Factual inaccuracies and corrections to the ASTRO webpage https://www.astro.org/news-and-publications/news-and-media-center/news-releases/2025/astro-corrects-media-misinformation-on-breast-cancer-treatment-options **which is stated to be in response to the NBC news coverage** https://www.nbcnews.com/news/us-news/us-women-are-increasingly-shut-breast-cancer-treatment-valued-world-rcna229395

The NBC news piece was not instigated by TARGIT-A trial investigators. However, as ASTRO's response involves the TARGIT-A trial randomised trial about TARGIT-IORT, so we believe it is appropriate and fair for ASTRO to publish the TARGIT-A investigators' response to their post on the same webpage:

ASTRO: As the leading organization representing radiation oncologists, ASTRO takes seriously any public mischaracterization of radiation therapy. We are deeply disturbed by a recent NBC News story on intraoperative radiation therapy for breast cancer that presented inaccurate and misleading information, because such reporting risks confusing patients and undermining trust in evidence-based medicine. … However, our endorsement is reserved for techniques with proven efficacy and patient safety.

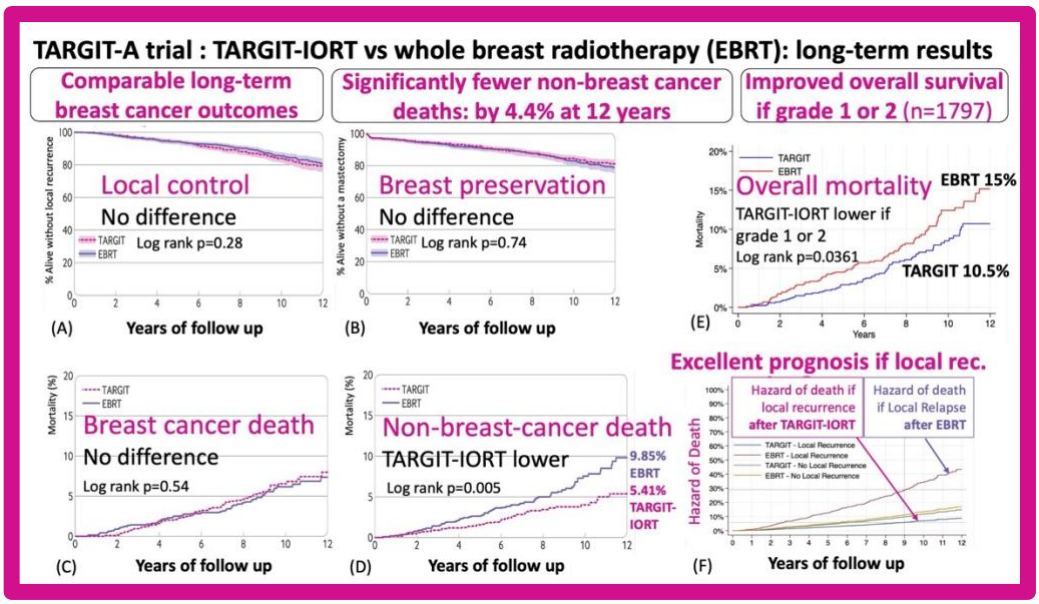
TARGIT-A investigators: In an unusual move, ASTRO has decided to issue a rebuttal to a recent NBC News Story on the benefits to women of IORT for the treatment of breast cancer. ASTRO claims erroneously that the report presented inaccurate and misleading information. We contend that the only misleading information in the report came from ASTRO's Dr Cathryn Yasher who claims the recurrence rate among IORT patients is higher. She omitted to mention that the 1% increase in local recurrence at 5 years with TARGIT-IORT – an almost inconsequential increase (1% vs 2%) is matched by a 1% reduction in mortality (5% vs 4%).

