HÔPITAL DU SACRÉ-CŒUR
DE MONTRÉAL

HSCM *Doués pour la vie*

Imagerie en trauma: Mise a jour sur le panscan

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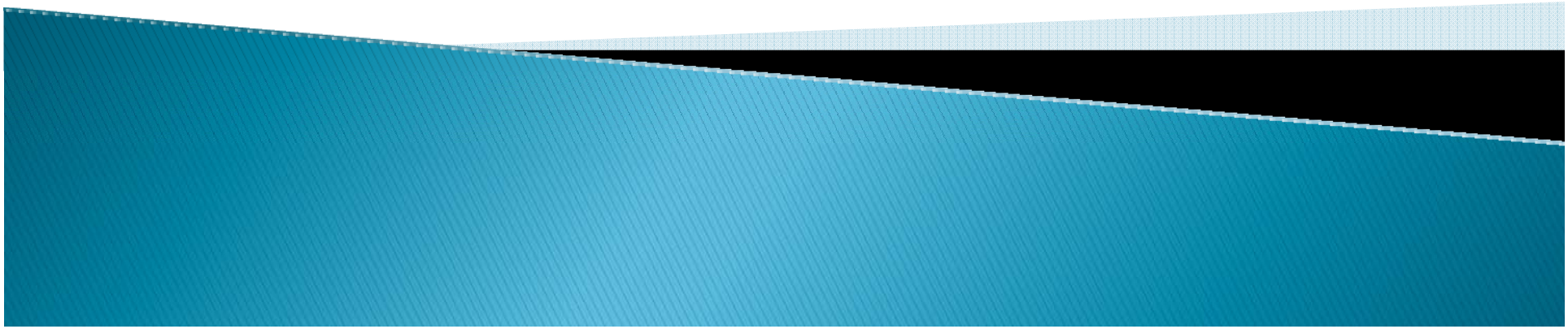


Population ciblée

- Patients polytraumatisés
- Trauma contondants
- Adultes

Evaluation radiologique ?

1. Approche sélective:
   - évaluation du patient
   - observation clinique
   - tests moins invasifs si patient stable
   - **À la discrétion du MD traitant**

2. Approche 'shotgun' : panscan rapidement
   - Variable dans la pratique
   - Pan scan :
     - CT : tête, cervical, thoraco-abdo-pelvien avec possibilité de reconstruction des colonnes dorso-lombaires

Ce qu'on sait :

