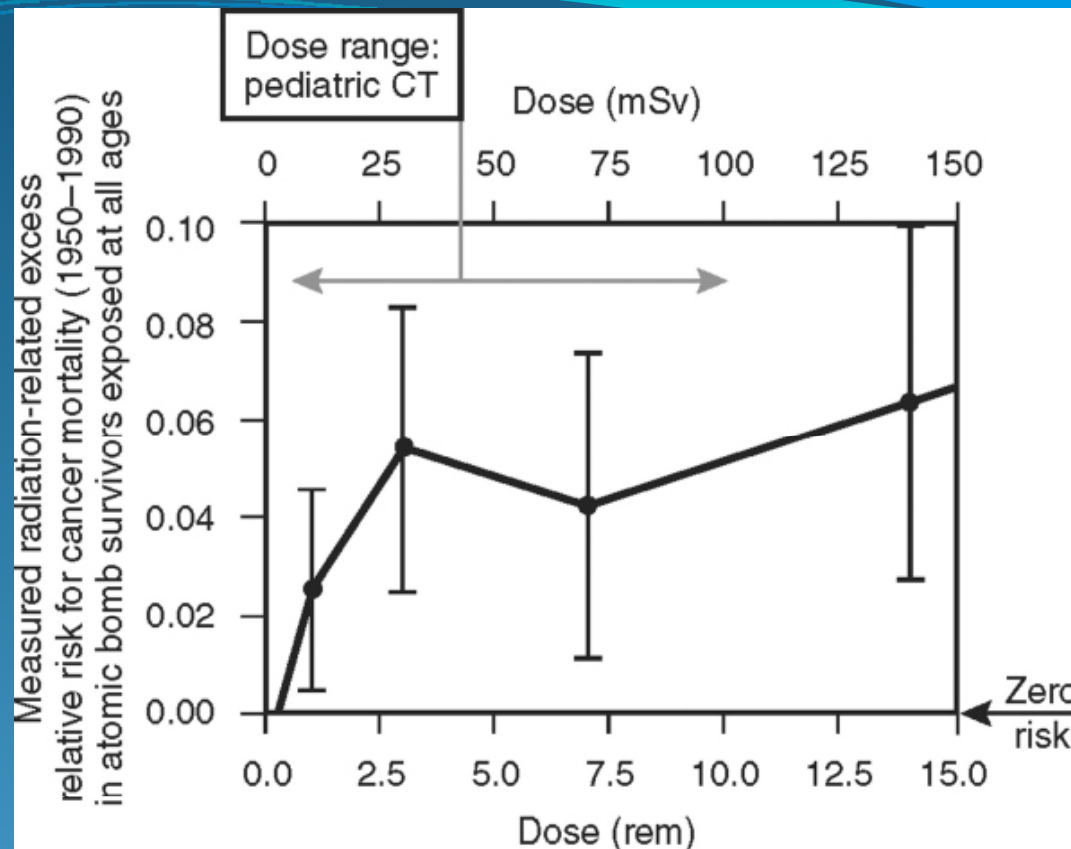
**Table 7.** Thyroid cancer after childhood radiotherapy

Study	Mean dose (Gy)	ERR/Gy
Enlarged thymus	1.4	9.1 (3.6–29)
Michael Reese tonsils	0.6	2.5 (0.6–26)
Israeli <i>tinea capitis</i>	0.1	32 (14–57)
Childhood cancer	12	1.1 (0.4–29)
A-bomb survivors (< 15 years)	0.3	4.7 (1.7–16)

**Table 3.** Breast cancer mortality and diagnostic X-rays for scoliosis (*ERR* excess relative risk; from [4])

4,822 Exposed; 644 nonexposed  
 Mean age at exposure, 10.6 years  
 Mean dose, 0.11 Gy  
 70 Observed cancers; 35.7 expected  
 ERR at 1 Sv = 5.4 (95% CI = 1.2–14)  
 Results similar to A-bomb survivors



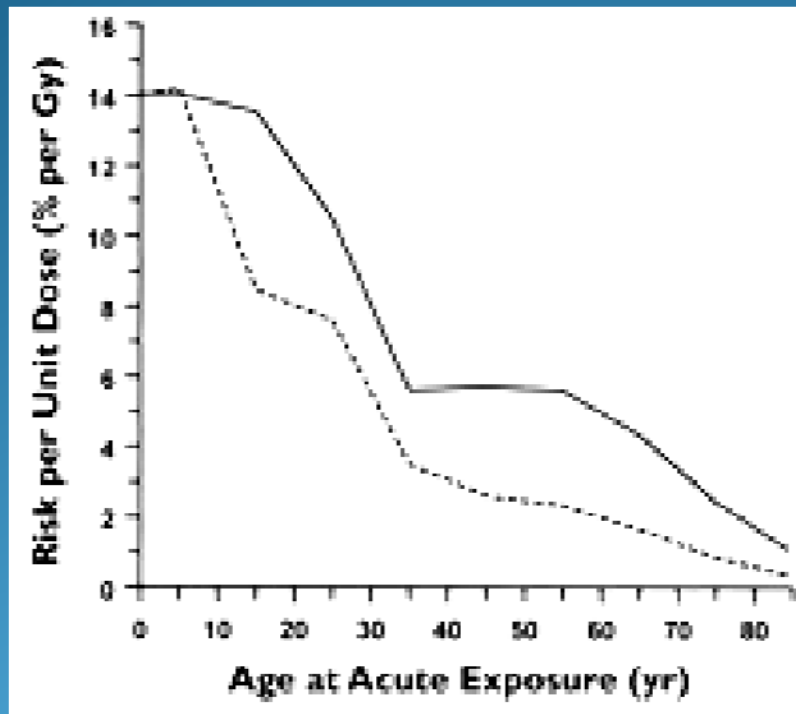


**FIGURE 1-4** Relevant dose range for pediatric CT: 6 to 100 mSv (0.006 to 0.1 Sv).  
 “There is direct, statistically significant evidence for risk in the dose range from 0 to 0.1 Sv.”

*(From Brenner DJ: Estimating cancer risks from pediatric CT: going from the qualitative to the quantitative. Pediatr Radiol 2002;32:228-231.)*



# “Estimated Risks of Radiation-Induced Fatal Cancer from pediatric CT” / Brenner et al., (AJR:176, Feb 2001)



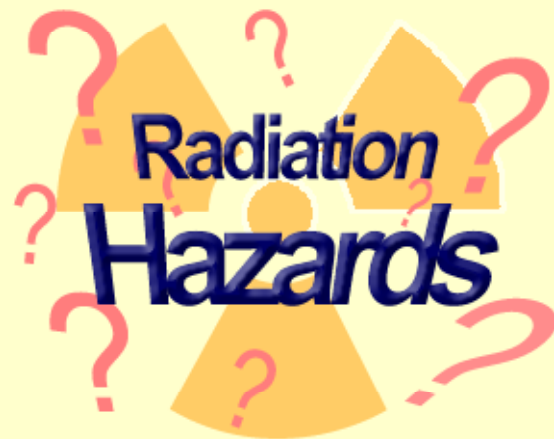
- Pediatric CT will result in significantly increased lifetime radiation risk over adult CT
  - Increased dose per mAS
  - Increased tissue radiosensitivity
  - Increased life time risk per unit dose

**Table 7**  
**Dose Summary for CT Examinations (at 120 kVp)**

Patient Age (y)	Radius (mm)*	Mean Section Dose (mGy)	Milliampere Second Setting	Energy Imparted to the Phantom (mJ)	Effective Dose (mSv)
Head Examinations					
Newborn	52.5	41.3	300	32.2	6.0
1	71.4	39.2	340	75.2	4.9
5	83.9	38.8	380	120.0	4.0
10	87.3	39.5	400	142.0	2.8
15	91.9	37.8	400	150.0	1.7
Adult	94.3	36.8	400	165.0	1.5
Abdomen Examinations					
Newborn	57.6	19.7	150	14.4	5.3
1	75.7	16.6	150	32.8	4.2
5	92.9	15.0	160	56.7	3.7
10	108.0	14.4	180	95.6	3.7
15	132.0	12.5	200	158.0	3.6
Adult	143.0	11.2	200	172.0	3.1

\* Computed with Equation (4).





## From the Editor's Notebook

### Taking Care of Children: Check Out the Parameters Used for Helical CT

**S**orry to say, but kids can get overlooked. In most cases, I am sure this is not intentional. Maybe it is more benign neglect, "out of sight, out of mind." Nevertheless, oversights do occur, some of which are unfortunate.

I am writing in the midst of our presidential campaign. I am therefore compelled to quickly add that these oversights, in our case, are not of a political nature, promises not kept—or worse, promises made with no intention of keeping them. During elections, kids are pawns in the game. When grubbing for votes, politicians promise children health care and education because it sounds good to their parents and other voters. But their promises are often hollow. Once the election is over, these same politicians, knowing they can get away with this charade (because children can't vote), find all manner of excuses for not delivering.

But, as it turns out, we as radiologists should watch what we say; those in glass houses should not throw stones. It has come to light that in one way, at least, we radiologists may be as guilty as others when it comes to not watching out for children.

In this issue Brenner et al. [1] report on their assessment of the potential risks of cancer arising as a result of the increased use of CT in the pediatric population. They point out that the use of CT has significantly increased in children (for good and clinically sound reasons). But they warn that this increased usage carries with it a potential for excessive exposure to radiation. And furthermore, the excess exposure and consequent increase in radiation dose result in an increased risk of cancer in this population.

The reason for the excess radiation dose is the common practice of using the same X-ray exposure factors for CT examinations of children as those used for adults. A report by Peterson et al. [2], also in this issue, tends to support this contention. However, such exposure factors are greater than those necessary to perform a

satisfactory CT examination in children. In fact, a perfectly satisfactory examination in a child can be obtained with approximately half the ex-

posure is accomplished with the lowest possible radiation dose. This does not likely require any significant changes in hardware, if indeed it

### Estimated Risks of Radiation-Induced Fatal Cancer from Pediatric CT

David J. Brenner<sup>1</sup>  
Carl D. Elliston<sup>1</sup>  
Eric J. Hall<sup>1</sup>  
Walter E. Berdon<sup>2</sup>

**OBJECTIVE:** the purpose of this study was to estimate the risk of radiation-induced fatal cancer from pediatric CT examinations. **MATERIALS AND METHODS:** The risk was estimated for a range of exposure factors (per unit of radiation dose) and for a range of patient sizes. **RESULTS:** The risk of radiation-induced fatal cancer is estimated to be 0.01% per unit of radiation dose for a 10-year-old child and 0.001% per unit of radiation dose for a 1-year-old child. **CONCLUSIONS:** The risk of radiation-induced fatal cancer is estimated to be 0.01% per unit of radiation dose for a 10-year-old child and 0.001% per unit of radiation dose for a 1-year-old child. **KEY WORDS:** radiation-induced fatal cancer, pediatric CT, radiation dose, risk of cancer.

**T**he use of helical CT has increased in children. The use of helical CT in children has increased from 2.8% in 1995 [1] to 10.1% in 1999 [2]. This increase in use of CT as the primary imaging technique in multiple clinical scenarios, the child with abdominal pain, suspected appendicitis, or suspected renal calculi. A major disadvantage with this increased use of helical CT is the associated radiation exposure. Radiation dose is particularly important in children because of the relatively increased lifetime cancer risk of children compared with that of adults [3–7]. Recent publications have focused on the fact that the radiation dose associated with helical CT is much greater than the dose associated with most other imaging procedures [1, 3, 4]. CT, which accounts for approximately 4% of the medical radiographic examinations, reportedly contributes 40% of the

AJR Feb 2001

### Helical CT of the Body: Are Settings Adjusted for Pediatric Patients?

Anne Peterson<sup>1</sup>  
Donald P. Frush<sup>2</sup>  
Lane F. Donnelly<sup>3</sup>

**OBJECTIVE:** Our objective was to determine whether adjustments related to patient age are made in the scanning parameters that are determinants of radiation dose for helical CT of the body.