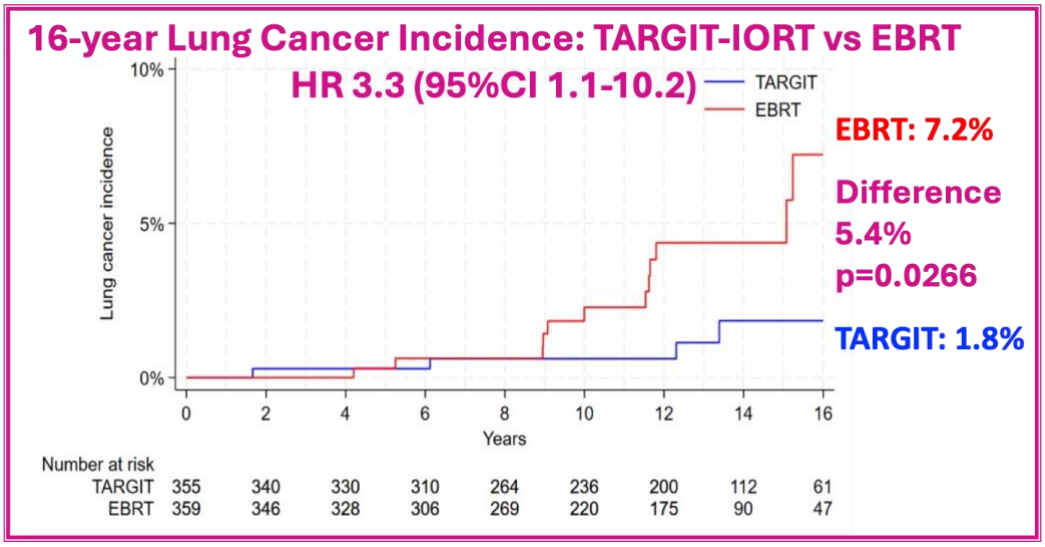
ASTRO reminds us that their recommendations are always based on evidence. However, in his paper "Evidence based medicine in oncology - when it suits us – BMJ Oncology[1], Peter Hoskin talks about "Perverse incentives for prolonged and more intensive treatment" and " reimbursement per fraction delivered makes it very difficult to switch practice to single doses"

If anything is to be retracted, it should be the persistent opposition and suppression of TARGIT-IORT by ASTRO despite powerful evidence of safety, efficacy and patient benefit and preference (multiple reports - see literature).

In reality, long-term randomised evidence from the large international TARGIT-A trial found that **the local control of breast cancer (local recurrence-free survival) with IORT is the same as whole breast radiotherapy (EBRT).** Local control was also equivalent in those who had TARGIT-IORT alone vs EBRT. Furthermore, the chance of breast preservation – mastectomy free survival, chance of being free of distant disease and breast cancer mortality was also the same with TARGIT-IORT and EBRT. [2-7]

Most importantly, **there were substantially and statistically significant fewer deaths** from causes such as heart attacks, lung problems and lung / other cancers. With TARGIT-IORT, there was a significant overall survival benefit for patients with the common types of cancers (grade 1 or 2). The overall death rate at 12 years reduced from 15.1% with EBRT vs 10.5% with TARGIT-IORT vs whole breast radiotherapy [2-7]





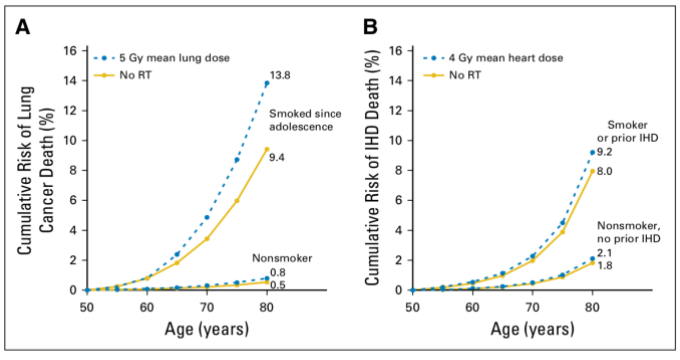
Newly published evidence shows that TARGIT-IORT patients are far less likely to be diagnosed from lung cancers. As presented in European Society of Surgical Oncology on 14 October 2025, there were significantly more lung cancer diagnoses in the EBRT arm compared with TARGIT-IORT arm; HR 3.3 (95%CI 1.1-10.2). The 16-year incidences were: EBRT: 7.2% (95%CI 3.7 – 13.7) and TARGIT-IORT: 1.8% (95%CI 0.6-5.2), difference 5.38% (95%CI 0.3 -10.5), log rank p=0.0266.