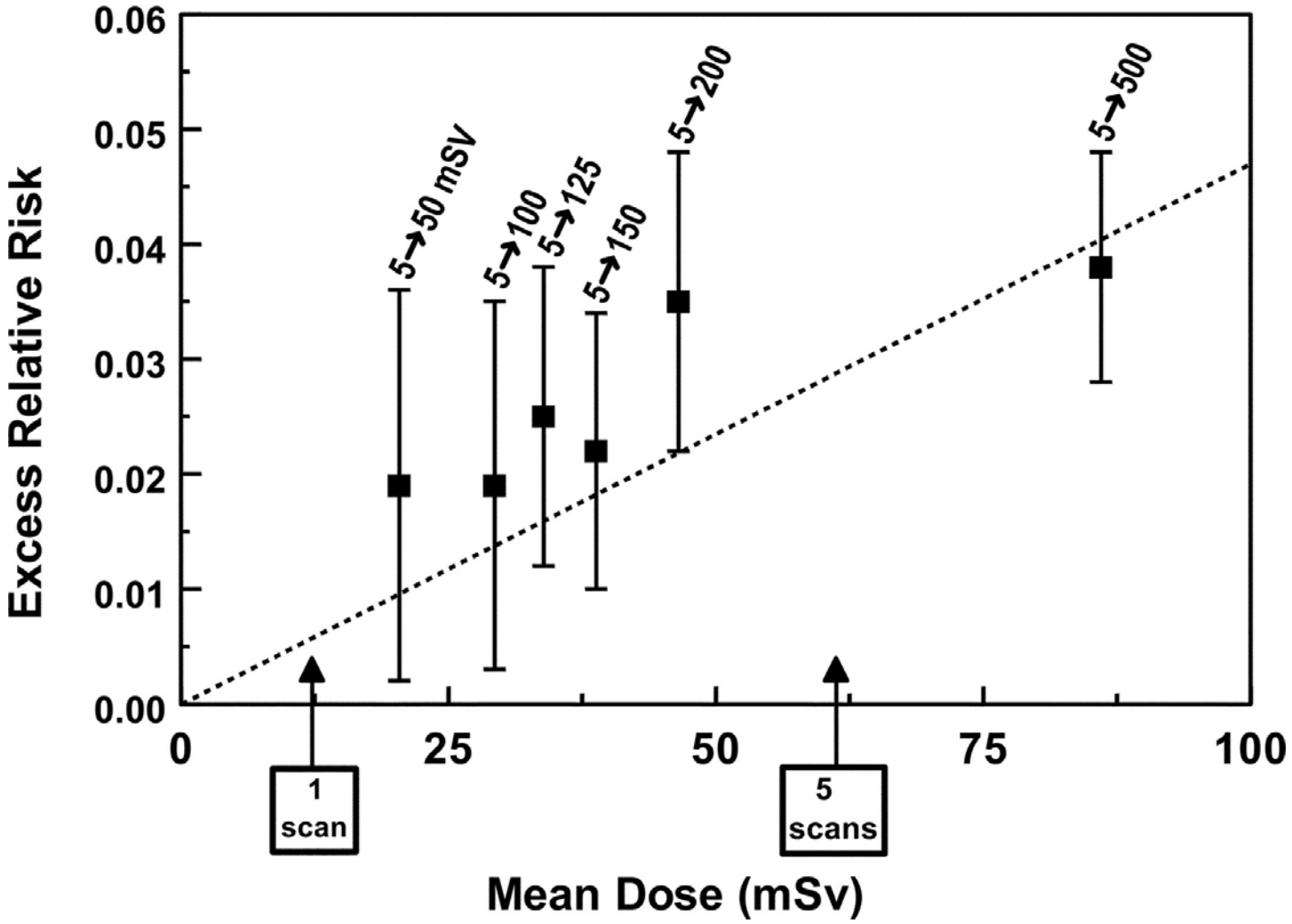
1. Risque de la radiation
2. L'utilisation rapportée du scan en traumatologie dans la dernière décennie
3. Risque de la radiation en traumatologie
4. Les avantages et inconvénients du panscan
   - Temps
   - Diagnostics + et -
   - Survie ?

Risque de radiation

- Risque linéaire
- Basé sur des études de gens exposés après explosions atomiques
- Pas de seuil précis défini
- 100mSv = risque de néoplasie 1 sur 100
- Risque d'un CT = 0.05-0.2% ?

Source	Dose
Exposition unique	5-50mSv (moyenne 29mSv)
Exposition répétée (totale)	50-100mSv