### Perspective

### Minimizing Radiation Dose for Pediatric Body Applications of Single-Detector Helical CT: Strategies at a Large Children's Hospital

Lane F. Donnelly<sup>1,2</sup>, Kathleen H. Emery<sup>1,2</sup>, Alan S. Brody<sup>1,2</sup>, Tal Laor<sup>1,2</sup>, Victoria M. Gyllys-Morin<sup>1,2</sup>, Christopher G. Azzam<sup>1,2</sup>, Stephen R. Thomas<sup>2</sup>, Donald P. Frush<sup>2</sup>

**T**here has been much recent debate concerning the rising number of indications for which helical CT is used and the radiation dose with which helical CT is associated [1–4]. Increasing numbers of publications suggest more widespread use of CT as the primary imaging technique in multiple clinical scenarios, the child with abdominal pain, suspected appendicitis, or suspected renal calculi. A major disadvantage with this increased use of helical CT is the associated radiation exposure. Radiation dose is particularly important in children because of the relatively increased lifetime cancer risk of children compared with that of adults [5–7]. Recent publications have focused on the fact that the radiation dose associated with helical CT is much greater than the dose associated with most other imaging procedures [1, 3, 4]. CT, which accounts for approximately 4% of the medical radiographic examinations, reportedly contributes 40% of the

radiation dose, technical factors should be adjusted to minimize the radiation dose. This adjustment is the responsibility of the radiologist supervising the examination. Little attention has been given to the technical parameters that can be adjusted to reduce the radiation dose associated with CT. In this perspective, we review the adaptations made to our helical CT protocols with the intention of reducing the radiation dose to pediatric patients. We hope that by calling attention to the issue of reducing radiation exposure in the pediatric population, these adaptations will be implemented for helical CT in pediatric and general imaging departments. Two parameters that can be adjusted easily and that have a profound effect on radiation dose are tube current and pitch.

#### Tube Current (mA)

In conventional radiography, the need to tar-

get, according to the child's size. It is unacceptable to use a tube current setting that is appropriate for an adult on a child. In review articles concerning helical CT of pediatric patients, the recommended tube current setting has been progressively decreasing over the past several years [9, 10, 11]. A recent review article on the subject suggested 80–140 mA for helical CT of the chest and 100–160 mA for evaluation of the abdomen [10]. Although few articles have compared image quality using different tube current settings for the abdomen in pediatric patients, several investigations have suggested that the tube current setting can be significantly reduced from adult doses within the chest without loss of important diagnostic information [12–15]. A recent article that compared helical CT of the chest with tube currents as low as 12.5 mA with that of a more standard technique (175 mA) showed that although there was a statistically significant increase in the amount of noise

AJR 176, February 2001

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<sup>1</sup>Center for Radiology Research, Columbia University, 600 W. 168th St., New York, NY 10032. Address correspondence to D. J. Brenner.

<sup>2</sup>Department of Radiology, Division of Pediatric Radiology, Columbia Presbyterian Medical Center, 630 W. 168th St., New York, NY 10032.

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DOI: 10.2214/ajr.176.209

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AJR 176, February 2001



LNT – Linear No Threshold  
Theory

ALARA –  
As Low As Reasonably  
Achievable

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## The Alliance for Radiation Safety in Pediatric Imaging

Test Procedures | In The News | Parent | Radiologic Technologist | Medical Physicist | Radiologist | Referring Physician | Partners in Industry | Global Resources | FAQs

*image gently* when we care for kids! The *image gently* Campaign is an initiative of the Alliance for Radiation Safety in Pediatric Imaging. The campaign goal is to change practice by increasing awareness of the opportunities to promote radiation protection in the imaging of children.

### Image Gently Impact

The *image gently* campaign launched 1/22/08. This is a snapshot of what has happened since:

- 18,180 medical professionals have taken the pledge
- This website has been visited 391,142 times
- The CT protocol has been downloaded over 26,425 times

 [Click here to take the image gently pledge!](#)

### Quick Links

Proof of IG Pledge	Referring Physician
Protocols	Radiologic Technologist
Resources	Medical Physicist
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### Back to Basics...

Image Gently's latest initiative released September 2012. [Click here for new resources in Digital Radiography!](#) This rollout includes PQI projects, parent information, and a large selection of educational materials.

[Back to Basics](#) | [Butterfly Award](#) | [IAEA Report](#) | [Posters](#) | [TO PARENTS](#)

### Recent News

#### NCRP Report 172 Available

The NCRP Report No. 172, *Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States* is now available. This Report represents an important continuation of NCRP reports on radiation safety and health protection in medicine and lays the foundation for the development and application of DRLs and achievable doses for diagnostic x-ray examinations. [Please click here to read the NCRP press release and for information on how to purchase a copy.](#)

#### Public Service Announcement features Image Gently

### News from Image Wisely

The Minnesota Department of Health is the first state health agency in the country...

Thanks to everyone who has pledged to image wisely, including many this week at...

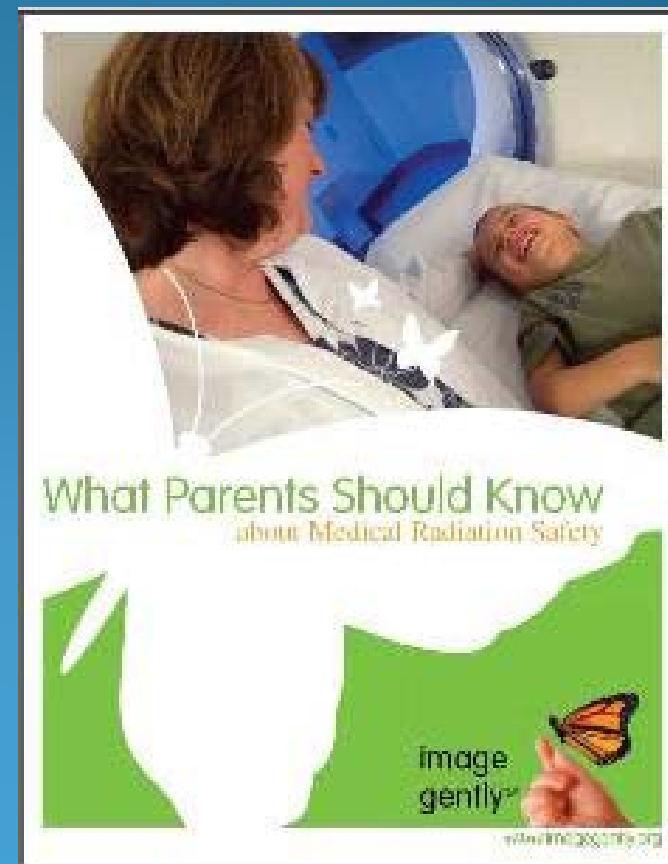
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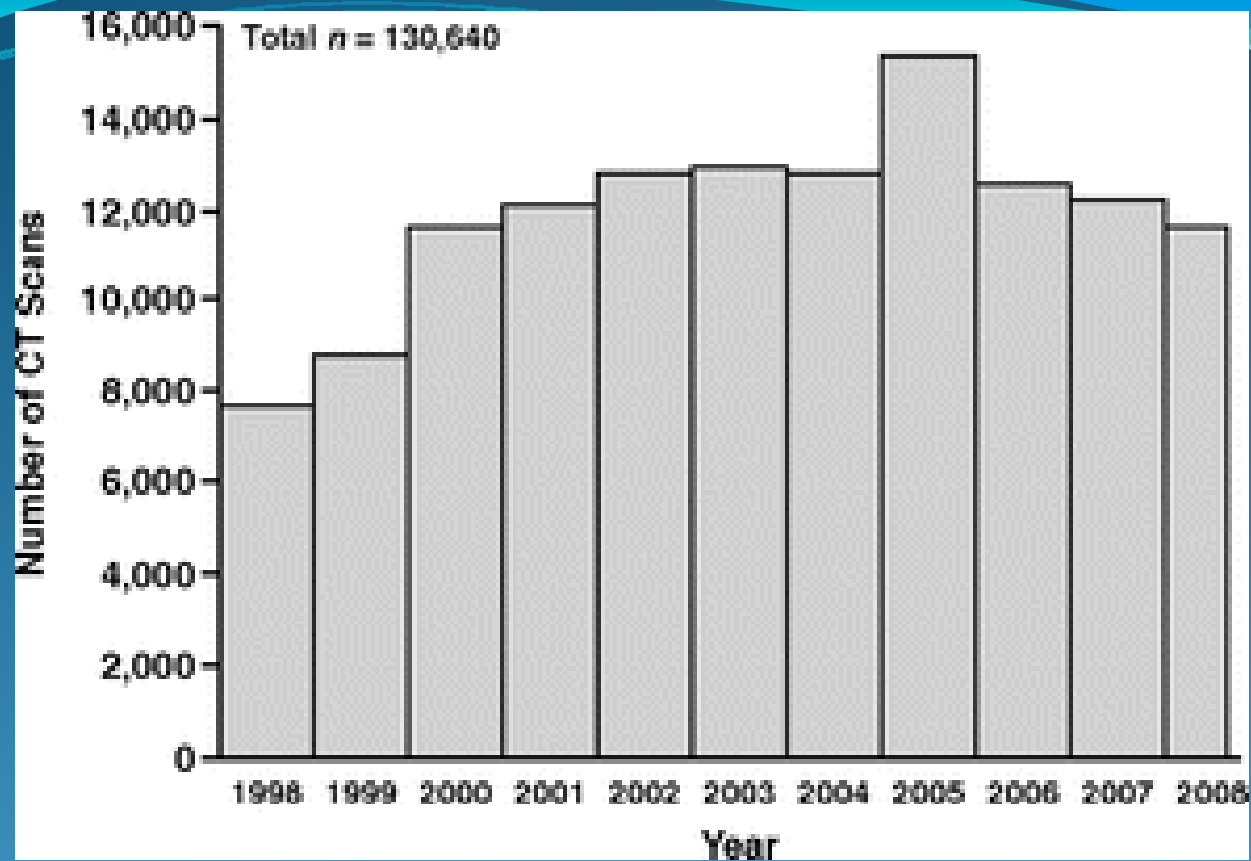
### News from the IAEA

[Public Service Announcement features Image Gently](#)



<http://www.pedrad.org>





## Has Pediatric CT at Children's Hospitals Reached Its Peak?

Brent A. Townsend<sup>1 2</sup>, Michael J. Callahan<sup>1</sup>, David Zurakowski<sup>1</sup> and George A. Taylor<sup>1</sup>

AJR, May 2010, Volume 194, Number 5

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


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# Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study

[Kim](#) PhD , [Nicola L. Howe](#) MSc , [Cecile M. Ronckers](#) PhD , [Preetha Rajaraman](#) PhD , [Alan W. Craft](#) MD , [Louise Parker](#) PhD ,  
[Amy Barrington de González](#) DPhil [Download images](#)

## Findings

During follow-up, 74 of 178 604 patients were diagnosed with leukaemia and 135 of 176 587 patients were diagnosed with brain tumours. We noted a positive association between radiation dose from CT scans and leukaemia (excess relative risk [ERR] per mGy 0.036, 95% CI 0.005–0.120;  $p=0.0097$ ) and brain tumours (0.023, 0.010–0.049;  $p<0.0001$ ). Compared with patients who received a dose of less than 5 mGy, the relative risk of leukaemia for patients who received a cumulative dose of at least 30 mGy (mean dose 51.13 mGy) was 3.18 (95% CI 1.46–6.94) and the relative risk of brain cancer for patients who received a cumulative dose of 50–74 mGy (mean dose 60.42 mGy) was 2.82 (1.33–6.03).



## Interpretation

Use of CT scans in children to deliver cumulative doses of about 50 mGy might almost triple the risk of leukaemia and doses of about 60 mGy might triple the risk of brain cancer. Because these cancers are relatively rare, the cumulative absolute risks are small: in the 10 years after the first scan for patients younger than 10 years, one excess case of leukaemia and one excess case of brain tumour per 10 000 head CT scans is estimated to occur. Nevertheless, although clinical benefits should outweigh the small absolute risks, radiation doses from CT scans ought to be kept as low as possible and alternative procedures, which do not involve ionising radiation, should be considered if appropriate.