About 920,000 of 2,300,000 breast cancer patients diagnosed yearly worldwide are suitable for TARGIT-IORT. Using the 5.38% reduction in lung cancer risk that we have observed, if TARGIT-IORT were to be made accessible to these patients, then 49496 (95%CI 5500-134320) of them would be spared the diagnosis of a lung cancer during their follow up.

It has been interpedently established that 23% smokers who have external beam radiotherapy for breast cancer will die because of heart attacks or lung cancer, a **6% increase compared with no radiotherapy.** Radiotherapy for early breast cancer cannot be expected to reduce breast cancer mortality by 6% (for this to happen, it would need to make an absolute reduction of 24% in local recurrence at 5 years). Using TARGIT-IORT almost completely avoids these tragic consequences of scattered irradiation that inevitably accompanies external beam radiotherapy. ASTRO should recognise that it is truly unethical to not offer TARGIT-IORT to eligible patients who are smokers.

Estimating the Risks of Breast Cancer Radiotherapy: Evidence From Modern Radiation Doses to the Lungs and Heart and From Previous Randomized Trials

Carolyn Taylor, Candace Correa, Frances K. Duane, Marianne C. Aznar, Stewart J. Anderson, Jonas Bergh, David Dodwell, Marianne Ewertz, Richard Gray, Reshma Jagsi, Lori Pierce, Kathleen I. Pritchard, Sandra Swain, Zhe Wang, Yaochen Wang, Tim Whelan, Richard Peto, and Paul McGale, for the Early Breast Cancer Trialists' Collaborative Group



Furthermore, TARGIT-IORT also improves quality of life, leads to less pain, a superior cosmetic outcome, and reduces shoulder side effects. [2-7]

Surely, ASTRO cannot find it appropriate to deny such a large survival benefit, and give an exposure of such a high risk of lung cancer to American patients (and patients worldwide whose clinicians who take ASTRO's word as gospel). Thus, by their own reckoning, ASTRO should recommend TARGIT-IORT rather than EBRT – as it is clearly the safer of the two!

For those who may be unaware, TARGIT-IORT is given during the initial lumpectomy operation for breast cancer, under the same anaesthetic, in about 25-30 minutes. Patients finish all the local treatment in one go - a single pit-stop. They can completely avoid the onerous and exhausting course of external beam radiotherapy planning and the several days/weeks long course and associated delays (weeks, often months). When asked patients (from USA) overwhelmingly choose having TARGIT-IORT; please see *Patients Older 65 Years With Early Breast Cancer Prefer Intraoperative Radiation as a Locoregional Treatment Choice* [8].

Patients prefer TARGIT-IORT to even the shorter, 5-day day course of radiotherapy [9]. Some patient voices from his paper are in the appendix at the end. This qualitative study[9] found that "patients perceived EBRT as being greatly disruptive to their lives. In contrast, the one-- off feature of TARGIT-- IORT given while they are asleep during surgery gives them the feeling of stamping out the cancer without conscious awareness".[10:11]

ASTRO: At no point are financial considerations factored in, and there is a strict firewall between the data analysis and any financial implications for the physician practice.

TARGIT-A investigators: The data regarding the obvious difference in remuneration with TARGIT-IORT vs EBRT are in the public domain. The remuneration of a radiation oncologist is $525 if the patient has only TARGIT-IORT vs up to $3008 if they have the full course of EBRT. Even the strongest firewall cannot hide the truth from the conscious or subconscious thought.

An ASTRO president (Prof Anthony Zietman) was so right when he said in his editorial published in ASTRO's own journal said 10 years ago: "*Many careers have been built around fractionated radiation therapy for breast cancer, and it comprises a substantial proportion of the practice of the average contemporary radiation oncologist. Depending on your perspective, intraoperative radiation therapy is thus either a very serious threat or a quantum leap forward..... It is one substantial aspect of our practice that may, or may not, change dramatically in the very near future. The discussion also casts a very revealing light on our own behaviors and attitudes as physicians and scientists.*"

