To: Spiegel, Aldona(aldonas@mac.com)
Subject: U.S. Trademark Application Serial No. 97119973 - NEOBREAST
Sent: August 26, 2022 11:07:17 PM EDT
Sent As: tmng.notices@uspto.gov

Attachments

screencapture-www-collinsdictionary-com-us-dictionary-english-neo-16615664308381
screencapture-www-collinsdictionary-com-us-dictionary-english-breast-16615666010391
screencapture-www-sciencedirect-com-science-article-pii-S0360301617308982-16615666453501
screencapture-www-researchgate-net-publication-266111560_MRI_of_the_Reconstructed_Breast_after_Mastectomy_Does_It_Do_More_Harm_Than_Good-16615666891651
screencapture-link-springer-com-protocol-10-1007-978-1-4939-2703-6_2-figures-2-16615667078691
screencapture-www-ajronline-org-doi-pdfplus-10-2214-AJR-12-9270-16615667660601

United States Patent and Trademark Office (USPTO)
Office Action (Official Letter) About Applicant's Trademark Application

U.S. Application Serial No. 97119973

Mark: NEOBREAST

Correspondence Address:
SPIEGEL, ALDONA
2727 BARBARA LANE
HOUSTON TX 77005 UNITED STATES

Applicant: Spiegel, Aldona

Reference/Docket No. N/A

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NONFINAL OFFICE ACTION

The USPTO must receive applicant's response to this letter within six months of the issue date below or the application will be abandoned. Respond using the Trademark Electronic Application

System (TEAS). A link to the appropriate TEAS response form appears at the end of this Office action.

Issue date: August 26, 2022

The referenced application has been reviewed by the assigned trademark examining attorney. Applicant must respond timely and completely to the issue(s) below. 15 U.S.C. §1062(b); 37 C.F.R. §§2.62(a), 2.65(a); TMEP §§711, 718.03.

SEARCH OF USPTO DATABASE OF MARKS

The trademark examining attorney searched the USPTO database of registered and pending marks and found no conflicting marks that would bar registration under Trademark Act Section 2(d). 15 U.S.C. §1052(d); TMEP §704.02.

SUMMARY OF ISSUES:

- 2(e)(1) Refusal: Applied-For Mark is Merely Descriptive
- Identification of Goods and Services

Section 2(e)(1) Refusal: Applied-For Mark is Merely Descriptive

Registration is refused because the applied-for mark merely describes a feature and characteristic of applicant's goods and/or services. Trademark Act Section 2(e)(1), 15 U.S.C. §1052(e)(1); *see* TMEP §§1209.01(b), 1209.03 *et seq.*

A mark is merely descriptive if "it immediately conveys information concerning a feature, quality, or characteristic of [an applicant's] goods or services." *In re N.C. Lottery*, 866 F.3d 1363, 1367, 123 USPQ2d 1707, 1709 (Fed. Cir. 2017) (citing *In re Bayer Aktiengesellschaft*, 488 F.3d 960, 963, 82 USPQ2d 1828, 1831 (Fed. Cir. 2007)); TMEP §1209.01(b); *see DuoProSS Meditech Corp. v. Inviro Med. Devices, Ltd.*, 695 F.3d 1247, 1251, 103 USPQ2d 1753, 1755 (Fed. Cir. 2012) (quoting *In re Abcor Dev. Corp.*, 588 F.2d 811, 814, 200 USPQ 215, 218 (C.C.P.A. 1978)).

The determination of whether a mark is merely descriptive is made in relation to an applicant's goods and/or services, not in the abstract. *DuoProSS Meditech Corp. v. Inviro Med. Devices, Ltd.*, 695 F.3d 1247, 1254, 103 USPQ2d 1753, 1757 (Fed. Cir. 2012); *In re The Chamber of Commerce of the U.S.*, 675 F.3d 1297, 1300, 102 USPQ2d 1217, 1219 (Fed. Cir. 2012); TMEP §1209.01(b). "Whether consumers could guess what the product [or service] is from consideration of the mark alone is not the test." *In re Am. Greetings Corp.*, 226 USPQ 365, 366 (TTAB 1985).

In this case, the applied-for mark is "NEOBREAST" used in connection with "A novel 3D printed bioengineered breast for reconstruction or augmentation" in International Class 10 and "Provide a pathway to breast reconstruction or augmentation using a novel 3D printed bioengineered breast" in International Class 44

The term "NEO" is defined as something new, recent, latest; a new, different, or modified way; or designating a compound related in some way to an older one. In addition, the term "breast" is the generic term for the applicant's goods and services and is defined as the corresponding gland in a female primate. See attached definitions from the Collins dictionary.Taken together, NEOBREAST would be perceived by consumers as describing a feature and characteristic of applicant's goods and

services, namely that the goods are new or modified breasts and the services involve breast reconstruction and augmentation using new or modified breasts.

Moreover, as shown by the attached evidence from Science Direct, Research Gate, Springer Link, and the American Journal of Roentgenology, the term NEOBREAST is commonly used in the relevant industry to refer to a new breast. For example:

- Conclusions: RT to the **neo-breast** compared with no RT following immediate autologous free flap reconstruction for breast cancer is well tolerated at 1 year following surgery despite patients undergoing RT also having a higher cancer stage and more intensive surgical and systemic treatment. **Neo-breast** symptoms are more common in patients receiving RT by the EORTC Breast Cancer-Specific Quality of Life Questionnaire but not by the BREAST-Q. Patient-reported results at 1 year after surgery suggest RT following immediate autologous free flap breast reconstruction is well tolerated.
- METHOD AND MATERIALS IRB approved retrospective review of women with a history of mastectomy and reconstruction (**neobreast)** including muscle flap and/or implant who had at least one MRI of the **neobreast** was performed over the period of 4/1/05 – 4/31/09.
- The **Neo Breast** formation occurs by mobilizing and reshaping the residual or remnant Breast into a new and better breast. The remnant tissue is then re-shaped into a **new breast** using techniques of Mastopexy(Breast Lift) for the majority of the time.
- In that procedure, the abdominal skin, subcutaneous fat, and rectus abdominis muscle with its associated native vasculature are used to create a **neobreast**.