Within 10 years after the first scan for patients younger than 10 years, one excess case of leukaemia and one excess case of brain tumour per 10 000 head CT scans is estimated to occur. Nevertheless, although clinical benefits should outweigh the small absolute risks, radiation doses from CT scans ought to be kept as low as possible and alternative procedures, which do not involve ionising radiation, should be considered if appropriate.

## Funding

US National Cancer Institute and UK Department of Health.


[Review](#) Chernobyl-related ionising radiation exposure and cancer risk: an epidemiological review [Seminar](#) Aetiology of acute leukaemia 



**SPR Response to *Lancet* article re  
Radiation Exposure from CT Scans in  
Childhood and Subsequent  
Risk of Leukemia and Brain Tumors –  
June 6, 2012  
The**

## RESEARCH

## Cancer risk in 680 000 people exposed to computed tomography scans in childhood or adolescence: data linkage study of 11 million Australians

 OPEN ACCESS

John D Mathews *epidemiologist*<sup>1</sup>, Anna V Forsythe *research officer*<sup>1</sup>, Zoe Brady *medical physicist*<sup>12</sup>, Martin W Butler *data analyst*<sup>3</sup>, Stacy K Goergen *radiologist*<sup>4</sup>, Graham B Byrnes *statistician*<sup>5</sup>, Graham G Giles *epidemiologist*<sup>6</sup>, Anthony B Wallace *medical physicist*<sup>7</sup>, Philip R Anderson *epidemiologist*<sup>8,9</sup>, Tenniel A Guiver *data analyst*<sup>8</sup>, Paul McGale *statistician*<sup>10</sup>, Timothy M Cain *radiologist*<sup>11</sup>, James G Dowty *research fellow*<sup>1</sup>, Adrian C Bickerstaffe *computer scientist*<sup>1</sup>, Sarah C Darby *statistician*<sup>10</sup>

<sup>1</sup>School of Population and Global Health, University of Melbourne Vic, Australia; <sup>2</sup>Medical Benefits Scheme Analytics Section, Department of Imaging, Southern Health, and Monash University Southern Clinical Research on Cancer, Lyon, France; <sup>3</sup>Cancer Epidemiology Centre Medicine Section, Australian Radiation Protection and Nuclear Safety Commission, Canberra, Australia; <sup>4</sup>Faculty of Health, University of Oxford, Oxford, UK; <sup>5</sup>Medical Imaging

For brain cancer and for all cancers combined, IRRs were highest for CT exposures in children younger than 5 years, and decreased with increasing age at first exposure ( $P=0.001$  for trend for brain cancer,  $P<0.001$  for trend for all cancers; table 7⇓). For all solid cancers other than brain cancer, the IRR also tended to decrease with increasing age at first exposure ( $P=0.06$  for trend). Despite these reductions, the IRR remained significantly increased in the oldest group at first exposure, for brain cancers, all cancers combined, and all solid cancers other than brain cancer. For lymphoid and haematopoietic cancers



**Conclusions** The increased incidence of cancer after CT scan exposure in this cohort was mostly due to irradiation. Because the cancer excess was still continuing at the end of follow-up, the eventual lifetime risk from CT scans cannot yet be determined. Radiation doses from contemporary CT scans are likely to be lower than those in 1985-2005, but some increase in cancer risk is still likely from current scans. Future CT scans should be limited to situations where there is a definite clinical indication, with every scan optimised to provide a diagnostic CT image at the lowest possible radiation dose.

#### **What is already known on this topic**

CT scanning rates have risen substantially since the 1980s. Although large doses of ionising radiation are known to cause cancer, there is uncertainty about the risks following the lower doses from CT scans (5-50 mGy per organ)

A recent study of 180 000 young people exposed to CT scans in the United Kingdom found an increasing risk of leukaemia and brain cancer with increasing radiation dose

#### **What this study adds**

Among 680 000 Australians exposed to a CT scan when aged 0-19 years, cancer incidence was increased by 24% (95% confidence interval 20% to 29%) compared with the incidence in over 10 million unexposed people. The proportional increase in risk was evident at short intervals after exposure and was greater for persons exposed at younger ages

By 31 December 2007, with an average follow-up of 9.5 years after exposure, the absolute excess cancer incidence rate was 9.38 per 100 000 person years at risk

Incidence rates were increased for most individual types of solid cancer, and for leukaemias, myelodysplasias, and some other lymphoid cancers

מה נייעץ להורים?



# כיצד נחסוך קרינה לילדים

- האם נדרשת בדיקת הדמייה? (האם בדיקה דרושה לשם האבחנה והאם הטיפול ישתנה בהתאם לתוצאות הבדיקה)
- כאשר נדרשת בדיקה – מה היא הבדיקה המתאימה ביותר? (האם בדיקות אשר אינן מייצרות קרינה מייננת מתאימות לענות על השאלה)

**מניעת בדיקת CT מיותרת**



MRA

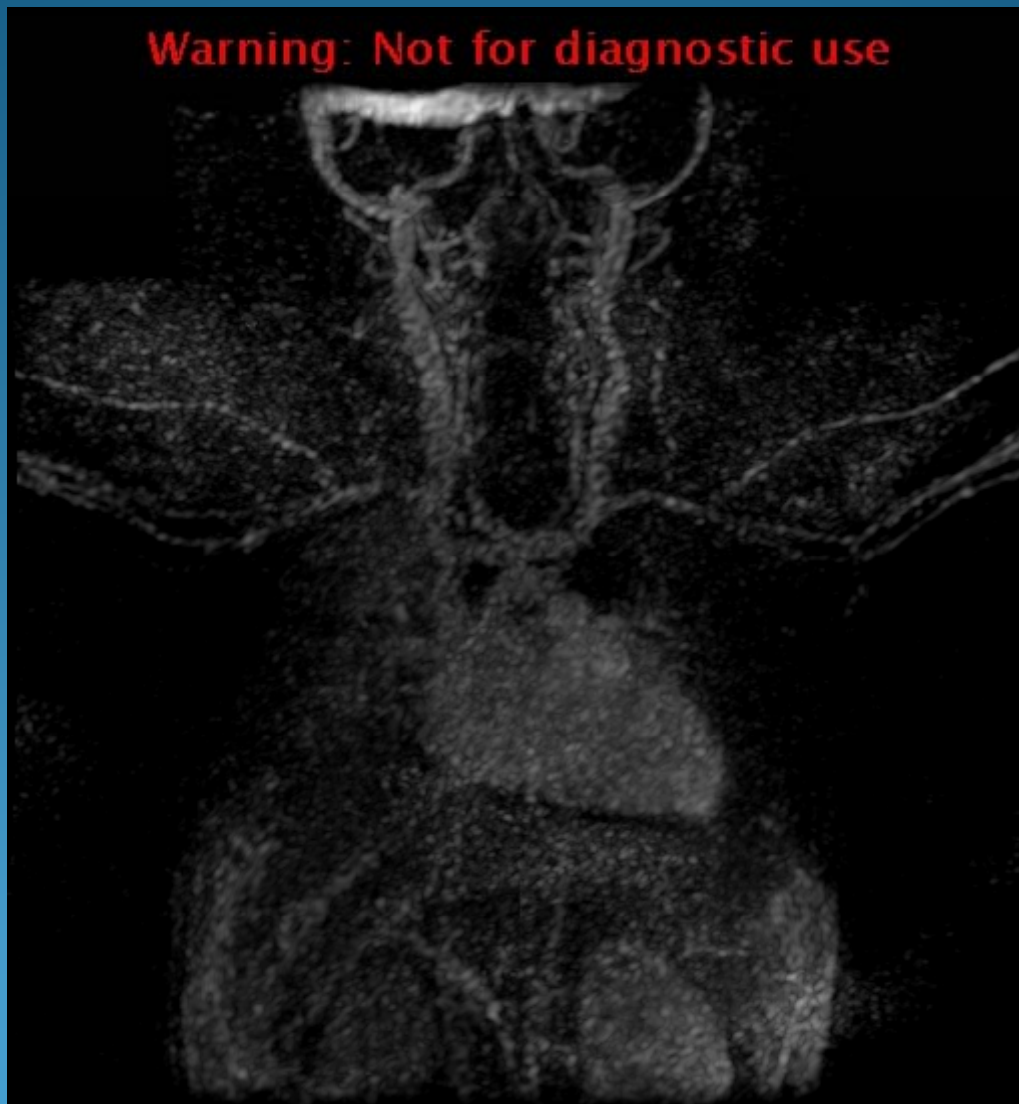
- Non ionizing radiation
- **Better temporal resolution**

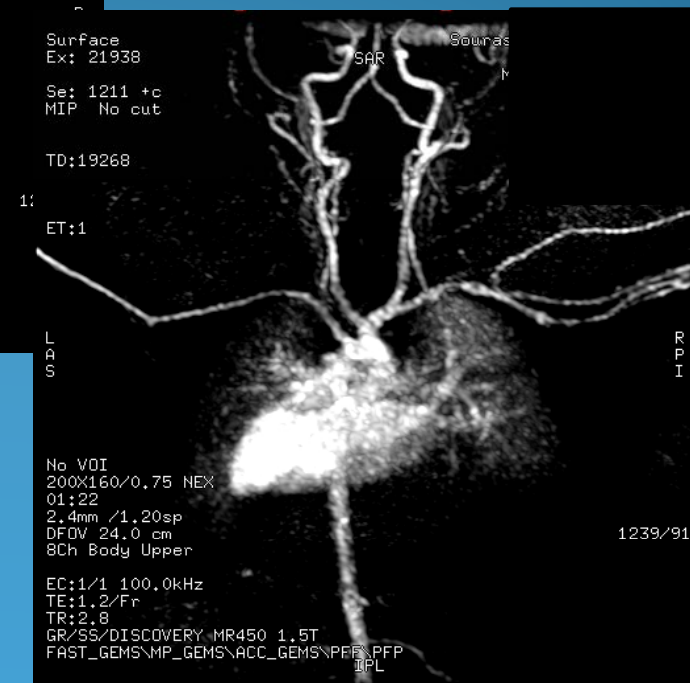
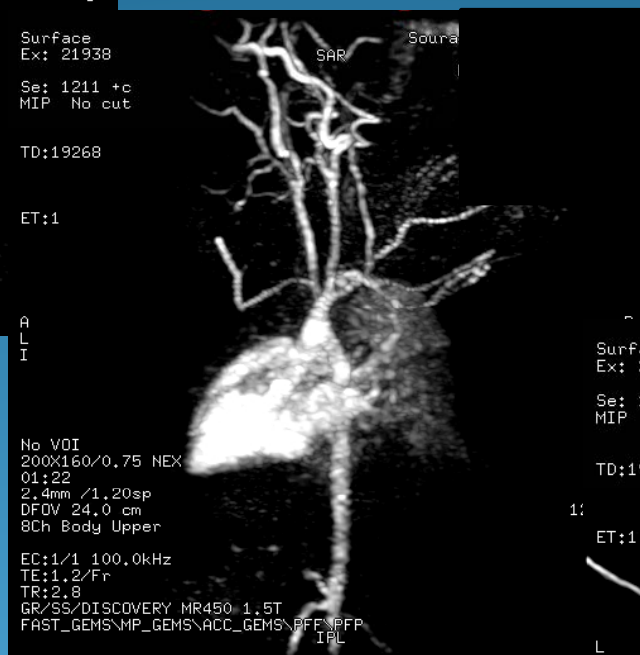
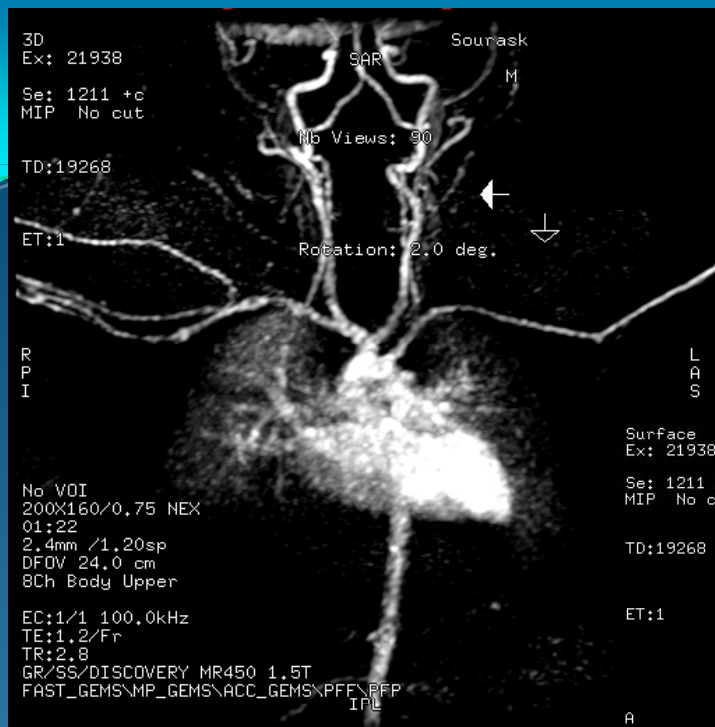


