

Caution: Medical Technology Can Be Dangerous to Your Health

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News item: It was reported in the *Archives of Internal Medicine* (Redberg, 2009) that Americans are overexposed to radiation from diagnostic tests. Radiation from CT scans done in 2007 will cause 29,000 cancers and kill nearly 15,000 Americans.

We may be tempted to defend CT scans and the benefits derived from their continued use. We may feel that medical technology is always beneficial, and that attacks on medical technology hits us in our technological solar plexuses. Biomedical engineers, after all, spend large amounts of time, effort, and resources to develop these technologies—make them work, make them reliable, and make them affordable. These things are undeniable, and have made modern medical health care the best that it has ever been. Patients suffering from trauma or disease are now surviving, whereas a century ago they would have died or been severely incapacitated.

But before we completely dismiss negative comments about the medical technologies we have spent so much of our very beings developing, we must admit that even the safest technologies have limits. We have not, and cannot, assure that medical technologies will always be used correctly, or that medical equipment will always function as intended.

Related to the above news item is another that was recently in the news. Direct consumer advertising about the benefits of robotic prostate surgery has prompted a number of patients to elect robotic surgery over traditional surgical methods or other

types of procedures dealing with prostate cancer. The only problem with their choice is that it has been shown that, at least at this stage in the technology cycle, complications of robotic surgery are worse than for other surgical methods (Hu et al., 2009).

Drugs are part of modern medical technology, and direct advertising of pharmaceuticals to consumers is clearly with us, and apparently paying off for pharmaceutical manufacturers. Patients see the ads and claimed benefits, but apparently do not pay attention to side effect risks of using the drugs. Patients with varying degrees of desperation try to insist on choosing their own methods of treatment without knowing the risks. The results can sometimes be disastrous for the patients. Just recently we have learned that the pain killer Vioxx poses serious risks of heart attacks and stroke. The drug Baycol lowers cholesterol, but also causes kidney failure.

In order for medicines to be effective for a vast majority of those taking the drugs, more sensitive patients must receive an overdose. That means that the standard dosage for at least half of the patients is too large, and the risks-to-benefit ratios of these medicines rises accordingly. Until personalized medicine becomes a reality, this situation will continue to prevail.

Defensive medicine is too easily practiced with modern medical technologies. If one CT scan is good, are not two better? Certainly, two have a better chance than one of keeping the lawyers at bay, but do they result in better care? That is arguable, but the long-term risks of radiation exposure are cumulative. Two CT scans have twice the DNA-damaging risk without twice the benefit. That should give pause to those who would over-prescribe X-ray exposures.

As a personal case in point, my wife Cathy had a serious fall on 1 September 2009. She suffered a fractured skull and cranial bleeding in the occipital lobe of her brain. She was brought to a local hospital and then to the Shock Trauma facility in Baltimore. Her condition was very serious. This is a list of the X-ray procedures she was given:

1 Sept	Chest X-ray
1 Sept	CT scan of head/brain
1 Sept	CT scan of maxillofacial area
1 Sept	CT scan of neck/spine
2 Sept	CT scan of head/brain
2 Sept	CT scan of thorax
2 Sept	CT scan of head/brain
2 Sept	CT scan of head/brain
2 Sept	Chest X-ray
2 Sept	CT scan of abdomen
2 Sept	CT scan of neck
2 Sept	CT scan of pelvis
2 Sept	X-ray exam of pelvis
2 Sept	CT scan of pelvis
2 Sept	CT scan of thorax
2 Sept	CT scan of head/brain
3 Sept	CT scan of head/brain
3 Sept	Chest X-ray

4 Sept	Chest X-ray
4 Sept	X-ray exam of abdomen
4 Sept	Chest X-ray

She has fortunately recovered nearly completely, but were all these necessary? Will there be any long-term effects? We'll have to see. But, in the meantime, she will insist that her dentist forego the use of X-rays in his exams over the next few years. What else can she do?

References

Hu, J. C., X. Gu, S. R. Lipsitz, M. J. Barry, A. V. D'Amico, A. C. Weinberg, and N. L. Keating, 2009. Comparative Effectiveness of Minimally Invasive vs. Open Radical Prostatectomy, *JAMA* 302(14): 1557-1564.

Redberg, R. F., Cancer Risks and Radiation Exposure from Computed Tomographic Scans: How Can We Be Sure That the Benefits Outweigh the Risks?, 2009, *Arch. Intern Med* 169(22): 2049-2050.