As applied to the applicant's goods and services, the mark NEOBREAST, merely refers to the new breast that is bioengineered and breast reconstruction and augmentation using the new breast. The examining attorney refers once again to the attached evidence showing that “neobreast” is used in the relevant industry to describe new or modified breasts. Accordingly, the mark is merely descriptive of the goods and services, and registration must be refused under Section 2(e)(1) of the Trademark Act.

Although applicant's mark has been refused registration, applicant may respond to the refusal by submitting evidence and arguments in support of registration. However, if applicant responds to the refusal, applicant must also respond to the requirement set forth below.

Identification of Goods and Services

The identification of goods is indefinite and must be clarified because it is indefinite and too broad. *See* 37 C.F.R. §2.32(a)(6); TMEP §§1402.01, 1402.03. This wording is indefinite because it does not make clear what the goods and services are. Further, this wording could identify goods in more than one international class. For example, "3D bioprinted soft tissue preparations for use in breast reconstruction or augmentation treatments" are in International Class 5 and "3d printed bioengineered breast implant for reconstruction or augmentation made primarily from artificial materials are in International Class 10. In addition, the Class 44 services do not specify the nature of the services.

Applicant may substitute the following wording, if accurate:

International Class 5

“3D Bioprinted soft tissue preparations for use in breast reconstruction or augmentation treatments”

International Class 10

"3d printed bioengineered breast implant for reconstruction or augmentation made primarily from artificial materials"

International Class 44

“Cosmetic and plastic surgery services, namely, surgical implantation of 3D printed bioengineered breast implants for the purpose of breast reconstruction or augmentation procedures”

Scope Advisory

Applicant’s goods and/or services may be clarified or limited, but may not be expanded beyond those originally itemized in the application or as acceptably amended. *See* 37 C.F.R. §2.71(a); TMEP §1402.06. Applicant may clarify or limit the identification by inserting qualifying language or deleting items to result in a more specific identification; however, applicant may not substitute different goods and/or services or add goods and/or services not found or encompassed by those in the original application or as acceptably amended. *See* TMEP §1402.06(a)-(b). The scope of the goods and/or services sets the outer limit for any changes to the identification and is generally determined by the ordinary meaning of the wording in the identification. TMEP §§1402.06(b), 1402.07(a)-(b). Any acceptable changes to the goods and/or services will further limit scope, and once goods and/or services are deleted, they are not permitted to be reinserted. TMEP §1402.07(e).

For assistance with identifying and classifying goods and services in trademark applications, please see the USPTO’s online searchable *U.S. Acceptable Identification of Goods and Services Manual*. *See* TMEP §1402.04.

Response guidelines. For this application to proceed, applicant must explicitly address each refusal and/or requirement in this Office action. For a refusal, applicant may provide written arguments and evidence against the refusal, and may have other response options if specified above. For a requirement, applicant should set forth the changes or statements. Please see “Responding to Office Actions” and the informational video “Response to Office Action” for more information and tips on responding.

Please call or email the assigned trademark examining attorney with questions about this Office action. Although an examining attorney cannot provide legal advice, the examining attorney can provide additional explanation about the refusal(s) and/or requirement(s) in this Office action. *See* TMEP §§705.02, 709.06.

The USPTO does not accept emails as responses to Office actions; however, emails can be used for informal communications and are included in the application record. *See* 37 C.F.R. §§2.62(c), 2.191; TMEP §§304.01-.02, 709.04-.05.

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RESPONSE GUIDANCE

- **Missing the response deadline to this letter will cause the application to abandon.** The response must be received by the USPTO before midnight **Eastern Time** of the last day of the response period. TEAS maintenance or unforeseen circumstances could affect an applicant's ability to timely respond.

- **Responses signed by an unauthorized party** are not accepted and can **cause the application to abandon**. If applicant does not have an attorney, the response must be signed by the individual applicant, all joint applicants, or someone with legal authority to bind a juristic applicant. If applicant has an attorney, the response must be signed by the attorney.

- If needed, **find contact information for the supervisor** of the office or unit listed in the signature block.

Learner | American: neo- | neo- | English: neo-

Definition of 'neo-'

• You may also like •

neo-

in American English

('niou, 'nie)

1. *[often N-]*

a. new, recent, latest
Neolithic, Neozoic

b. in a new, different, or modified way
neologism

c. the New World
Neotropical

2. *Chemistry*

a. designating a compound related in some way to an older one
neoprene

b. indicating a hydrocarbon having at least one carbon atom joined to four other carbon atoms
neopentane

Word origin

ModL < Gr *neos*, young, new

neo-

in American English

COMBINING FORM

1. a combining form meaning "new," "recent," " revived," "modified," used in the formation of compound words
   neo-Darwinism
   Neolithic
   neoorthodoxy
   neophyte
2. *Chemistry*
   a combining form used in the names of isomers having a carbon atom attached to four carbon atoms
   neoarsphenamine

Also (esp before a vowel): ne-

Word origin

[< Gk, comb. form of *néos*; akin to NEW]

neo-

in British English

or sometimes before a vowel **ne-**

COMBINING FORM

1. (*sometimes capital*)
   new, recent, or a new or modern form or development
   neoclassicism
   neocolonialism
2. (*usually capital*)
   the most recent subdivision of a geological period
   Neogene

New collocations added to dictionary

Collocations are words that are often used together and are brilliant at providing natural sounding language for your speech and writing.