CTA

- Ionizing radiation
- **Better spatial resolution**

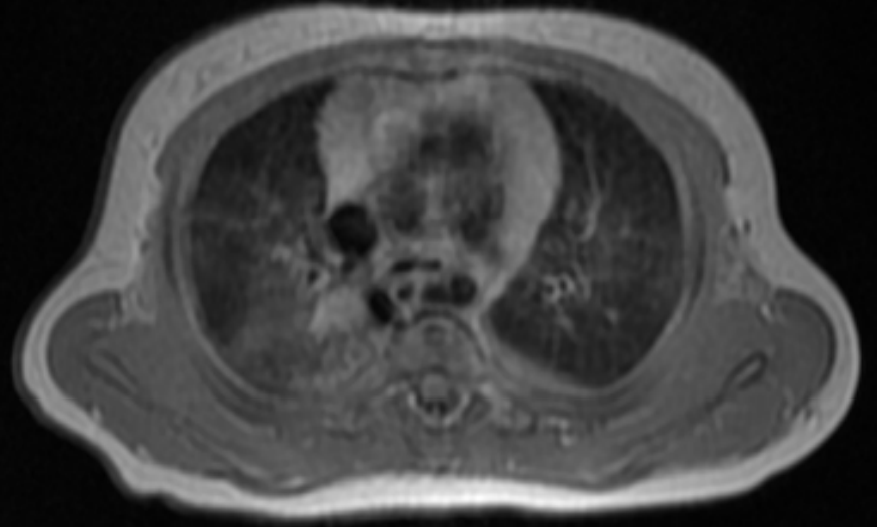
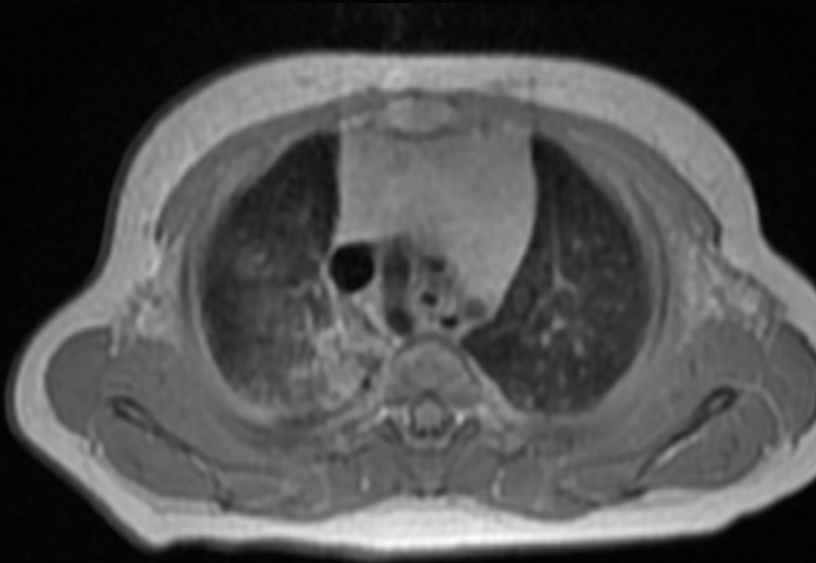
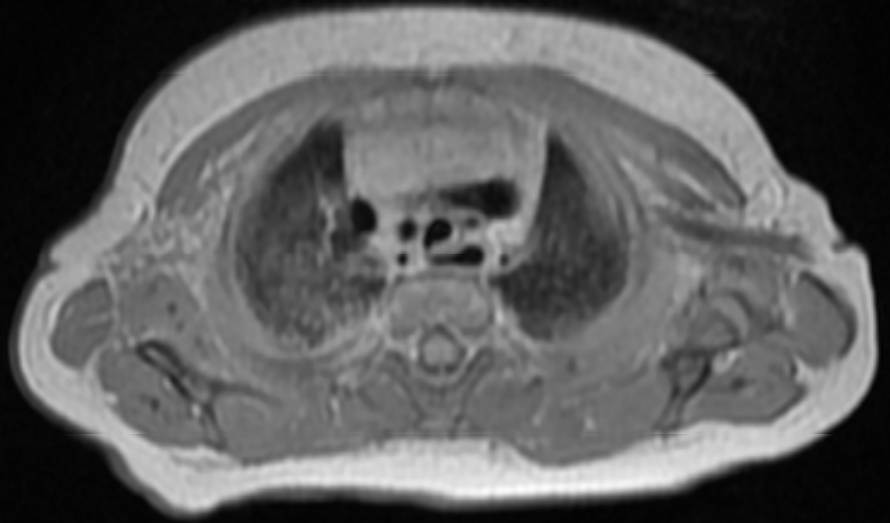
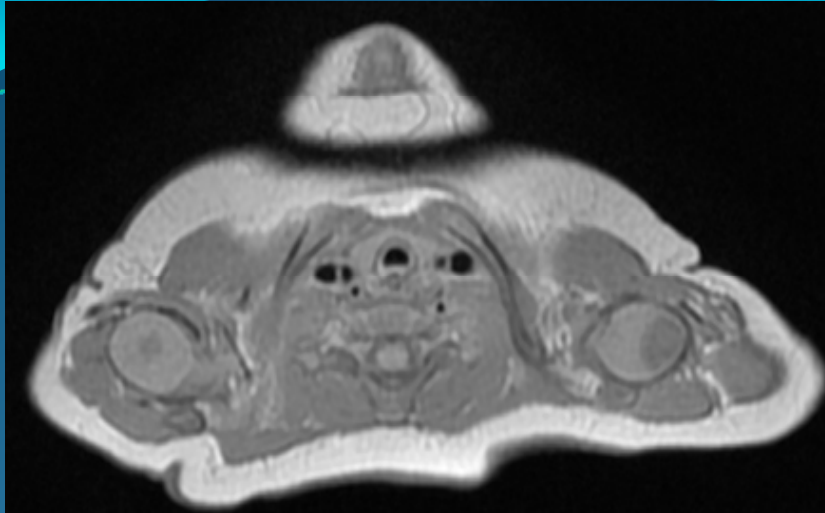
**Warning: Not for diagnostic use**





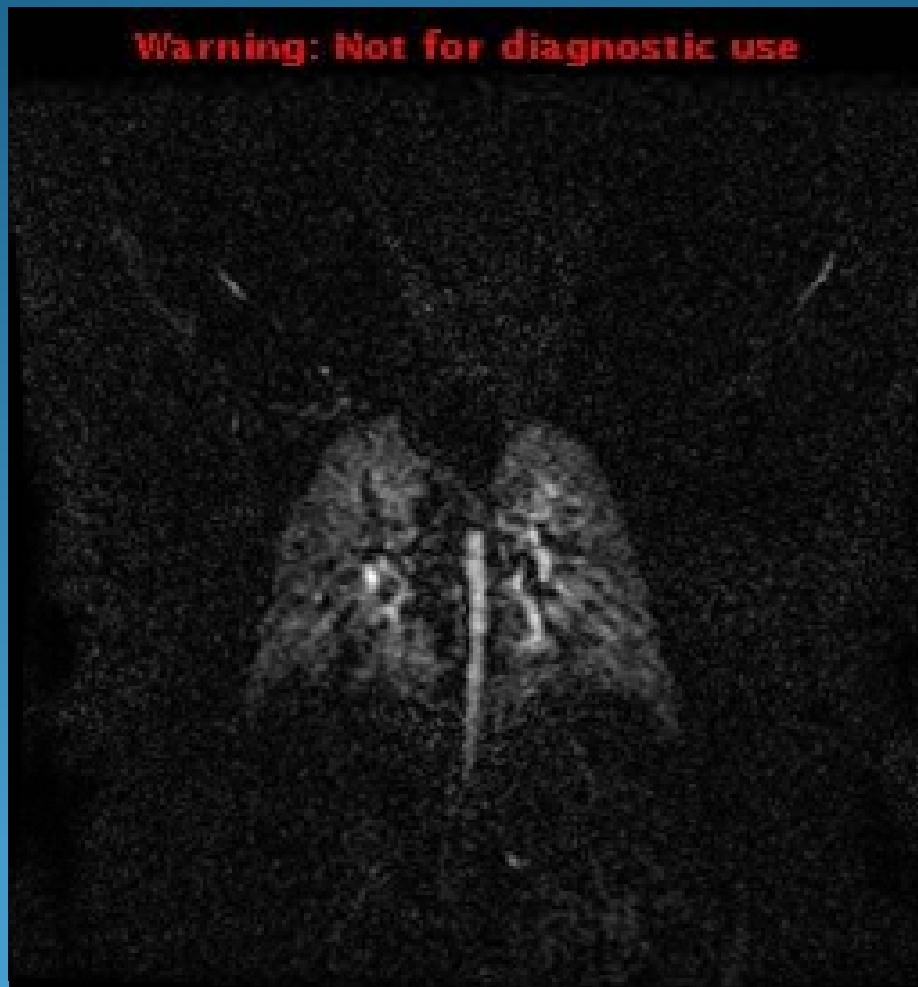
# מקרה 1

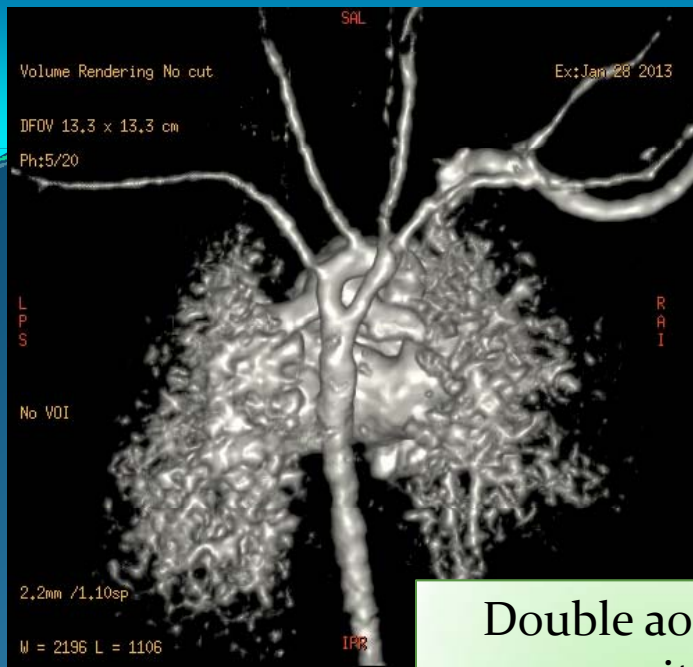
- בן 3 חודשים
- מצוקה נשימתית מתגברת עם רעש נשימתי
- FTT
- בברונכוסקופיה היצרות ניכרת מלווה בלחץ פועם בשליש התחתון של הקנה
- חשד לטבעת וסקולרית