Figure 1



Brenner D J, Elliston C D Radiology 2004;232:735-738

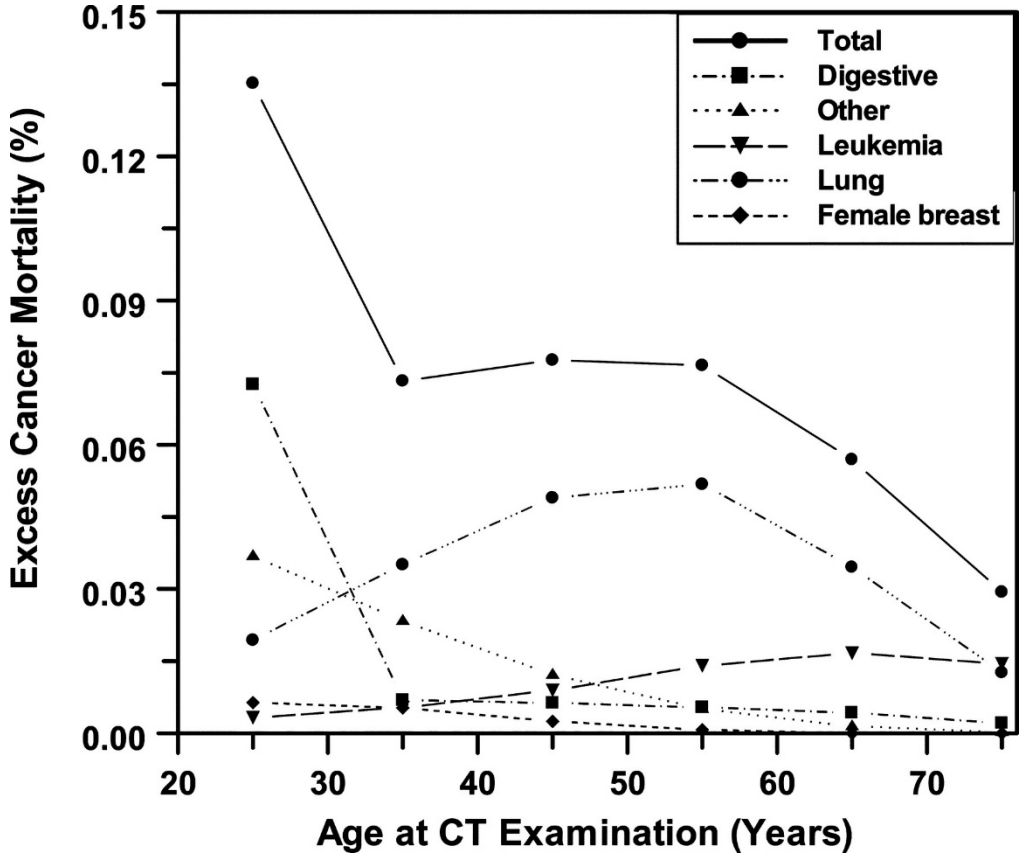
Radiology

Comparaisons : radiation

Source	Dose
Risque de néoplasie	5-50mSv
Exposition ‘naturelle’ / an	1mSv (ad 3 mSv)
CT thorax-abdo	1.6 à 10 mSv
Avion	0.01 mSv / 1600km

Risques de radiation

- Risque augmenté avec un âge plus jeune



Tomodensitométrie et doses de radiation ….théorique

- *Catherine Hui et al. Canadian Journal of Surgery. 2009 (Calgary)*

Procedure	mSv*	Equiv. RXPms	Equiv. background	Risque de Cancer
Rx Pms (PA)	0.02	1	2.4 jrs	-
CT Thorax-Abdo	10	500	3.3 ans	-
4 Barrettes	4.55	228	1.5 an	1 / 2197
40 Barrettes	1.60	80	6 mois	1 / 6250
64 Barrettes	1.52	76	6 mois	1 / 6579

Radiation en trauma : pratique

- Augmentation de l'utilisation du CT scan et de radiation dans les derniers 10 ans

Etude	Nombre de scans par patient	Radiation (séjour)
Inaba & al. 2002 à 2007	2.1 → 3.2 par patient	11.5mSv → 20.7mSv
Ahmadinia & al. '02-'05-'08	1.5 → 3.1 → 5.1 par patient	12mSv → 23.6mSv → 33.6mSv
Prasarn & al. (ortho) 2011	-	31mSv

Récentes études sur la radiation

- Notions théoriques:Jama Pediatrics, juin 2013

ONLINE FIRST

The Use of Computed Tomography in Pediatrics and the Associated Radiation Exposure and Estimated Cancer Risk