FEBRUARY 13, 2020

READ MORE

Word origin

from Greek *neos* new

Browse alphabetically

neo-

nene
Nenets
nenuphar
neo-
neo-catastrophism
neo-Catholic
neo-Christianity

All ENGLISH words that begin with 'N'

Related terms of

neo-

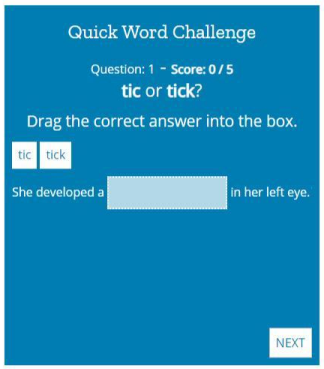
neo-Ju
neo-con
neo-dada
Neo-Latin
neo-Nazi

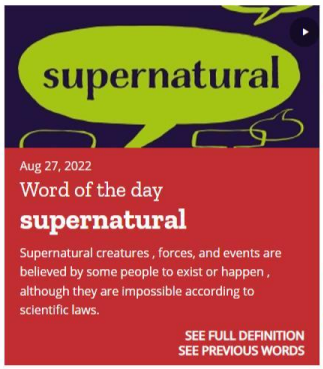
View more related words

Source

Definition of **neo-** from the Collins English Dictionary
Read about the team of authors behind Collins Dictionaries.

• New from Collins •





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American

FAQS

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her: breast | Video pronunciation | American: breast | breast | English: breast | Word lists | COBUILD idioms

Definition of 'breast'

breast

Collins COBUILD

Word Frequency

(brɛst)

Word forms: breasts

1. COUNTABLE NOUN

A woman's **breasts** are the two soft, round parts on her chest that can produce milk to feed a baby.

She wears a low-cut dress which reveals her breasts.

2. COUNTABLE NOUN

A person's **breast** is the upper part of his or her chest.

[*literary*]

He struck his breast in a dramatic gesture.

3. COUNTABLE NOUN

A bird's breast is the front part of its body.

The cock's breast is tinged with chestnut.

4. SINGULAR NOUN

The breast of a shirt, jacket, or coat is the part which covers the top part of the chest.

5. VARIABLE NOUN

You can refer to a piece of meat that is cut from the front of a bird or lamb as **breast**.

...a chicken breast with vegetables.

More Synonyms of **breast**

Video: pronunciation of

breast

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New collocations added to dictionary

Collocations are words that are often used together and are brilliant at providing natural sounding language for your speech and writing.

FEBRUARY 13, 2020

READ MORE

breast

Word Frequency

in American English

(brest)

NOUN

1. either of two milk-secreting glands protruding from the upper, front part of a woman's body
2. a corresponding gland in a female primate
3. a corresponding undeveloped gland in the male
4. figuratively, a source of nourishment
5.
   a. the front part of a person's chest
   b. the corresponding part of some animals, as a bird or lamb
6. the part of a garment, etc. that is over the breast
7. the breast regarded as the center of emotions
8. anything likened to the breast
   the breast of the sea
9. *Mining*
   the face that is being worked at the end of an excavation or tunnel

VERB TRANSITIVE

10. to oppose the breast to; face
11. to face or meet firmly; move forward against

Idioms:

beat one's breast
make a clean breast of

SYNONYMY NOTE:
breast refers to the front part of the human torso from the shoulders to the abdomen, or it designates either of the female mammary glands; , bosom refers to the entire human breast but, except in euphemistic applications *[a big-bosomed matron]*, is now more common in figurative usage, where it implies the human breast as a source of feeling, a protective, loving enclosure, etc. *[the bosom of his family]*; bust[1], as considered here, almost always implies the female breasts and is the conventional term in referring to silhouette, form, etc., as in garment fitting, beauty contests, etc.

Word origin

ME *brest* < OE *breost* < IE base **bhreus-*, to swell, sprout

breast

Word Frequency

in American English

(brest)

NOUN

1. *Anatomy & Zoology* (*in bipeds*)
   the outer, front part of the thorax, or the front part of the body from the neck to the abdomen; chest
2. *Zoology*
   the corresponding part in quadrupeds
3. either of the pair of mammae occurring on the chest in humans and having a discrete areola around the nipple, esp. the mammae of the female after puberty, which are enlarged and softened by hormonally influenced mammary-gland development and fat deposition and which secrete milk after the birth of a child: the breasts of males normally remain rudimentary
4. the part of a garment that covers the chest
5. the bosom conceived of as the center of emotion
   What anger lay in his breast when he made that speech?
6. a projection from a wall, as part of a chimney
7. any surface or part resembling or likened to the human breast
8. *Mining*
   the face or heading at which the work is going on
9. *Metallurgy*

a. the front of an open-hearth furnace

b. the clay surrounding the taphole of a cupola

10. *Nautical*

a. See breast line

b. a rounded bow

11. See beat one's breast
12. See make a clean breast of

TRANSITIVE VERB

13. to meet or oppose boldly; confront
    As a controversial public figure he has breasted much hostile criticism
14. to contend with or advance against