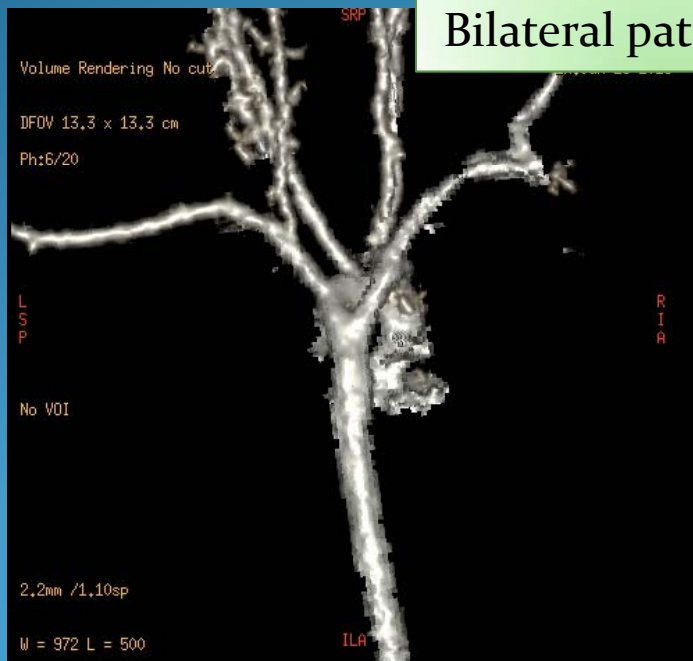
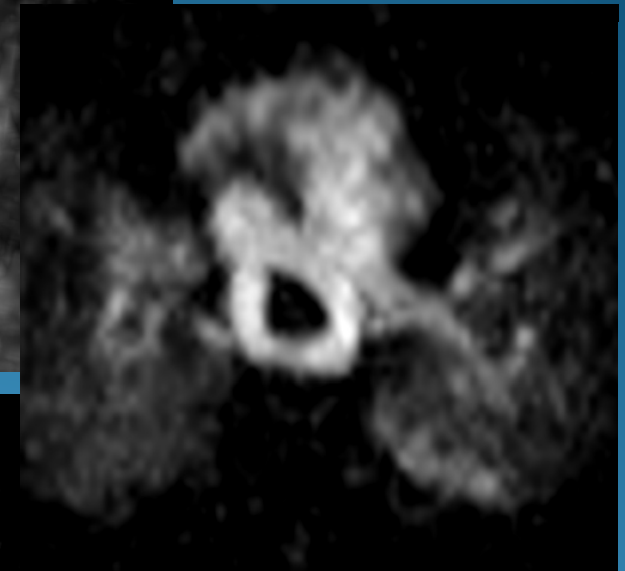
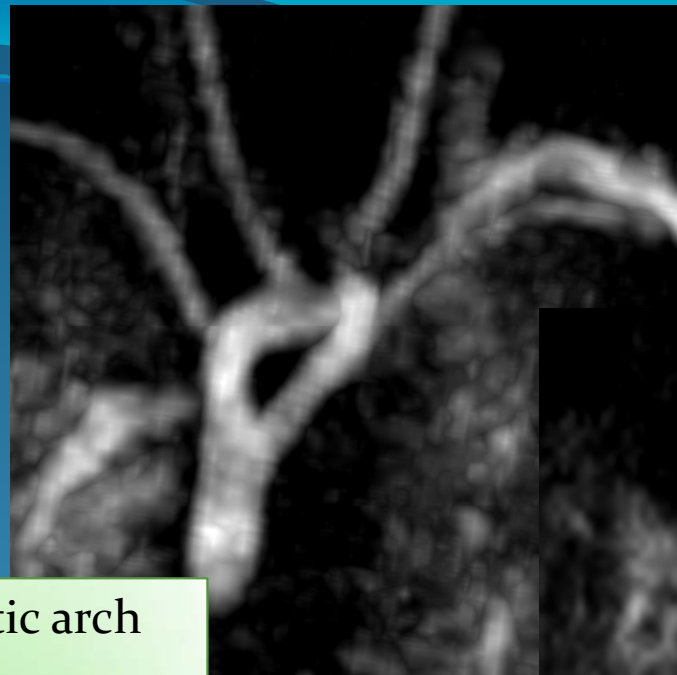


Warning: Not for diagnostic use





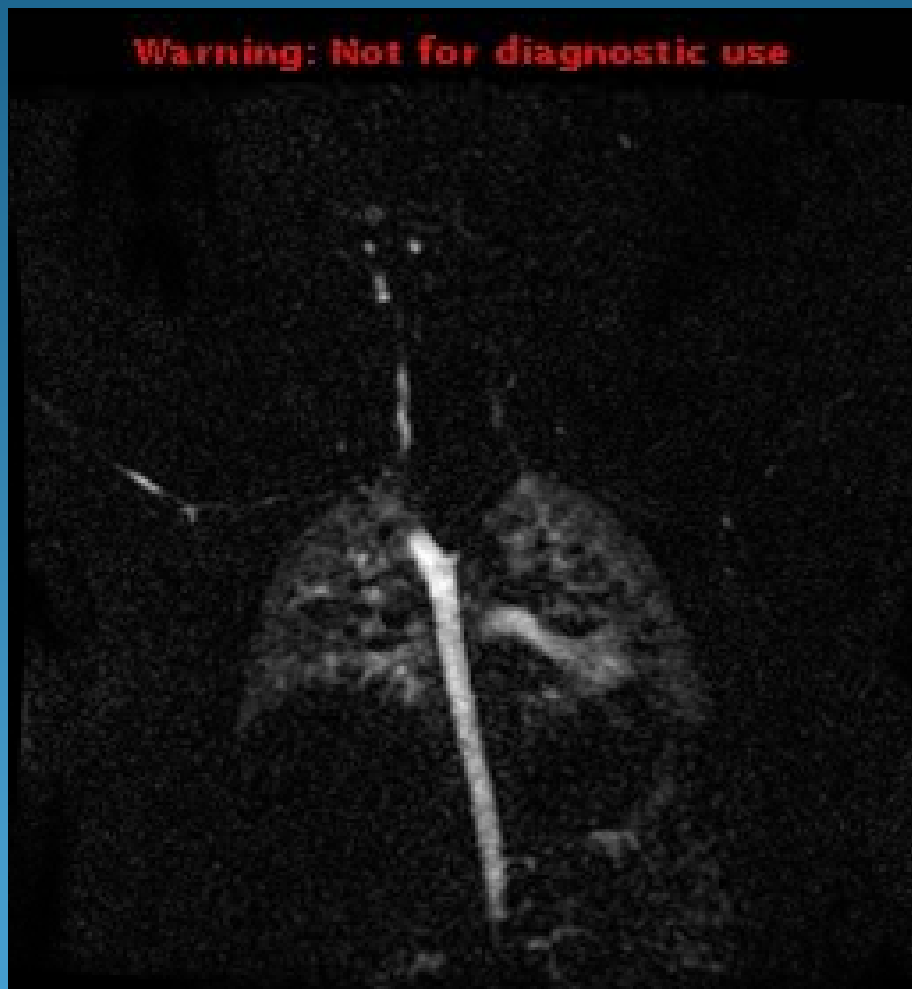
Double aortic arch  
with  
Bilateral patent arches

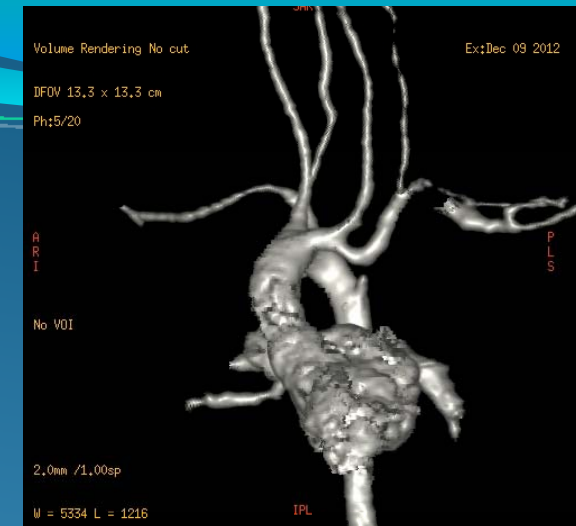
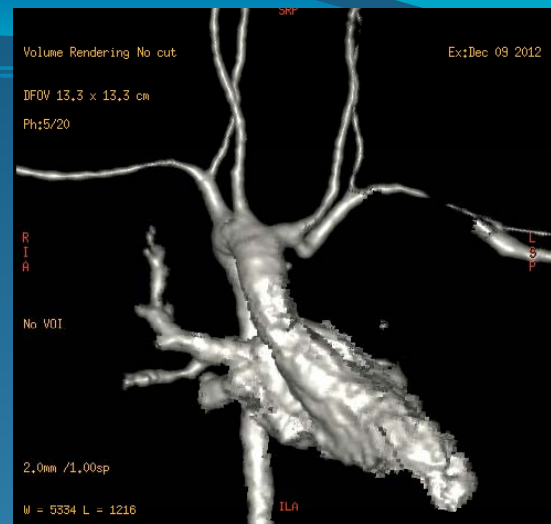


# מקרה 2

- בן 12 חודשים
- קוצר נשימה וארועי השתנקות בעת אכילה
- בברונכוסקופיה הצרות קשה של הקנה עם לחץ קידי פועם
- חשד לטבעת וסקולרית

**Warning: Not for diagnostic use**

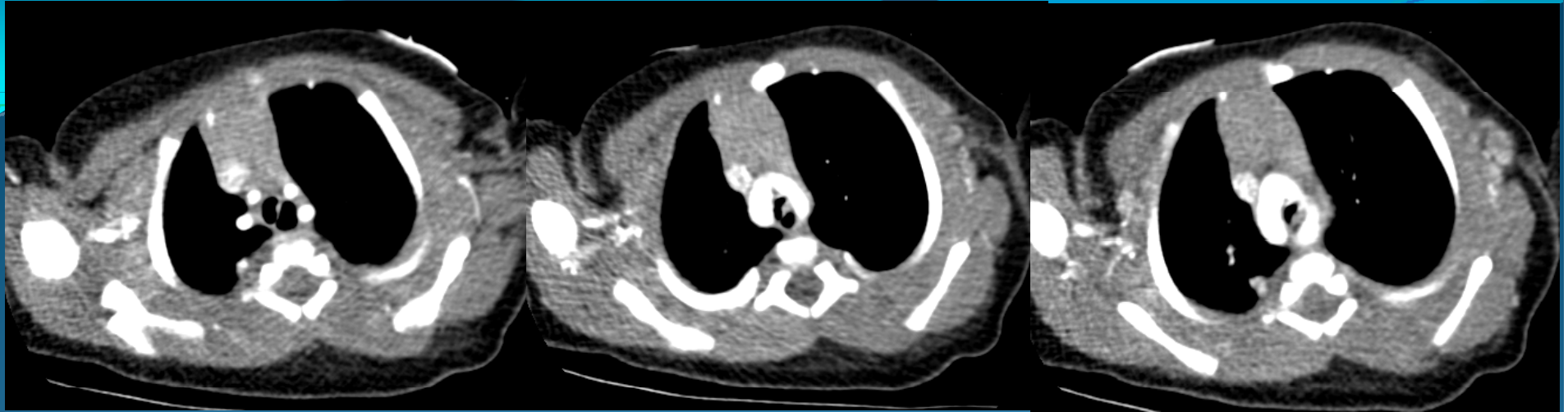




Double aortic arch  
with  
Dominant right arch  
and short segment  
atresia in left arch