Diana L. Miglioretti, PhD; Eric Johnson, MS; Andrew Williams, PhD; Robert T. Greenlee, PhD, MPH; Sheila Weinmann, PhD, MPH; Leif I. Solberg, MD; Heather Spencer Feigelson, PhD, MPH; Douglas Roblin, PhD; Michael J. Flynn, PhD; Nicholas Vanneman, MA; Rebecca Smith-Bindman, MD

Données sur le risque réel de néoplasie

- BMJ, Mai 2013 :

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*[1], Anna V Forsythe *research officer*[1], Zoe Brady *medical physicist*[12], Martin W Butler *data analyst*[3], Stacy K Goergen *radiologist*[4], Graham B Byrnes *statistician*[5], Graham G Giles *epidemiologist*[6], Anthony B Wallace *medical physicist*[7], Philip R Anderson *epidemiologist*[89], Tenniel A Guiver *data analyst*[8], Paul McGale *statistician*[10], Timothy M Cain *radiologist*[11], James G Dowty *research fellow*[1], Adrian C Bickerstaffe *computer scientist*[1], Sarah C Darby *statistician*[10]

- Lancet, Aout 2012

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

Avantages du panscan

- Durées de séjour : hôpital, urgence améliorés
- Clarification du plan de traitement plus rapidement
- Plus de lésions traumatiques identifiées
  - ? Cliniquement significatives
- Technique utile lorsque lésions multiples suspectées

Inconvénients du pan scan / approche libérale

- Exposition à la radiation potentiellement augmentée
  - *Asha & al. 2012* = Pan scan : radiation dose >20mSv x 1.7
  - Pas plus de lésions manquées
- Coûts et utilisation des ressources augmentés
- Découverte de lésions non significatives

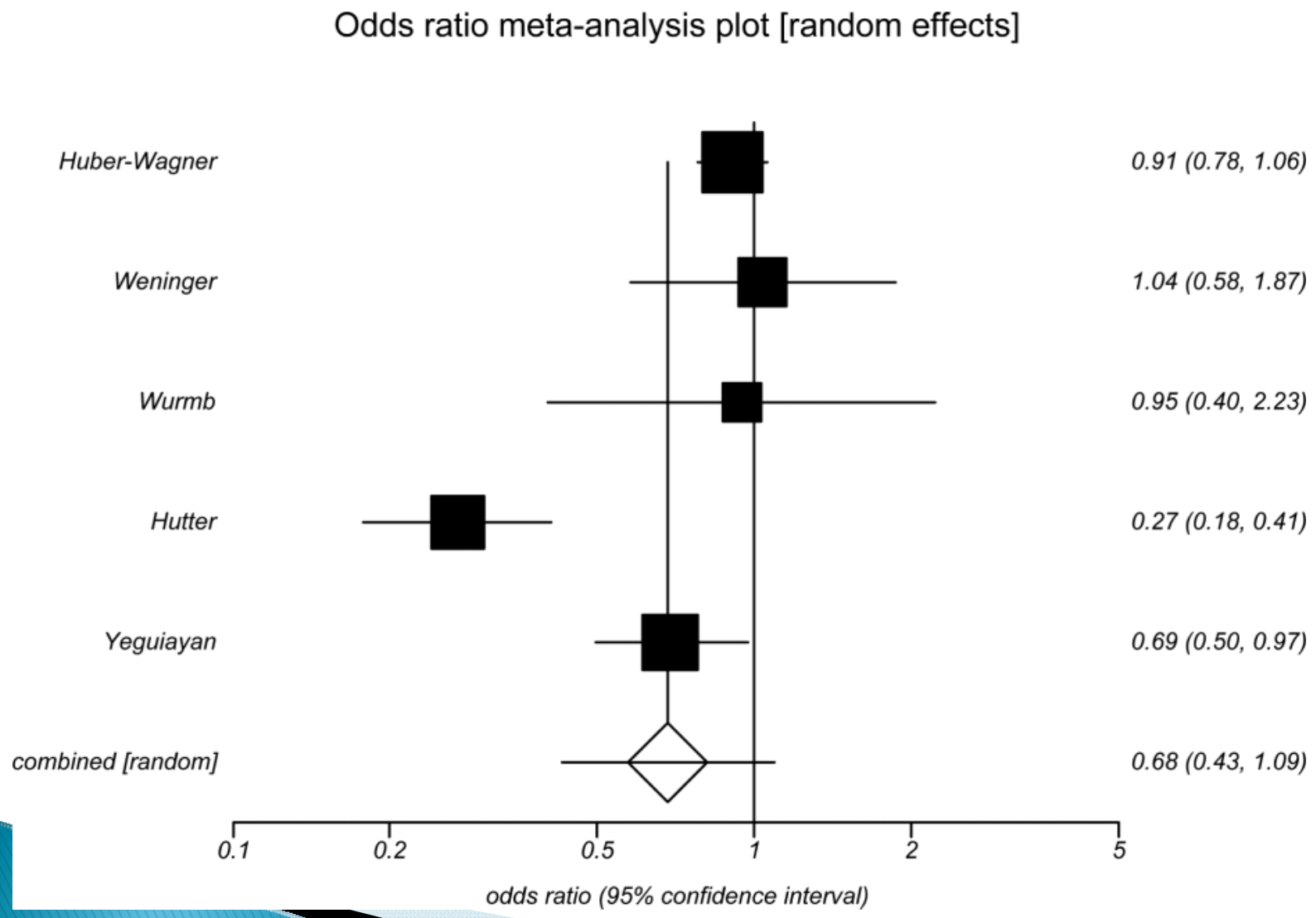
Bénéfices de survie ? *Jan 2013, E Med journal.*