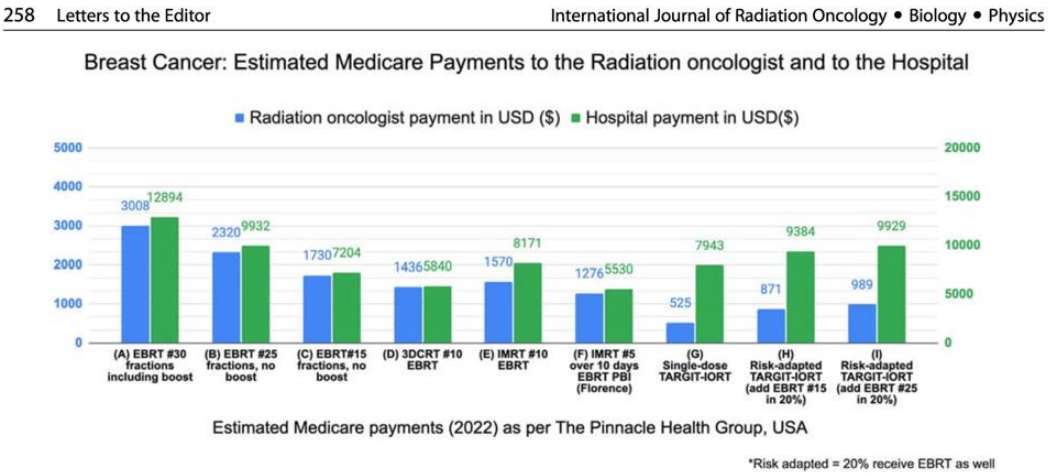
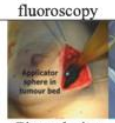
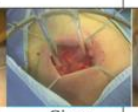
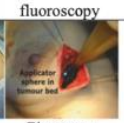
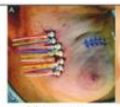
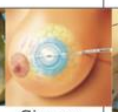


Fig. 1. Current US Medicare payments for various radiation therapy regimens (A-I). The payments to the radiation oncologist are separate and in addition to the payments to the hospital. In the real world, the option (G) will normally be followed by additional EBRT in 20% of cases, making the options (H) or (I) the real-world scenarios. *Abbreviations:* EBRT = external beam radiation therapy; IMRT = intensity modulated radiation therapy; IORT = intraoperative radiation therapy.

ASTRO: As of now, IORT has not been proven to have the value of other methods of partial breast irradiation.

TARGIT-A investigators: We believe that patients deserve be given the choice in a transparent and understandable manner for example, see the table from *Single-dose intraoperative radiotherapy during lumpectomy for breast cancer: an innovative patient-centred treatment*. https://www.nature.com/articles/s41416-020-01233-5.pdf

Table 1. Modern trials comparing partial breast irradiation with whole breast radiotherapy.