The ship breasted the turbulent seas

15. to climb or climb over (a mountain, obstacle, etc.)
16. to overcome, succeed against
17. to come alongside or abreast of
18. See breast in
19. See breast off

Derived forms

breastless ADJECTIVE

Word origin

[bef. 1000; ME *brest*, OE *brēost*; c. ON *brjōst*; akin to G *Brust*, Goth *brusts*, D *borst*]

breast

Word Frequency

in British English

(brest)

NOUN

1. the front part of the body from the neck to the abdomen; chest
2. either of the two soft fleshy milk-secreting glands on the chest in sexually mature human females ▸ Related adjective: mammary
3. a similar organ in certain other mammals
4. anything that resembles a breast in shape or position
   the breast of the hill
5. a source of nourishment
   the city took the victims to its breast
6. the source of human emotions
7. the part of a garment that covers the breast
8. a projection from the side of a wall, esp that formed by a chimney
9. *mining*
   the face being worked at the end of a tunnel
10. See beat one's breast
11. See make a clean breast of

VERB (*transitive*)

12. to confront boldly; face
    breast the storm

13. to oppose with the breast or meet at breast level
breasting the waves

14. to come alongside of
breast the ship

15. to reach the summit of
breasting the mountain top

Word origin

Old English *brēost*, related to Old Norse *brjóst*, Old High German *brust*, Dutch *borst*, Swedish *bräss*, Old Irish *brú* belly, body

Word lists with

breast

architectural features

More idioms containing

breast

make a clean breast of something
beat your breast

Examples of 'breast' in a sentence

breast

Example sentences from Collins dictionaries

Happiness flowered in her breast.

this form of vitamin D is naturally present in breast milk

a special feature on breast cancer research

to make a clean breast of it

Early detection of breast cancer is vital.

...grilled chicken breast.

Men, like women, are more vulnerable to breast cancer as they get older.

localized breast cancer

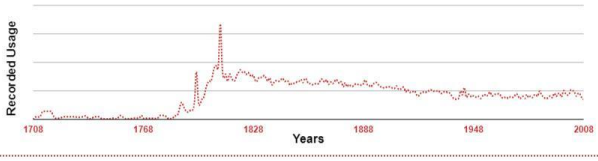
the removal of a small lump in her breast

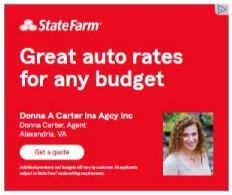
The linnet shook herself and preened a few feathers on her breast.

Trends of

breast

View usage over: Since Exist





In other languages

breast

British English: breast /brest/ noun

A woman's *breasts* are the two soft round pieces of flesh on her chest that can produce milk to feed a baby.

American English: breast / brɛst/
Arabic: ثَدْي
Brazilian Portuguese: peito
Chinese: 乳房
Croatian: dojka
Czech: prs
Danish: bryst
Dutch: borst
European Spanish: seno mama
Finnish: rinta
French: sein
German: Brust
Greek: στήθος
Italian: seno
Japanese: 乳房
Korean: 가슴
Norwegian: bryst
Polish: pierś
European Portuguese: peito
Romanian: sân
Russian: грудь
Spanish: seno mama
Swedish: bröst
Thai: เต้านม
Turkish: göğüs
Ukrainian: груди
Vietnamese: ngực

Translate your text for free

Browse alphabetically

breast

breakwater
breakweather
bream
breast
breast beam
breast cancer
breast drill

All ENGLISH words that begin with 'B'

Related terms of

breast

breast in
breast beam
breast-feed
breast line
breast lump

View more related words

Source

Definition of **breast** from the Collins English Dictionary
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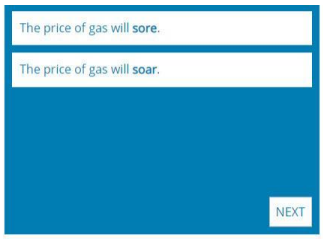

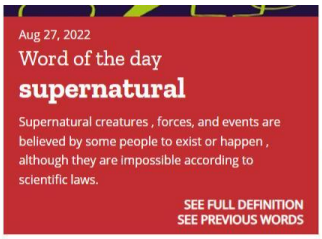

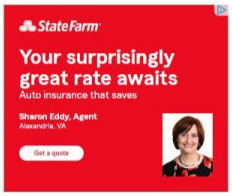

Outline

Cited By (13)

Tables (3)

International Journal of Radiation Oncology*Biology*Physics
Volume 99, Issue 1, 1 September 2017, Pages 165-172

Clinical Investigation

Radiation Therapy Versus No Radiation Therapy to the Neo-breast Following Skin-Sparing Mastectomy and Immediate Autologous Free Flap Reconstruction for Breast Cancer: Patient-Reported and Surgical Outcomes at 1 Year—A Mastectomy Reconstruction Outcomes Consortium (MROC) Substudy

Andrew L. Cooke MD *, †, Julian Diaz-Abele MD †, Tom Hayakawa MD †, ‡, Ed Buchel MD †, ‡, Kimberly Dalke MSc ‡, Pascal Lambert MSc *

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https://doi.org/10.1016/j.ijrobp.2017.05.001 Get rights and content

Purpose

To determine whether adjuvant radiation therapy (RT) is associated with adverse patient-reported outcomes and surgical complications 1 year after skin-sparing mastectomy and immediate autologous free flap reconstruction for breast cancer.