Systematic review and meta-analysis of routine total body CT compared with selective CT in trauma patients

Donagh A Healy,[1,2] Aidan Hegarty,[1] Iain Feeley,[1] Mary Clarke-Moloney,[1] Pierce A Grace,[1,2] Stewart R Walsh[1,2]

- Pas encore démontrés
- Pas d'études randomisées
- Bénéfices peut-être liés à protocoles en place

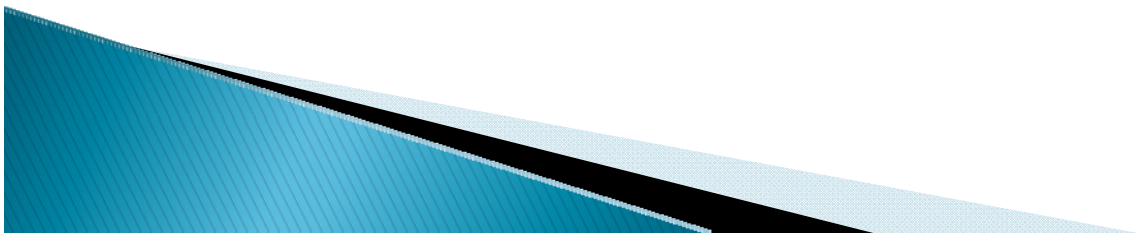
Bénéfice de survie ?



Ce qui reste à définir….

1. Quoi faire en clinique ?

2. Autres pistes pour diminuer la radiation



Indications cliniques

- Lignes directrices : EAST 2011:
  - Pas d'indication officielle pour le panscan

- Examens ciblés : trauma contondants
  - CT cerveau : TCC GCS 3-15
  - CT abdomen : examen non fiable, douleur, contusion paroi abdominale, patient instable
  - CT thorax : mécanisme, signes et symptômes de trauma thoracique, rayon X anormal, fracture de côte
  - Prudence en pédiatrie, considérer observation

Indications sur l'histoire

- *Salim & al., Arch Surg. 2006*
- Critères de panscan : trauma contondant
  1. Peu de signes cliniques de trauma
  2. Mécanisme important : Accident de voiture >55km/hr, auto-piéton, assault avec GCS diminué, chute > 10 pieds.