	Intraoperative		Post-operative 2nd procedure interstitial			Post-operative external beam	
	TARGIT-A Risk-adapted TARGIT-IORT during lumpectomy	**Electron IORT during lumpectomy ELIOT**	**TARGIT-A Delayed second-procedure TARGIT-IORT**	**Interstitial wires x 5 days GEC-ESTRO**	**NSAPB-B039 Balloon (6% of exp. arm)**	**NSAPB-B39/ RAPID /Florence 3DCRT /IMRT**	**IMRT IMPORT-Low**
Patients							
Total	2298	1305	1153	1184	811	2193/ 1754/ 520	1343
At 6-yr FU	**1967**	**676**	**1068**	**784**	**708**	**1915/ 1548/ 503**	**661**
KM curves to	12 years	9 years	12 years	6.5 years	10 years	10/9/10.5 yrs	7 years
Tumours	Medium risk	Medium risk	Low risk	Low risk	Low risk	Low risk	Low risk
Grade 3 (%)	20%	20%	6%	9%	1%	1%/15%/11%	9%
Pos. nodes (%)	22%	26%	6.5%	0%	10%	10%/1%/ 10%	3%
5-year Local recurrence	2.11% vs. 0.95%	4.4% vs. 0.4%	3.96% vs. 1.05%	1.44% vs.0.92%	2.8% vs. 2.1%	2.8/2.3/2.5% vs 2.1/1.7/1.3%	0.5% vs. 1.1%
Non-inferiority Margin and whether achieved?	2.5% (bkgr 6%) Non-inferior	Equivalence margin 4.5% (bkgr 3%) (4.4% v 0.4%)	2.5% (bkgr 6%) No. Non-inferior in HR+HER-, ET	3% (bkgr 4%) Non-inferior	NA Not equivalent	NA/ 2.75% (bkgr 4%)/ 2% (bkgr 3%) Not equivalent/Non-inferior/Non-inferior	2.5% (bkgr 2.5%) Non-inferior
Breast cancer control similar to WBRT?	Yes	No	Yes	Yes	No	No/Yes/Yes	Yes
Toxicity/ QOL less or more than WBRT?	Less toxicity, better QOL	Not reported	Less toxicity, better QOL	Less toxicity, but wire-entry scarring not reported	More toxicity, QOL not reported	Generally more toxicity, QOL not reported	No major difference
Deaths from other causes different?	Sig. reduced (HR0.59); by 4.4% at 12y	No significant difference	No significant difference	No significant difference	No significant difference	No significant difference	No significant difference
Significant scatter radiation to vital organs?	No	Possibly, if lead shield is not properly used	No	Yes	Yes	Yes	Yes
Additional hospital visits and time?	**No additional visits for 80%**; 20% had supplemental WBRT (~16 half days)	**No additional visits**	Additional surgical procedure for 1 dose single dose **1 full day**	Additional procedure 10# over 5 days, 2# /day as inpatient **5 full days**	Additional procedure 10 # over 8 days 2#/ day **5 full days**	10# twice per day over 5-8 days or 5# over 2 weeks **5.5 full days or 6 half days over 2wks**	16 hospital visits **16 half-days**
Where is it done?	Standard OR like c-arm fluoroscopy	Lead-lined walls	Standard OR like c-arm fluoroscopy	Lead-lined walls	Lead-lined walls	Lead lined bunker	Lead lined bunker
How it is done?	 Given during lumpectomy surgery	 Given during lumpectomy surgery. Needs extensive dissection + deep lead shield	 Given as a second-procedure by re-opening the lumpectomy wound	 Given as second-procedure and radioactive wires remain in place for 4 days (in-patient)	 Given as second procedure and the baloon remains in place for 8 days (in-patient)	 Given as twice daily treatments over 8 days or 5 non-consecutive days over 2 weeks	 Given as daily doses for 15 days over 3 weeks

For NSABP-39 overall LR used for balloon. External beam days includes half a day for planning. The very old or small trials with less than 500 patients or those with less than 5-year follow-up—from Leeds (EBRT over 28 days, $n = 174$, published 2005)[38] and Christie (EBRT 10 days, $n = 708$, published 1995)[39] both with worse outcome for PBI, Budapest (interstitial wires twice a day over 7 days, $n = 258$, published 2013) with similar outcome for PBI[40] and trials with no published cancer outcome data[41] are not included in this table. Table reproduced and slightly modified from Vaidya, J.S., Bulsara, M., Baum, M. et al. Intraoperative radiotherapy for breast cancer: powerful evidence to change practice, *Nature Reviews Clinical Oncology*. https://doi.org/10.1038/s41571-021-00471-7 (2021).
Numbers are for patients with invasive breast cancer.
bkgr expected background risk in the control arm, *ET* endocrine therapy, *QOL* quality of life.

ASTRO: The key decision point for radiation oncologists and patients is first between PBI and whole breast irradiation (WBI) — it is not a decision about IORT versus WBI.

TARGIT-A investigators: Clinical trials have compared individual PBI methods separately with WBI methods, not with each other. The eligibility criteria for various PBI methods were different.

Importantly, patients in the TARGIT-A trial had a medium-risk of relapse, whereas those from most other PBI trials were at a low or very-low risk of relapse. This point should be clear to anyone who assesses scientific literature properly. Therefore, it is surprising to read an assertion by ASTRO that the decision about APBI vs WBI should be first, rather than assessing the comparisons of individual APBI techniques with WBI

It is so obvious to any scientific assessor that the decision should indeed by considering each of the PBI technique vs WBI (including TARGIT-IORT vs WBI), and qualitatively comparing the actual outcomes of individual trials.