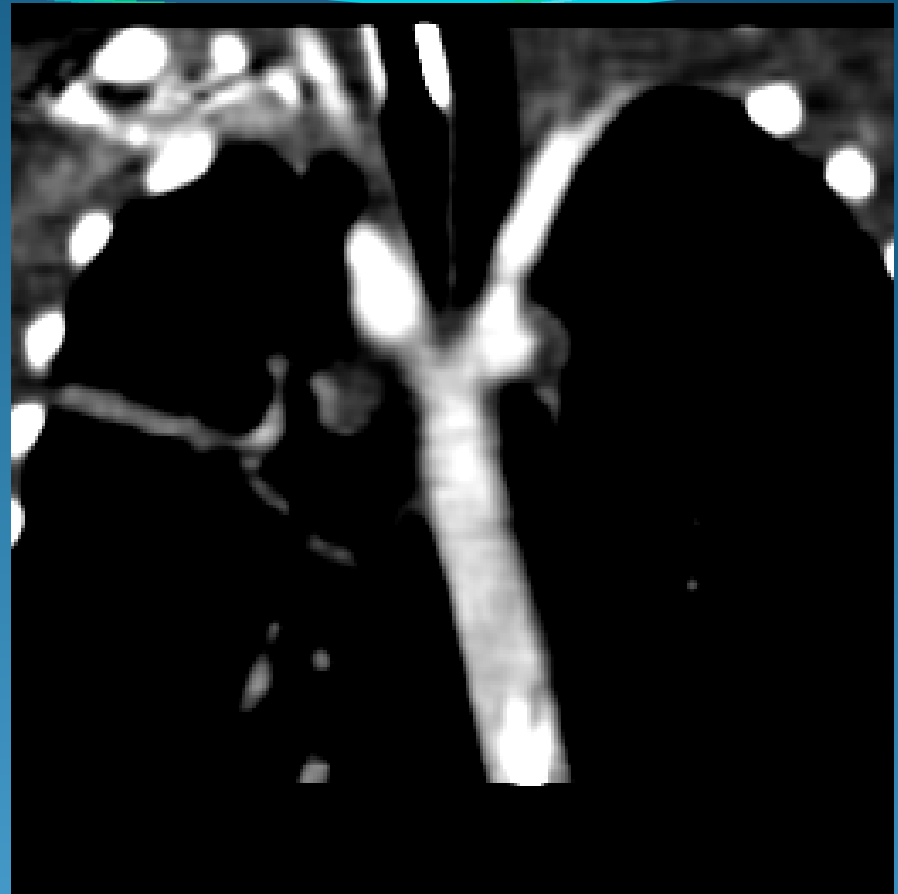




Double aortic arch  
with  
Bilateral patent arches



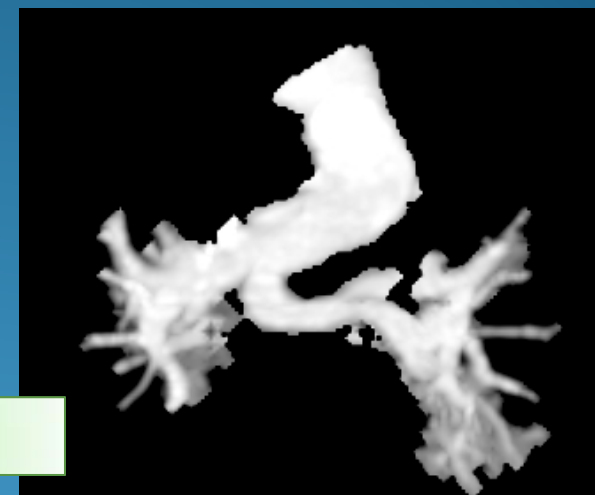
MRA



CTA

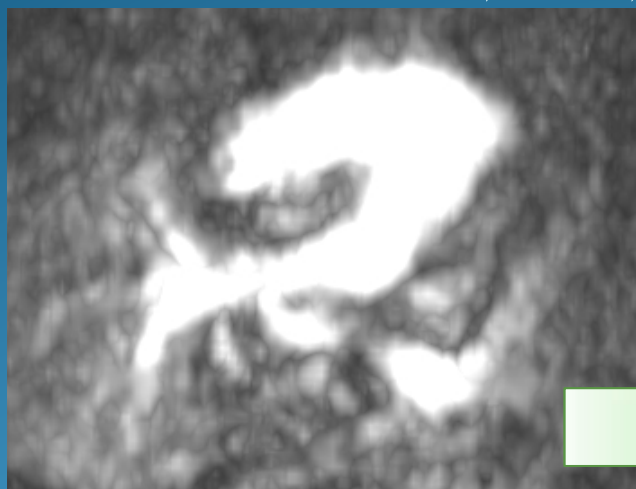
מקרה 4

בת 9 חודשים, אשר אושפזה עם אי ספיקה  
נשימתית  
בברונכוסקופיה הצרות קשה בקנה על רקע  
טבעת סחוסית מלאה

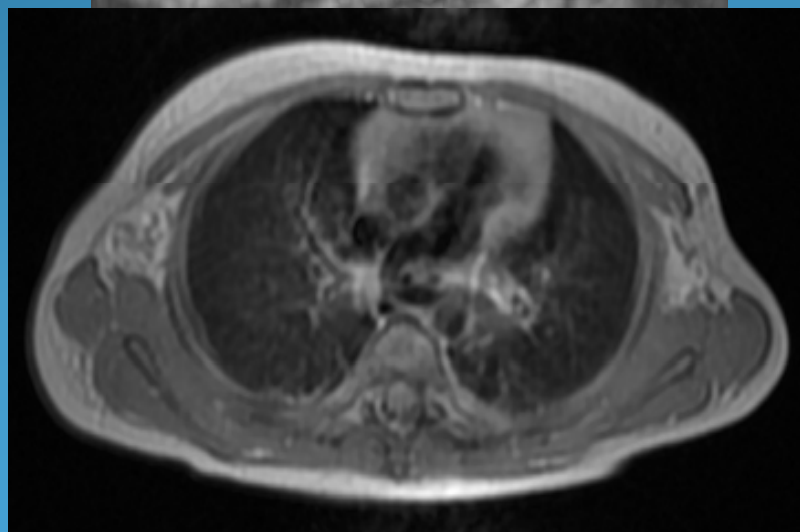


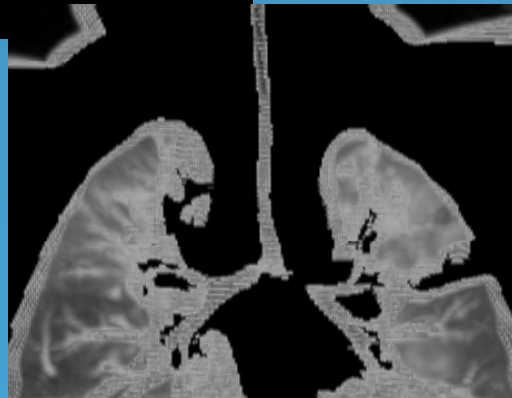
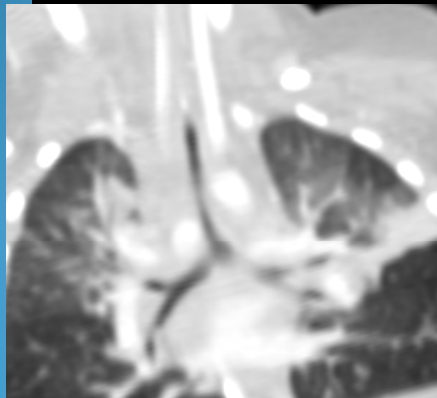
מקרה 5

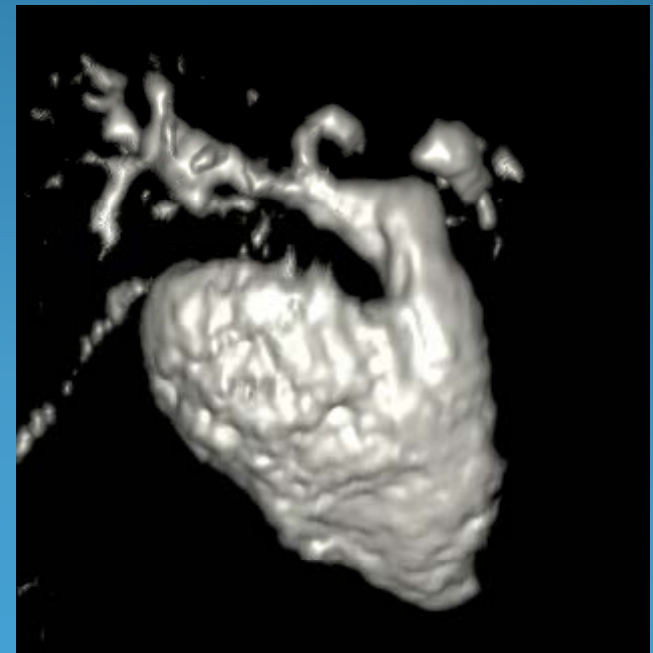
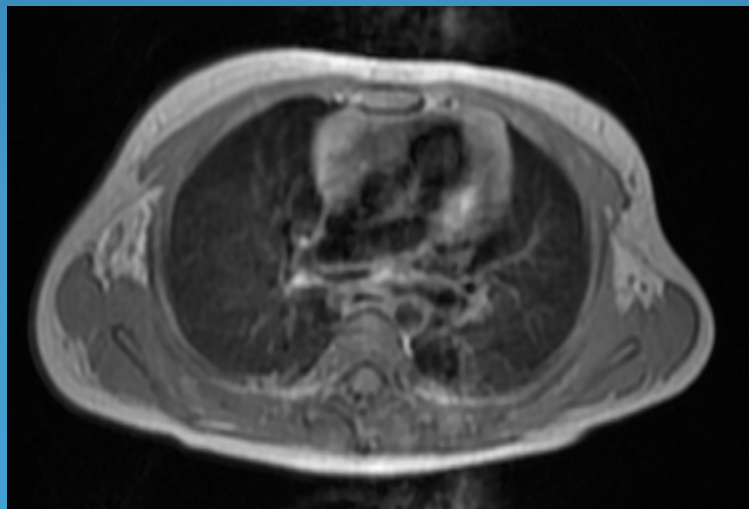
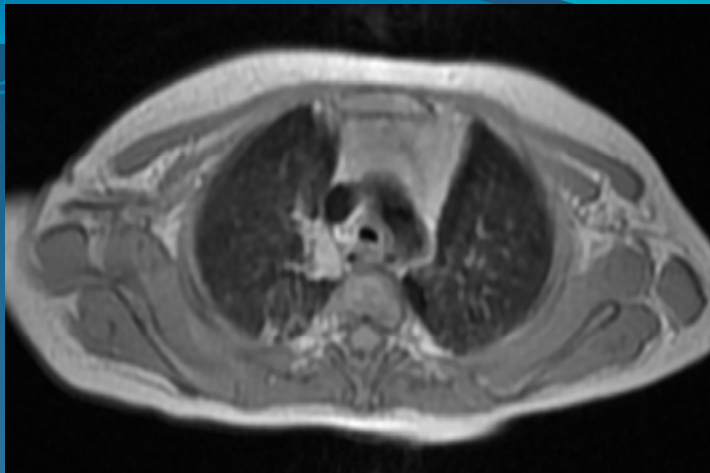
בן 9 חודשים, מצוקה נשימתית עם רעש  
נשימתי קבוע  
בברונכוסקופיה הצרות פועמת בשליש  
תחתון של הקנה



Pulmonary Sling











MRA

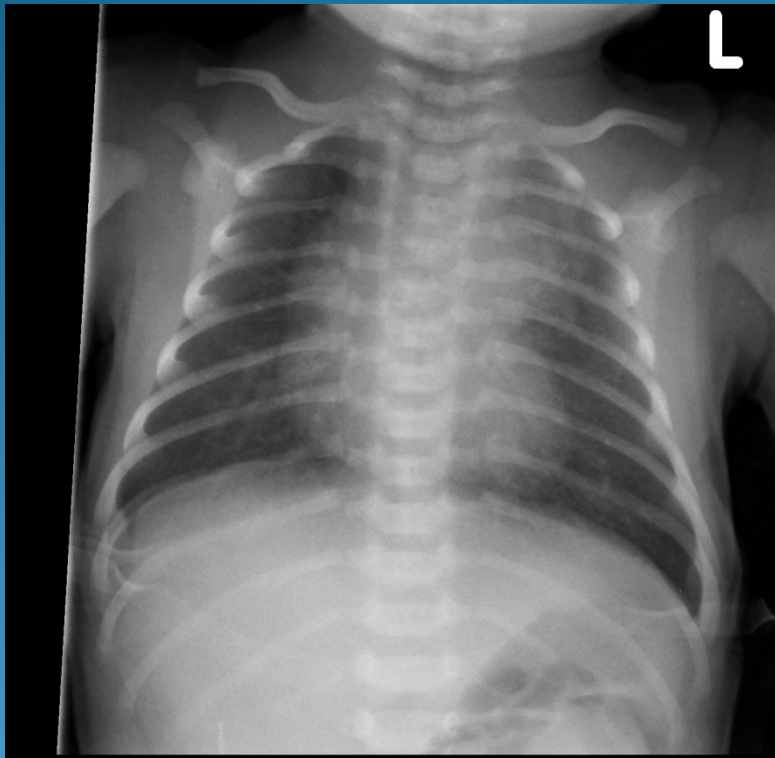
- Non Ionizing Radiation
- Better temporal resolution
- **Better delineation of mediastinal structures**
  - Better soft tissue characterization
  - Demonstrates segmental bronchii