Methods and Materials

We compared 24 domains of patient-reported outcome measures 1 year after autologous reconstruction between patients who received adjuvant RT and those who did not. A total of 125 patients who underwent surgery between 2012 and 2015 at our institution were included from the Mastectomy Reconstruction Outcomes Consortium study database. Adjusted multivariate models were created incorporating RT technical data, age, cancer stage, estrogen receptor, chemotherapy,

breast size, body mass index, and income to determine whether RT was associated with outcomes.

Results

At 1 year after surgery, European Organisation for Research and Treatment of Cancer (EORTC) Breast Cancer-Specific Quality of Life Questionnaire breast symptoms were significantly greater in 64 patients who received RT (8-point difference on 100-point ordinal scale, $P<.0001$) versus 61 who did not receive RT in univariate and multivariate models. EORTC arm symptoms (20-point difference on 100-point ordinal scale, $P=.0200$) differed on univariate analysis but not on multivariate analysis. All other outcomes—including Numerical Pain Rating Scale, BREAST-Q (Post-operative Reconstruction Module), Patient-Report Outcomes Measurement Information System Profile 29, McGill Pain Questionnaire–Short Form (MPQ-SF) score, Generalized Anxiety Disorder Scale, and Patient Health Questionnaire–were not statistically different between groups. Surgical complications were uncommon and did not differ by treatment.

Conclusions

RT to the neo-breast compared with no RT following immediate autologous free flap reconstruction for breast cancer is well tolerated at 1 year following surgery despite patients undergoing RT also having a higher cancer stage and more intensive surgical and systemic treatment. Neo-breast symptoms are more common in patients receiving RT by the EORTC Breast Cancer-Specific Quality of Life Questionnaire but not by the BREAST-Q. Patient-reported results at 1 year after surgery suggest RT following immediate autologous free flap breast reconstruction is well tolerated.

FEEDBACK

Previous article in issue

Next article in issue

Summary

There is controversy as to whether autologous reconstruction should be performed before (immediate) or after radiation therapy (delayed). Using cohort quality-of-life data from patients with autologous reconstruction who did and did not receive radiation therapy, we show that radiation therapy made little to no difference in quality of life 1 year after surgery.

Introduction

Locoregional radiation therapy (RT) is indicated for node-positive breast cancer after mastectomy to improve local control and overall survival 1, 2. The optimum sequence of reconstruction and postmastectomy RT is debated (3). Immediate autologous free flap reconstruction based on the deep inferior epigastric perforator (DIEP) or superficial inferior epigastric artery (SIEA), that is, performing breast

reconstruction during the same operation as mastectomy, may allow patients to avoid a second operation and have a potentially excellent cosmetic appearance immediately after mastectomy. The advantage of immediate over delayed breast reconstruction is not clear according to a Cochrane Database Review (4). Meta-analysis and Surveillance, Epidemiology, and End Results (SEER) Program data have shown autologous reconstruction is medically and esthetically superior to implant-based reconstruction if RT is contemplated 5, 6.

Some investigators have argued that postmastectomy RT of the neo-breast affects outcome and therefore favor a delay in reconstruction until after RT is completed 7, 8, 9. A technique of delayed-immediate reconstruction has been adopted by some (10) to avoid this potential problem. Others, however, have found the effects of RT to the autologous free flap neo-breast acceptable (11) and argued that RT is not associated with an increased incidence of fat necrosis. The group from St Guy's Hospital has found no deleterious effect of RT on immediate DIEP reconstruction (12). A review of 14 articles evaluating irradiation-associated complications of autologous reconstruction by El-Sabawi et al (3) suggested that patients undergoing autologous reconstruction before RT have a higher risk of late complications. However, a review of 25 studies (total of 1247 patients) concluded that the majority of studies report satisfactory outcomes and a similar incidence of complications between immediate autologous reconstruction with adjuvant RT, immediate autologous reconstruction with no RT, and delayed reconstruction following RT (13). Another systematic review of 37 publications found no difference in total complication rates and found improved patient and physician satisfaction with immediate autologous reconstruction followed by RT compared with autologous reconstruction following RT (14).

While acute irradiation effects are of some concern, they are transient. More important are the late side effects of RT that are irreversible, take months to appear, and may evolve over a period of 3 to 4 years (15). Breast volume, current smoking, poor postsurgical cosmesis, and postoperative infection are all associated with poorer breast outcomes after RT (16).

In this substudy we aimed to determine whether RT after immediate autologous free flap reconstruction of the breast influenced patient-reported quality-of-life outcomes and surgical complications at 1 year after surgery.

Methods and Materials

Patient population

The Mastectomy Reconstruction Outcomes Consortium (MROC) is a 5-year prospective, multicenter cohort study of mastectomy reconstruction patients funded by the National Cancer Institute (NCI 1RO1CA152192). MROC includes 57 plastic surgeons from 11 centers in the United States and Canada. Women aged ≥18 years undergoing first-time unilateral or bilateral mastectomy followed by immediate or delayed breast reconstruction of any type were eligible. The

reconstructive procedure choice was based on patient and surgeon preference. The MROC study seeks to compare long-term outcomes of commonly used options for breast reconstruction.

For this substudy, a population-based cohort of Manitoba participants within the MROC study who enrolled from 2012 to 2015, underwent immediate unilateral autologous DIEP or SIEA reconstruction for breast cancer with or without postmastectomy RT, and completed the 1-year postoperative questionnaires was included. Excluded from this study were patients with reconstruction following RT, patients with exogenous implant material in the neo-breast, patients with bilateral reconstruction, patients with pedicle flap reconstruction, patients who died before completing the 1-year questionnaires, and patients with a noncancer diagnosis leading to reconstruction. Patients who received neoadjuvant chemotherapy followed by surgery were included. Smoking was defined as any amount of smoking within the last year.