- *Wurmb et Al. 2009, J of Trauma (Allemagne)*
  - **Mécanismes** : chute > 5 m, ejection de voiture, auto-piéton, décès du passager, haute-vélocité

Indication sur l'histoire

- Pas encore de critères clairs, utilisés de façon répétée
- Pas de bonne étude démontrant le bénéfice de certains critères
- Place au jugement clinique demeure

Pistes futures…

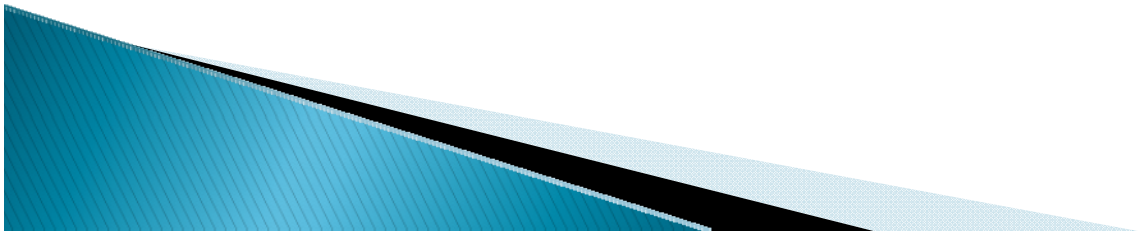
AAST 2011 PLENARY PAPER

Evidence-based guidelines are equivalent to a liberal computed tomography scan protocol for initial patient evaluation but are associated with decreased computed tomography scan use, cost, and radiation exposure

Eric Mahoney, MD, Suresh Agarwal, MD, Baojun Li, PhD, Tracey Dechert, MD, John Abbensetts, MD, Andrew Glantz, MD, Alan Sherburne, MD, Dinesh Kurian, BS,
and **Peter Burke, MD,** *Boston, Massachusetts*

Protocoles cliniques: études

- Diminution des scans
  - *Mahoney & al. (EBG)*: 1.9 → 1.2 scans par patients, réduction des scans de 37%
- Peu ou pas de lésions significatives manquées
  - *Gupta & al. :* Lésions manquées: fractures stables, contusions pulmonaires, lésions rate et foie (grade I), pas d'action clinique immédiate manquée
  - *Mahoney & al. :* Pas de lésions significatives manquées
- Approche systématique gardée, protocoles cliniques clairement établis et enseignés



Aide technique pour limiter la radiation

- Littérature présente pour tenter de diminuer les doses de radiation par étude faite :
  - Diminue avec les scans nouvelle génération
  - Position du patient affecte la dose reçue
  - Autres aspects technologiques peuvent être optimisés si un pan scan est fait
  - A discuter avec votre département de radiologie
- Tenter d'éviter des scans répétés

Discuter avec la radiologie

Viser un équilibre…

Comparison of Trauma Mortality and Estimated Cancer Mortality From Computed Tomography During Initial Evaluation of Intermediate-Risk Trauma Patients

Torrey A. Laack, MD, Kathryn M. Thompson, BS, James M. Kofler, PhD, M. Fernanda Bellolio, MD, Mark D. Sawyer, MD, and Nadia N. Issa Laack, MD

- Entre le risque de décès du trauma et le risque de néoplasie suite au tests diagnostiques
- *Journal of Trauma, 2011* : trauma modéré
  - Risque de néoplasie (0.1%): 0.2% < 20 ans et 0.05% > 60 ans.
  - Décès dans leur population : 0.6% (âge > 80 ans)

Pan scan…

- Pas encore de bénéfices de survie clairs
- Pas de critères bien établis pour le faire
- Approche clinique systématique privilégiée :
  - Protocoles à développer ?
- Optimiser les protocoles (radiologie) pour limiter les radiations

Questions

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