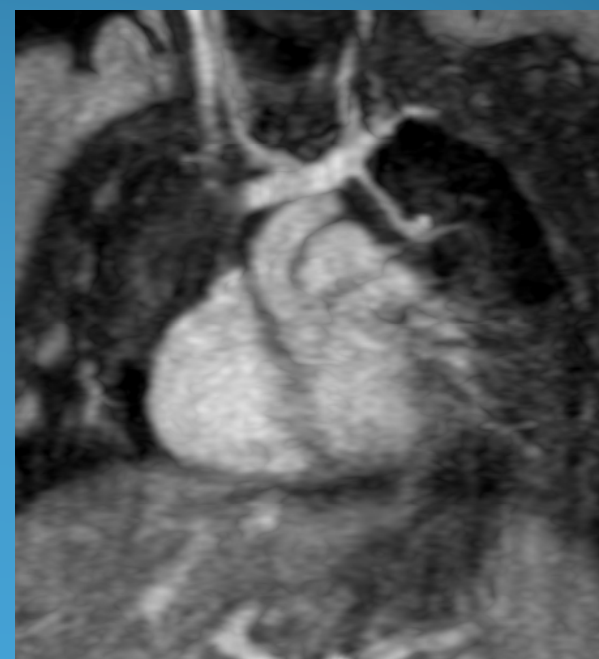
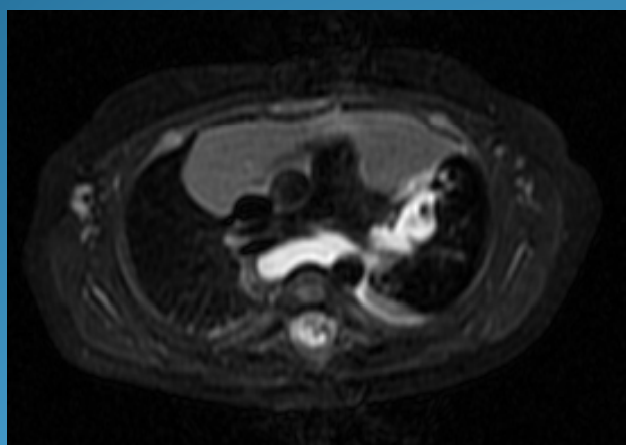
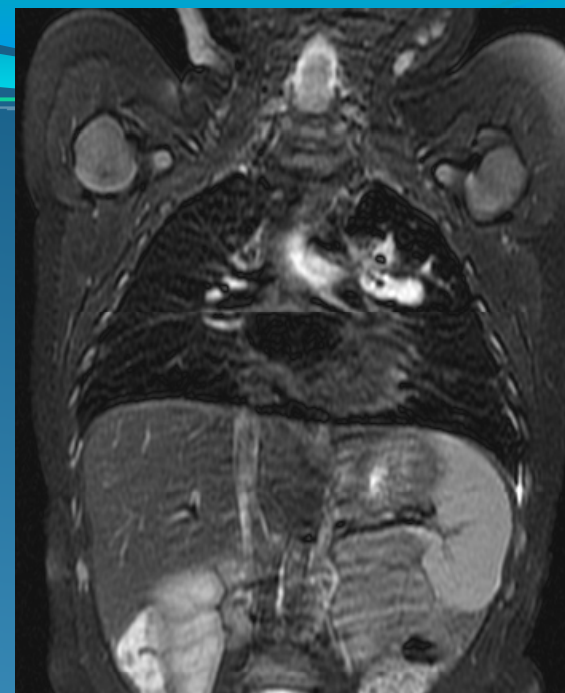
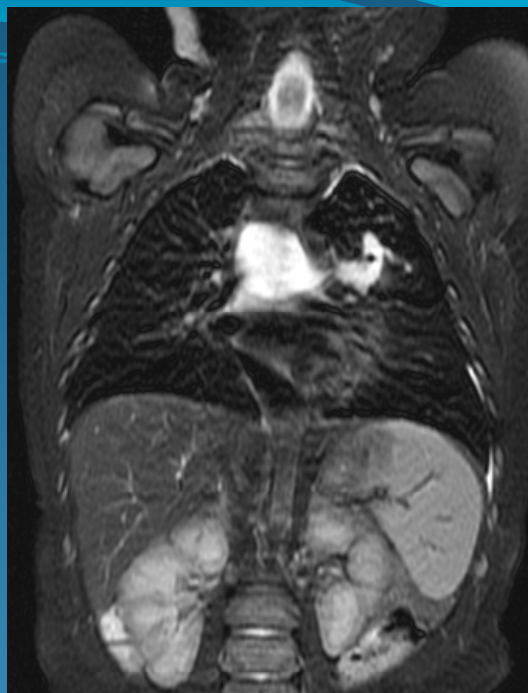
CTA

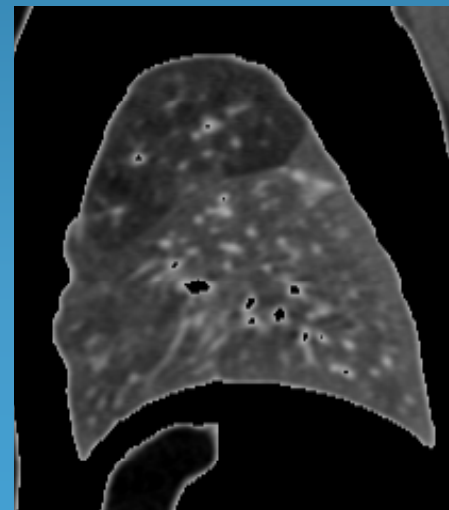
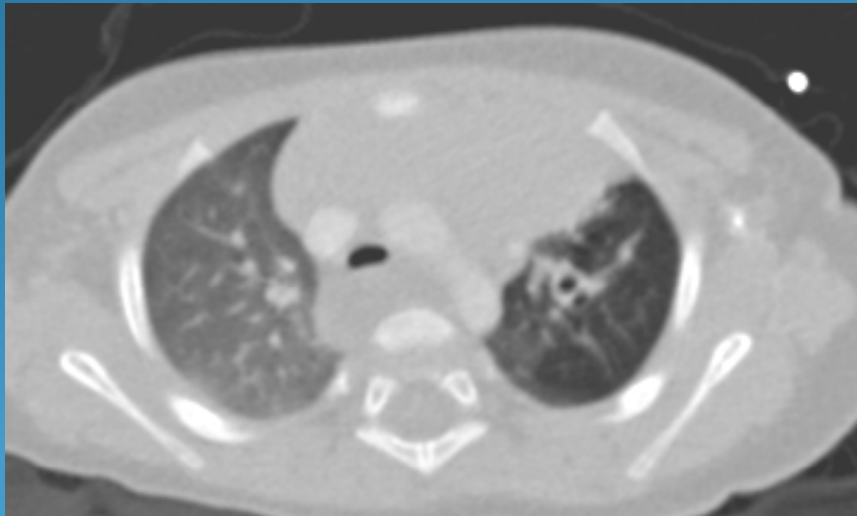
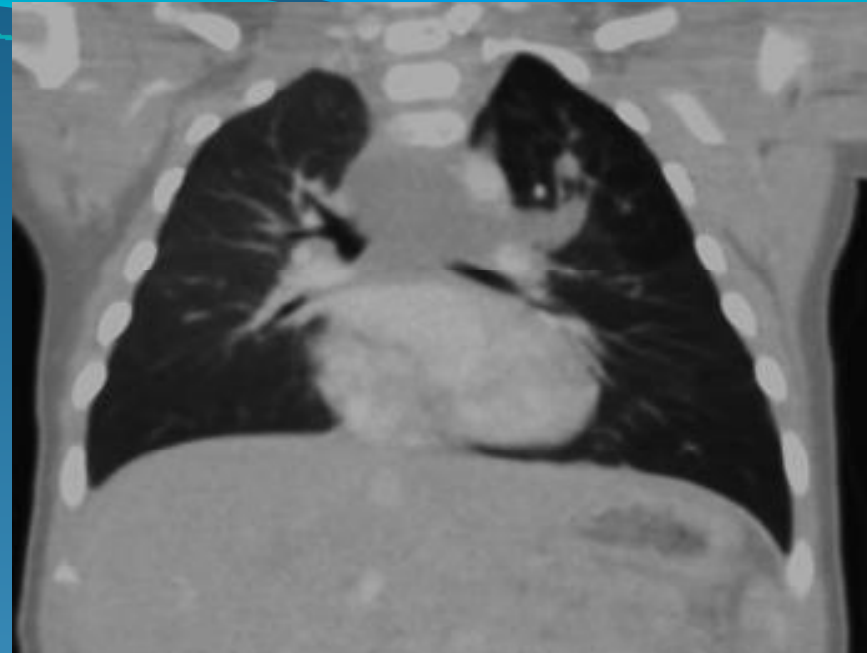
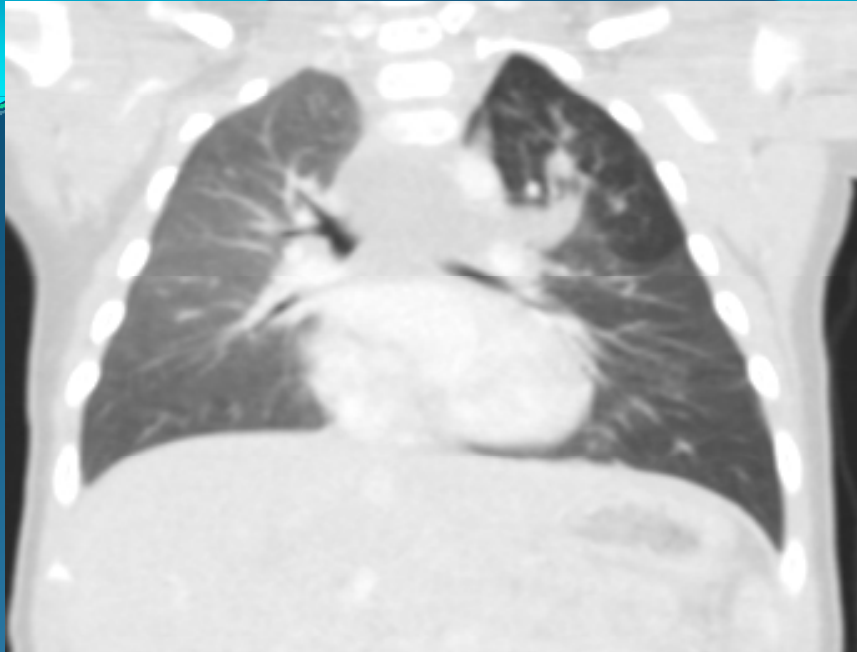
- Ionizing Radiation
- Better spatial resolution
- **Better delineation of lung parenchyma**
  - Demonstrates the 2nd pulmonary lobule
  - Demonstrates down to 6-8 generation bronchii