Surgery

Patients were treated by a surgical oncologist with a skin-sparing mastectomy, removing the areola en bloc with the breast tissue through a circum-areolar incision. Sentinel node biopsy was performed, when indicated, through a separate incision, and in selected cases an axillary lymph node dissection was carried out. Subsequently, a plastic surgeon performed a DIEP- or SIEA-based free flap reconstruction. The areolar defect was closed with the exposed skin pedicle of the flap. Patients were advised against smoking.

Breast cancer therapy

Stage was assigned according to American Joint Committee on Cancer staging manual, seventh edition. RT was offered to all patients with pT3 cancers and to any pN1a to pN3 pN+(sn), or ypN+ patient. RT to the chest wall including the neo-breast was administered after chemotherapy, if any, as 50 or 50.4 Gy in 25 or 28 fractions of 2 or 1.8 Gy daily. Internal mammary node irradiation with wide tangents was administered at the physician's discretion. A skin bolus was administered at the physician's discretion. Field-in-field intensity modulated RT was used in all cases with 6–MV photons or in some cases a 6-MV intensity modulated beam with a 23-MV open beam to optimize homogeneity. Treatment of the regional lymph nodes was prescribed as 45 or 50 Gy in 25 fractions of 1.8 or 2 Gy daily using 6 MV for the anterior beam and 23 MV for the posterior beam, if any. RT was given 4 to 6 weeks after surgery if neoadjuvant chemotherapy was given or after adjuvant chemotherapy was completed. Antiestrogen therapy was given to estrogen receptor–positive or progesterone receptor–positive patients after chemotherapy and RT were completed. Trastuzumab was given according to standard guidelines.

MROC questionnaires

After written informed consent to participate in the MROC study was obtained, a self-administered baseline survey was completed prior to surgery. Questionnaires were completed by all patients 1 week, 3 months, 1 year, and 2 years after surgery.

This study concerns the 1-year postoperative questionnaire. Research assistants collected surgeon-reported data on wound infections, complications, fat necrosis, and revision surgery via the medical record. RT, tumor, and oncology treatment data were obtained from the electronic record of CancerCare Manitoba. It should be noted that the assessment 1 year after surgery may only be several months after RT was completed because of interceding adjuvant chemotherapy. Where applicable, breast questions referred to the neo-breast. The MROC patient questionnaires included the following:

- The European Organisation for Research and Treatment of Cancer (EORTC) Breast Cancer-Specific Quality of Life Questionnaire (QLQ-BR23) is a breast cancer patient–specific, 23-item survey with demonstrated validity and reliability in assessing breast cancer treatment modalities on women's well-being (17). Its 8 domains include body image, sexual functioning, sexual enjoyment, future perspective, therapy side effects, breast symptoms, arm symptoms, and hair loss symptoms.
- The Numerical Pain Rating Scale (NPRS) is a 1-item 10-point scale rating pain from "no pain" to "worst pain." The NPRS has demonstrated reliability and validity with psychometric strength and ease of application 18, 19.
- The BREAST-Q (Post-operative Reconstruction Module) (20) is a condition-specific survey instrument that measures surgery-related quality of life and patient satisfaction among breast reconstruction patients. The 114-item survey covers 7 domains including satisfaction with neo-breasts, satisfaction with overall outcome, psychosocial well-being, sexual well-being, physical well-being, and satisfaction with process of care, as well as additional scales related to nipple reconstruction and abdominal effects. The BREAST-Q is owned by Memorial Sloan Kettering Cancer Center and the University of British Columbia.
- The Patient-Report Outcomes Measurement Information System Profile 29 version 1 (PROMIS-29) is a self-administered survey for patient-reported symptoms and other health outcomes in clinical practice. The Patient-Report Outcomes Measurement Information System has been developed under the National Institutes of Health Roadmap for Medical Research for use in a wide range of disease conditions (21). The MROC study uses a profile short form (PROMIS-29) that consists of 7 domains including depression, anxiety, physical function, pain, fatigue, sleep disturbance, and satisfaction with participation in social roles.
- The McGill Pain Questionnaire–Short Form (MPQ-SF) uses 16 items of pain experience and provides a valid measure of the sensory and affective components of pain (22).
- The Generalized Anxiety Disorder Scale (GAD-7) is a brief self-report scale used to identify cases of generalized anxiety disorder (23).
- The Patient Health Questionnaire (PHQ-9) is a self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD) diagnostic

instrument for common mental disorders and measures the severity of depression (24).

Statistical methods

Descriptive statistics of patients receiving RT and patients not receiving RT were produced. Continuous variables were compared by use of the *t* test, ordinal variables were compared by the Wilcoxon test, and categorical variables were compared by the χ^2 test. Pretreatment survey responses between the 2 treatment groups were compared by the Wilcoxon test. Quantile regression models were used to predict median differences in survey responses at 1 year. The R package (version 3.3.0; R Foundation for Statistical Computing, Vienna, Austria) was used for the analyses. The "quantreg" package was used to run quantile regression models, and standard errors were calculated from bootstrapping. Pretreatment survey responses were categorized into binary variables by their median values. In addition to the missing data among the cohort characteristics, 6 pretreatment survey scales had missing data (with a median of 9% missing and the most missing data being 18%), and 24 1-year survey scales had missing data (with a median of 5% and the most missing data being 23%). The missing data were assumed to be missing at random, and 30 imputations for these variables were produced using the "mice" package. Diagnostics on the imputations were conducted by comparing the distributions of residuals in the observed and imputed data. Multivariate analyses were controlled for baseline data. The MROC study and this substudy have both been approved by the institutional review board of the University of Manitoba.