ASTRO: Limited Follow-Up: The TARGIT trial has only published results with a median follow-up of less than three years for the full pre-specified population. This is insufficient to assess long-term recurrence and toxicity outcomes.

TARGIT-A investigators: This is another example of apparent non-understanding of the literature! Long-term follow up data of the TARGIT-A trials have been published in the BMJ, Br J Cancer, JAMA Oncology, and International Journal of Radiation Oncology Biology Physics. [2-7] The median follow up is in fact 8.6 years for the randomised trial of TARGIT-IORT during lumpectomy vs EBRT, and 9 years for the randomised trial of TARGIT-IORT vs EBRT. The preferred method of use of TARGIT-IORT is during the initial lumpectomy procedure and the results of its randomised comparison with EBRT at 8.6 years median follow up (maximum 19 years) have been published as above.

ASTRO: Higher Recurrence Rates: The ELIOT trial showed significantly higher local recurrence rates with IORT compared to WBI, even when re-analyzed for patients with very low risk disease. This suggests that the technique itself may be inherently less effective.

TARGIT-A investigators: This is another example of non-understanding of literature. Here ASTRO seems consider 'IORT' technique of ELIOT and TARGIT-IORT as the same technique!!

It is clear to anyone familiar with the evidence that one should certainly not club together the two different IORT techniques (ELIOT, TARGIT-IORT) - they are very different from each other. The reasons can be many and some are represented in a letter in Lancet Oncology and illustrated below. [12]

The TARGIT-IORT technique has been proven to be as effective as WBI, but not ELIOT. Non-inferiority was proven, and long-term data confirmed that local control, breast preservation rates, chance of remaining free of distant disease or breast cancer mortality with TARGIT-IORT was equivalent to whole breast radiotherapy. Mortality from other causes was proven to be nearly halved, leading to a 28% reduction in overall surival in patients with the common types of tumours (grade 1 or 2).

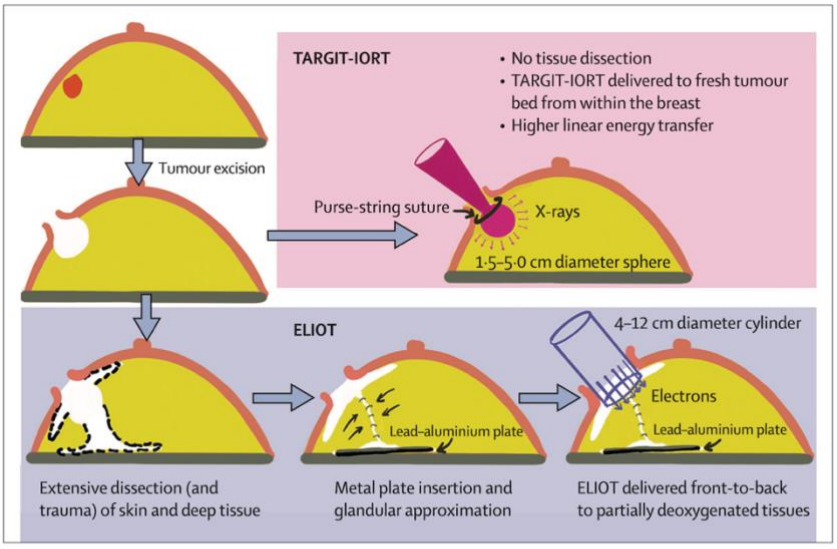


Figure: **Contrasting techniques of TARGIT-IORT (during lumpectomy for breast cancer) versus ELIOT**
ELIOT=electron intraoperative radiotherapy. TARGIT-IORT=targeted intraoperative radiotherapy.

www.thelancet.com/oncology **Vol 22 July 2021** https://doi.org/10.1016/S1470-2045(21)00278-3

ASTRO: Technical Concerns: IORT, particularly TARGIT-IORT, uses a proprietary device with a unique delivery method. Despite claims of distinct technique, the target volumes are similar or even smaller than those used in other APBI methods, which may contribute to inferior outcomes.
TARGIT-A investigators: The proof of the pudding is in eating. Ultimately, the TARGIT-IORT technique has proven in the highest level of testing to have the same breast cancer control as EBRT AND lead to fewer deaths, and improved quality of life. The success may well be attributed to the unique delivery method developed by a team of surgeons, radiation oncologists, radiation physicists, anaesthetists, and takes into consideration patient concerns. It only takes a review of literature with an open mind and only patient interests at heart to realise that ASTRO should be promoting TARGIT-IORT, rather than doing the opposite.