# מקרה 6

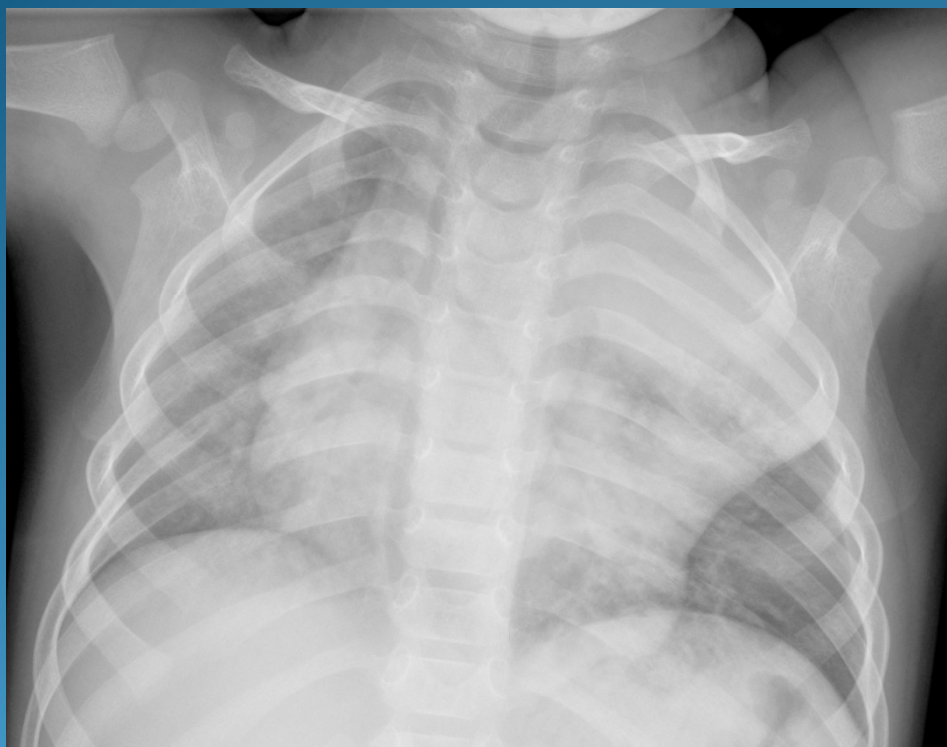


- בן 4 חודשים
- ידוע על ממצא ציסטי בפסגת ריאה שמאלית בסונר עוברי
- בצילום חזה לאחר הלידה הצללה המטשטשת גבול המייצר משמאל, עם דחיקה קלה של הקנה לימין



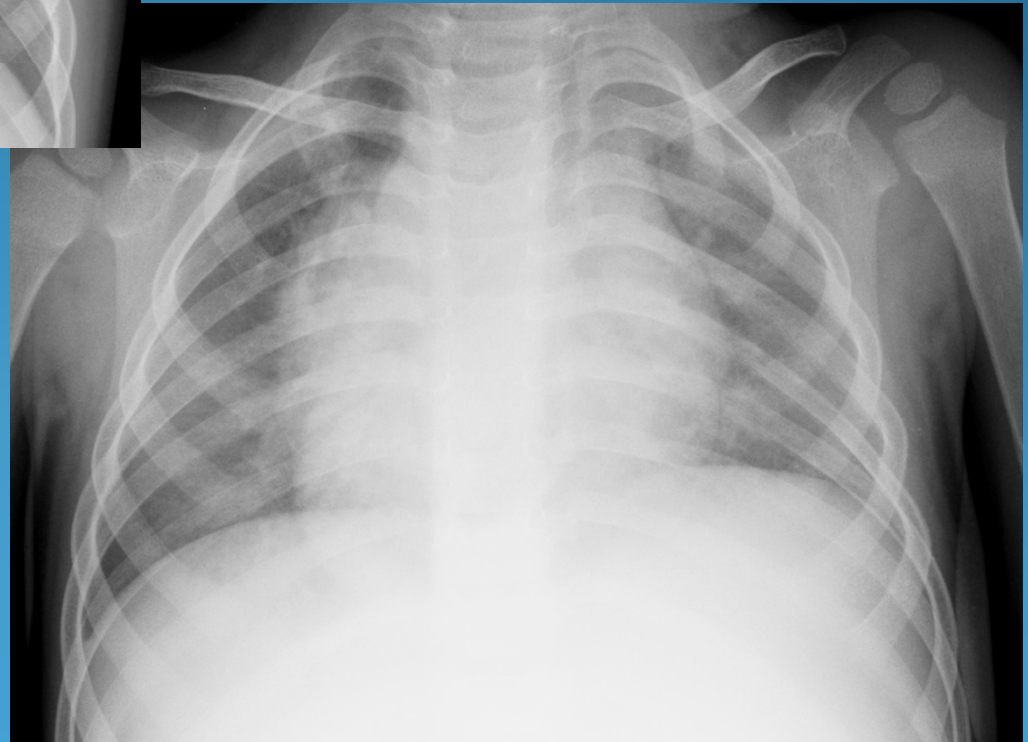
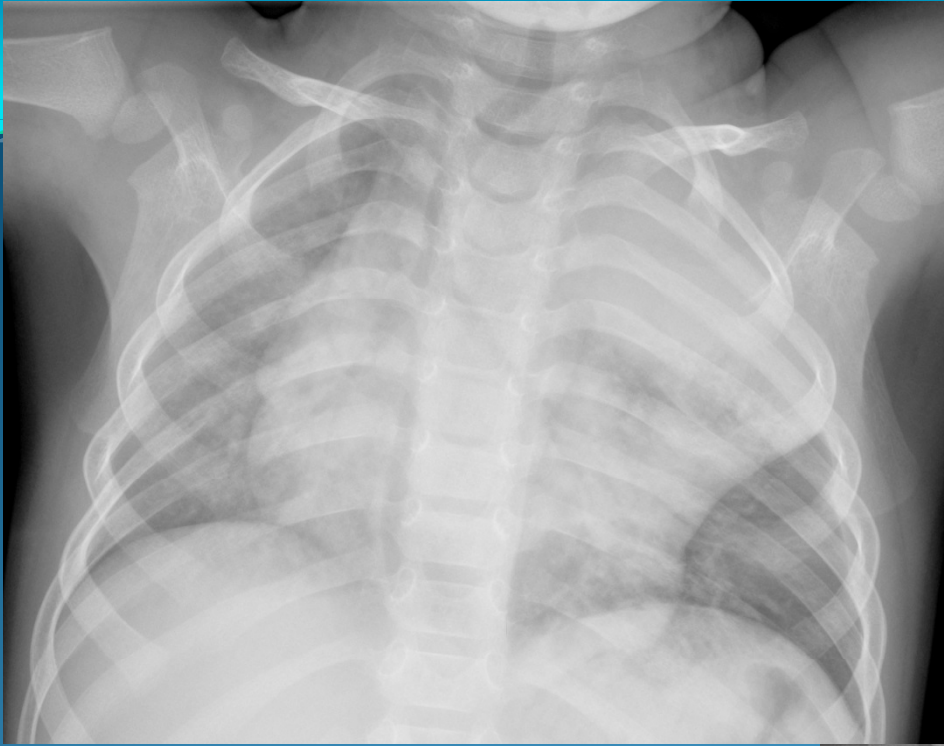






- הילד עבר ניתוח לכריתת הציסטה המדיאסטינלית
- אבחנה פתולוגית – ציסטה ממקור אזופגיאלי
- מספר חודשים לאחר הניתוח מגיע למיון עם מחלת חום ושיעול







- מקרה 7

- בת 14 שנים

- סקווסטרציה ידועה, למעקב





MRA

- Non Ionizing radiation
- Better temporal resolution
- Better delineation of mediastinal structures
- **Long study time (30-60min)**
- **Longer sedation**



CTA

- Ionizing radiation
- Better spatial resolution
- Better delineation of lung parenchyma
- **MDCT – fast Imaging (few min)**
- **Shorter sedation**

Unstable patient → higher sedation risk → CTA

חשד קליני לטבעת וסקולרית או מום  
מבני אחר

האם הילד יציב קלינית  
וכשיר להרדמה ב- MRI ?

לא

כן

CTA של בית החזה

MRA של בית החזה

כאשר CTA של בית החזה הוא בדיקת הבחירה -  
יש לוודא שיתבצע במקום בו קיימים פרוטוקולים  
מותאמים לילדים, עם פרמטרים טכניים  
המותאמים לגיל ומשקל הילד הנבדק



Promoting responsible imaging  
through patient and provider education

Login

#### FAQ of the Month



Are dental x-rays dangerous?

NOW AVAILABLE



FREE DOWNLOAD: Patient Radiation Handout

[home](#)

[about](#)

[faq's](#)

[calculate your risk](#)

[glossary](#)

[contact](#)

## Risk Calculator

[? Help](#)

### Plain Films (x-rays)

Chest x-ray (2 views)  
Abdomen x-rays  
Pelvis x-rays  
Hip x-rays (unilateral)  
Neck x-rays  
Upper Back x-rays  
Lower Back x-rays  
Extremity x-rays (Hands, Feet, etc)  
Mammogram (unilateral)  
Dental x-ray (panoramic)  
Dental x-ray (4 intraoral bitewings)  
Skull x-rays  
DEXA Scan (Bone Density)

Dose is based on multiple views

### CT Scans

### Fluoroscopy

### Nuclear Medicine

### Interventional Procedures

### MRI and Ultrasound

Please see [Glossary](#) for description of different studies.

Study:

Brain CT (Standard)

Gender:

Male ☒ Female ☐

Age at Time of Study:

4 (years)

Doses are based on adult averages and pediatric risk may be inaccurate.

Number of Exams:

22

Average Dose:

2.000 (mSv)

DLP (Optional for CT):

450 (mGy · cm)

Calculate

Add This Exam to your Report

Total Effective Dose:

21.78 (mSv)

Additional Cancer Risk:

0.390225 (%)

1 in 256

Baseline Cancer Risk:

44.9 (%)

Baseline + Additional Risk:

45.290225 (%)

Add This Exam to your Report


To learn more about how these calculations are made, see the [About](#) page.

### Your X-ray Risk Report

<http://www.xrayrisk.com>



# הסיכון האישי לנבדק קיים אך קטן, ולרוב זניח ביחס לפתולוגיה הדורשת ברור



The Alliance for Radiation Safety in Pediatric Imaging

[Test Procedures](#) [In The News](#) [Parent](#) [Radiologic Technologist](#) [Medical Physicist](#) [Radiologist](#) [Referring Physician](#) [Partners in Industry](#) [Global Resources](#) [FAQs](#)

*image gently* when we care for kids! The *image gently* Campaign is an initiative of the Alliance for Radiation Safety in Pediatric Imaging. The campaign goal is to change practice by increasing awareness of the opportunities to promote radiation protection in the imaging of children.

IMAGE GENTLY RESOURCES IN HEBREW

בדיקות Ct לילדים - מה הורים צריכים לדעת

Thanks to translators:  
Harris L. Cohen, MD  
Sandra W. Cohen, MD  
Rabbi Shai Finklestein  
Diana Galtini, MD  
Pearl Herskovitz, MD  
Jeffrey Jacobson, MD  
Pinchas Lebensart, MD  
Michalle Soudack-Ben Nun



### Comparison Doses

<b>Natural Background</b>	3.1 mSv/year <sup>10</sup>	<b>Domestic Pilots</b>	2.2 mSv/year <sup>11</sup>
<b>Average US Exposure</b>	6.2 mSv/year <sup>10</sup>	<b>7 Hour Airline Flight</b>	0.02 mSv <sup>12</sup>
<b>Chest x-ray (2 views)</b>	0.10 mSv	<b>Chest CT</b>	7.0 mSv

### Estimated Lifetime Risk of Death from Various Sources<sup>13</sup>

Motor Vehicle Accident	1% or 1 in 100 chances
Drowning	0.1% or 1 in 1000 chances
Bicycle Accident	0.01% or 1 in 10,000 chances
Lightning	0.001% or 1 in 100,000 chances

Keep in mind, the overall lifetime risk of developing an invasive cancer is 37.5% (1 in 3) for women and 44.9% (1 in 2) for men regardless of imaging history. These statistics are averages and do not predict what is going to happen to you. They do not take into consideration individual risk factors including lifestyle (smoking, diet, exercise, etc), family history (genetics) or radiation exposure. The majority of cancers occur later in life and the average lifetime risk of dying from cancer is 25% (1 in 4).

# לסיכום:

להדמיית מומים מולדים בבית החזה בדיקת MRI MRA הינה בדיקה אבחנתית מצוינת, הנותנת אבחנה מדויקת בדומה ל CT עם היתרון של העדר קרינה מייננת

CTA הינה עדין בדיקת הבחירה, כאשר מדובר בנבדק לא יציב, הזקוק לקיצור משך ההרדמה לשם הבדיקה או כשקיים חשד גם לפתולוגיה פרנכימתית ריאתית

כאשר נדרשת בדיקת CT יש לוודא ביצוע במרכז רפואי עם פרוטוקולים ופרמטרים קליניים המותאמים לגיל הנבדק

The background is a solid blue gradient. At the top, there are several wavy, horizontal lines in shades of blue and cyan, creating a layered effect. The text "The End" is centered in a yellow-green color.

**The End**