Results

A total of 131 women with unilateral autologous reconstruction for breast cancer were identified from the MROC database. Six of these women died of breast cancer before the 1-year postoperative visit and questionnaire and were not included. The demographic, tumor, and treatment characteristics of the remaining 125 patients are found in Table 1. Of the patients, 61 received no RT and 64 received RT. There were no differences between the groups except those related to tumor stage and treatment. The no-RT group included predominantly patients who had ductal carcinoma in situ (34.4%) or T1 tumors (45.9%), who had node-negative disease (95.8%), and who did not receive chemotherapy (62.3%). Cystosarcoma phyllodes was found in 2 patients (3.2%) in the no-RT group. In contrast, in the RT group, 78% of patients had T2 or T3 tumors and 86% had node-positive disease. The extent of axillary surgery was different in the RT group, with a median of 11 nodes removed versus 2 in the no-RT group. Nearly all RT patients (60 of 64) also received nodal RT, and of those, half also received internal mammary node RT. The RT group had a higher rate of chemotherapy administration (96.9% vs 37.7%).

Table 1. Patient demographic, disease, and treatment characteristics

	No RT (n=61)	RT (n=64)	P value
Age, mean (SD), y	53.2 (8.42)	51.2 (9.00)	.4352
Education, median (Q1-Q3)	3 (2-4)	3 (2-4)	.9644
Missing education, n (%)	0 (0)	1 (1.56)	-
Income, median (Q1-Q3)	3 (2-4)	3 (3-5)	.2942
Missing income, n (%)	2 (3.28)	3 (4.69)	-
Distance, median (Q1-Q3), km	11.8 (6-38)	8.9 (7-43)	.9331
Body mass index, mean (SD)	26.92 (4.70)	28.38 (5.09)	.0991
Cup size, median (Q1-Q3), in	36 (36-38)	36 (34-38)	.8698
Missing cup size (in), n (%)	9 (14.75)	7 (10.94)	-
Cup size (A, B, and so on), n (%)			
A or B	14 (22.95)	15 (23.44)	.8941
C	17 (27.87)	17 (26.56)	-
D or larger	22 (36.07)	27 (42.19)	-
Missing	8 (13.11)	5 (7.81)	-
Charlson Comorbidity Index, n (%)			
1	48 (78.69)	51 (79.69)	>.99
2	13 (21.31)	13 (20.31)	-
Smoking, n (%)			
Current	7 (11.48)	10 (15.63)	.4688
Ever	20 (32.79)	15 (23.44)	-
Never	34 (55.74)	39 (60.94)	-
T category, n (%)			
0	21 (34.43)	1 (1.56)	-
1	28 (45.90)	12 (18.75)	-
2	10 (16.39)	37 (57.81)	-
3	0 (0.00)	13 (20.31)	-
4	0 (0.00)	1 (1.56)	-
Phyllodes	2 (3.28)	0 (0.00)	
Estrogen receptor, n (%)			
Positive	42 (68.85)	51 (79.69)	-
Negative or unknown	19 (31.15)	13 (20.31)	-
RT bolus to skin, n (%)	NA	21 (33)	-
Node positive, n (%)			

Yes	3 (4.92)	55 (85.94)	-
No	58 (95.08)	9 (14.06)	-
Nodes removed			
Median (Q1-Q3)	2 (1-3)	11 (4-17)	-
None, n (%)	8 (13.1)	0 (0)	-
Regional nodal irradiation, n (%)	NA	60 (93.75)	-
Internal mammary irradiation, n (%)	NA	30 (46.86)	-
Chemotherapy, n (%)			
Adjuvant	23 (37.70)	52 (81.25)	-
Neoadjuvant	0	10 (15.63)	-
None	38 (62.30)	2 (3.13)	-

Abbreviation: NA = not applicable; Q = quartile; RT = radiation therapy.

There were 16 surgical complications in the no-RT group and 20 in the RT group, but in the RT group, all but 2 complications occurred prior to RT (Table 2). There were no significant differences (Fisher exact test). The only post-RT surgical complication observed was chronic fat necrosis in 2 patients who required surgery at 4 and 6 months, while only 1 such case was observed in the no-RT group. There were no other post-RT surgical complications. Of the 125 patients who completed the 1-year questionnaire, 5 had a recurrence and 1 died.

Table 2. Surgical complications within 1 year of surgery by treatment group

Surgical complication	No RT (n=61)	RT (n=64)
Loss of flap	0	0
Immediate postoperative vascular revision	0	4 before RT
Wound dehiscence	5	3 before RT
Flap necrosis without total flap loss	6	9 before RT
Antibiotics prescribed IV or PO	4	2 before RT
Fat necrosis requiring surgery	1	2 after RT

Abbreviations: IV = intravenously; PO = orally; RT = radiation therapy.

No significant differences were found by Fisher exact test.

For 33% of patients, a skin bolus was used to increase the skin radiation dose of the

neo-breast because a skin-sparing mastectomy might theoretically leave skin harboring persistent disease. In an analysis (not shown), we were unable to demonstrate an effect of the bolus and the increased skin dose on the MROC questionnaire outcomes at 1 year.