ASTRO: Need for Additional Treatment: Approximately 20% of patients in the TARGIT trial required subsequent WBI, undermining the premise of a single-treatment approach and introducing additional side effect risks.
TARGIT-A investigators: This is a strange objection. It is well known that a similar proportion of patients who undergo breast conserving surgery need further surgery for positive margins and this can include a mastectomy. Does that mean that we don't allow anyone to have breast conserving surgery in the first instance?
When TARGIT-IORT is given, over 80% of patients, (this proportion rises to over 90% with good selection), can get away without having to have further radiotherapy!

ASTRO: While acute skin toxicity is less severe with IORT compared to external beam radiation, long-term toxicity such as breast fibrosis is significantly higher in patients that receive IORT+WBI compared to IORT alone (38% vs. 6%). Breast fibrosis is permanent and impacts patient quality of life as well.
TARGIT-A investigators: Overall the proportion of patients who develop fibrosis is no different between patients receiving risk-adapted TARGIT-IORT (with about 20% receiving EBRT), and EBRT (with some receiving EBRT boost). The proportion of patients who receive EBRT also receive EBRT boost also leads to a higher chance of fibrosis. In fact, in a series of patients treated with TARGIT-IORT as a tumour bed boost followed by EBRT, the risk of any grade 3 toxicity was less than 10%. [10:11] which is even lower than the risk of fibrosis with EBRT boost - up to 37%[10:11].

With so many instances of apparent misunderstanding of the literature published in high-impact peer-reviewed journals, including their own journal, (more below), it is not surprising that someone has invoked the famous saying by Upton Sinclair.

If on the other hand, ASTRO, recognises the randomised evidence and recommends TARGIT-IORT as one of the options for suitable patients, then it will be in line with ASTRO's commitment to patient benefit well above any other considerations.

Extracts from Bagga SK, Swiderska N, Hooker C, Royle J, Ennis-O'Connor M, Freeney S, Watson D, Woolcock R, Lodge G, Laws S, Vaidya JS. Qualitative exploration of patients' experiences with Intrabeam TARGeted Intraoperative radioTherapy (TARGIT-IORT) and External-Beam RadioTherapy Treatment (EBRT) for breast cancer. *BMJ open* 2024;14(8):e081222. https://bmjopen.bmj.com/content/14/8/e081222

EBRT patients

The majority of EBRT participants expressed discontent with many of the standard elements of the EBRT procedure. Some participants felt intimidated by the size of the room being 'disturbing' (P22) and the radiotherapy machine being 'scary' (P19):

…the room that you go into where the machine is, is cold…it could be a bit warmer. Now, some of that could be psychological because you're in a big white room with a big, huge machine… (P3)

…the 2 nurses go into another side room, so, you feel so alone, and you know, and this machine sort of moving around you. It's, it is quite scary to deal with. (P19)

Four participants also described the challenge associated with needing to hold one's breath during sessions. This is done with the hope that the heart may receive less radiation by pushing the chest wall and the breast away from it. Participants described it as saying, 'that was the worst bit' (P12), 'it's going to be difficult' (P15),

'I don't want to be zapped on my heart' (P21) and another felt it was 'really claustrophobic' (P19) or causing 'panic' (P19).

The planning appointment required for EBRT was met with similar dissatisfaction. …, participants were unhappy with the dehumanising nature of these appointments: You become another face… you do feel like a slab of meat while they're trying to get you in the right position and it's not a pleasant experience. (P19)

These experiences resonated with working group members' recollections: 'silent' and 'cold, dark room' and finding it difficult, a 'physical challenge' to maintain position after surgery. Another member felt that while healthcare staff were pleasant, the experience of receiving radiotherapy itself is 'quite traumatic' and emotional, 'I remember lying there and tears came from nowhere…'.

The working group discussed isolation and the emotional impact during EBRT sessions. They recalled overwhelming feelings of sadness during the sessions with thoughts such as, 'how did I get here'.

A few participants … described how EBRT impacted their own work performance (eg, tiredness, weakness in arm) with one person concluding, 'I'm an office worker but if I'd be doing a manual job,

I think it might have impacted more.' (P3), 'I've worked out a part time basis to get back into work.' (P19).

One participant states: 'I'm the only person that does my job. So, I was acutely aware that when I'm not at work other people are picking up my job' (P19).

Similarly: ...we were a short- staffed team, I was aware that when I wasn't there, it was putting work onto other people, and I felt I should have been there.... (P3)

...I'd heard about friends having burns... (P12) ...and actually, talking to another friend, she said she would do chemotherapy any day over radiotherapy because of how the radiotherapy, the pushing around and making you feel like a piece of meat, how it how it made her feel. (P19)

The second concern was the potential for radiation to cause harm:

One thing is that my wife was worried about was the radiotherapy because obviously there is this thing with radiotherapy, particularly on the breast, of potential damage to the lungs and she was very concerned about that. (P23)

TARGIT-IORT patients

Most participants from the TARGIT- IORT cohort shared why they preferred to receive radiotherapy at the same time as the surgery. There is a recognition of the convenience that TARGIT- IORT brings as a result of not having to attend hospital on multiple occasions, for example, less travel and car parking and supporting independence (particularly for retired individuals):

It's my choice to have [TARGIT- IORT] because I thought that it was a better option for me particularly because I live on my own and it would allow me to be more independent. (P18)

.. those who did have young children felt TARGIT- IORT supports their caring responsibilities: 'I've got a [child] and I've got to look after him… This is a better way to go…' (P14).

...particularly for younger women this would be an extremely good thing, if they're working, it allows them to get back to work without that constant interruption and if they've got a young family. (P18)

.. inconvenience and impact of daily radiotherapy doses discouraged patients from EBRT when TARGIT- IORT was presented as an option. One participant whose father received daily doses for prostate cancer felt she would 'rather get it all over in one go' (P10). Similarly: [TARGIT- IORT] was perfect, because it just meant I didn't have to queue up in the car park with the other poor people having radiotherapy, and I did have friends who had serious cancers who were having radiotherapy at the time, and it was just miserable. (P9)

There is also a perception that with TARGIT- IORT recovery times are likely to be faster since it would signify the end of their cancer treatment: 'I'm going to get [TARGIT- IORT] and it's done' (P16) and 'I can just then get on and recover' (P4).

Another participant summarises her main reasons for opting to receive TARGIT- IORT: So, there were probably 3 reasons I went for [TARGIT- IORT]. You know, COVID, convenience, and the fact that I thought, you know, ultimately, I'd probably recover quicker. (P9)

Only one participant from the TARGIT- IORT cohort, a care partner, described a significant logistical impact due to his wife's cancer treatment in general: …created quite a challenge really for me, I mean, I was never going to moan about it, I wasn't the one who just had cancer surgery! But you know, it meant the days suddenly got very challenging… (P25)

Perception TARGIT-IORT is a safer alternative to standard practice

Five participants felt that they did not experience any complications as a result of TARGIT- IORT and were able to resume their normal activities quickly.

...most participants did not report the range of side effects seen in the EBRT cohort.

..I moved around, I got up, got changed, got dressed. It was surprising actually, this is why I've decided to do this, if this is what it gives you then everyone should have it. You know you don't need to feel debilitated, and you can carry on with your life. I've got a [child], and I've got to look after him. So, if you can, why not. This is a better way to go if the prognosis allows it. (P14) There were no, no after effects, no problems. It all healed up very well, because it was quite a small incision anyway and very, very successful. (P28) The majority of participants felt the procedure prevented healthy tissue and organs from being unnecessarily exposed to radiation because 'the radiotherapy is directed immediately where the lump [is]' (P17). I confess I heard that and thought 'God, that's a bloody good idea, why don't they do that more often?'. Because obviously if you don't have to beam through loads of flesh and muscle to get at what you're aiming for then that's got to be better to be honest. (P24)

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