The MROC questionnaire data are summarized in Table 3. Of 27 domains, 24 are reported. We excluded 3 domains because of lack of survey responses: EORTC QLQ-BR23 hair loss and sexual enjoyment and BREAST-Q nipple satisfaction. On univariate analysis, 1-year EORTC QLQ-BR23 breast symptoms and arm symptoms were significantly increased in the RT group. Breast symptoms differed by a median of 8 points. This domain is derived from 4 questions (questions 20-23 inclusive) with possible answers ranging from 1 (not at all) to 4 (very much) renormalized to a scale of 100. The 4 questions' topics cover neo-breast pain, swelling, sensitivity, and skin changes.

Table 3. Quantile regression models predicting outcomes of MROC questionnaire subunits by RT for neo-breast

MROC questionnaire subunit	RT	Univariate		Multivariate		Notes
		Median difference (95% CI)	*P* value	Median difference (95% CI)	*P* value	
EORTC						
Arm symptoms	Yes	20 (3-36)	.02	15 (−1 to 32)	.0589	*
	No	Ref		Ref		
Breast symptoms	Yes	8 (5-12)	<.0001			†
	No	Ref				
Future perspective	Yes	0 (−29 to 29)	>.99	0 (−11 to 11)	>.99	*
	No	Ref		Ref		
Functional body image	Yes	−12 (−25 to 2)	.0944	−3 (−17 to 11)	.6623	*
	No	Ref		Ref		
Systemic therapy side effects	Yes	0 (−6 to 6)	>.99	0 (−9 to 10)	.9646	*
	No	Ref		Ref		
Sexual functioning	Yes	−3 (−26 to 19)	.7675	0 (−16 to 16)	>.99	*
	No	Ref		Ref		
NPRS	Yes	1 (0-2)	.1801			†
	No	Ref				
BREAST-Q						
Satisfaction with outcome	Yes	−7 (−19 to 4)	.2244			†

	No	Ref				
Satisfaction with breast	Yes	−4 (−14 to 6)	.442	−5 (−12 to 1)	.1241	‡
	No	Ref		Ref		
Satisfaction with reconstruction or abdomen	Yes	0 (−6 to 6)	>.99			†
	No	Ref				
Physical well-being	Yes	−3 (−10 to 4)	.3578	−4 (−10 to 2)	.1559	‡
	No	Ref		Ref		
Psychosocial well-being	Yes	−9 (−19 to 2)	.1006	−7 (−14 to 1)	.0852	§
	No	Ref		Ref		
Sexual well-being	Yes	−3 (−14 to 7)	.5159	−4 (−12 to 4)	.3495	‡
	No	Ref		Ref		
PROMIS-29						
Anxiety	Yes	0 (−7 to 6)	.8928	0 (−5 to 5)	.9801	‡
	No	Ref		Ref		
Depression	Yes	−8 (−18 to 2)	.1232	0 (−1 to 1)	>.99	‡
	No	Ref		Ref		
Fatigue	Yes	2 (−4 to 8)	.4974	0 (−4 to 4)	.9457	‡
	No	Ref				
Pain interference	Yes	0 (−14 to 13)	.9628	0 (−4 to 4)	>.99	‡
	No	Ref		Ref		
Physical function	Yes	0 (−9 to 9)	>.99	0 (−6 to 7)	.9255	‡
	No	Ref		Ref		
Satisfaction with social role	Yes	0 (−6 to 6)	.9713	0 (−2 to 2)	>.99	‡
	No	Ref		Ref		
Sleep disturbance	Yes	0 (−2 to 2)	>.99			†
	No	Ref				
McGill Pain Questionnaire						
Affective	Yes	1 (−1 to 2)	.4979	0 (−1 to 1)	.8985	‡
	No	Ref		Ref		
Sensory	Yes	0 (−2 to 2)	.7394	0 (−2 to 2)	.8085	‡
	No	Ref		Ref		
GAD-7	Yes	0 (−2 to 2)	.9311	1 (−1 to 3)	.4903	‡
	No	Ref		Ref		

PHQ-9	Yes	0 (−3 to 3)	.9867	0 (−1 to 1)	>.99	*
	No	Ref		Ref		

Abbreviations: CI = confidence interval; EORTC = European Organisation for Research and Treatment of Cancer; GAD-7 = Generalized Anxiety Disorder Scale; MROC = Mastectomy Reconstruction Outcomes Consortium; NPRS = Numerical Pain Rating Scale; PHQ-9 = Patient Health Questionnaire; PROMIS-29 = Patient-Report Outcomes Measurement Information System Profile 29; Ref = reference category; RT = radiation therapy.

* Controlled for baseline survey response.

† No control variables were significant.

‡ Controlled for age and cup size in inches.

§ Controlled for age, education, and baseline survey response.

‖ Controlled for education.

On multivariate analysis controlled for baseline responses, EORTC arm symptoms did not significantly differ between groups but EORTC breast symptoms remained significantly different. Because of the possible confounding effect of lymph node removal, a regression analysis of EORTC arm symptoms was analyzed according to the number of nodes removed. A highly significant correlation between arm symptoms and nodes removed was noted (P=.0001).

Discussion

Immediate breast reconstruction, that is, performing breast reconstruction during the same operation as mastectomy, has increased in use and is associated with decreased psychological morbidity 25, 26 and decreased cost (27). Breast reconstruction has increasingly shifted to autologous reconstruction given the decreased time delay for RT (28) and improved results when compared with prosthetic reconstruction, especially if RT is also to be used 25, 29. DIEP or SIEA free flaps have been favored over alternatives, given the decreased postoperative pain (30), as well as improved esthetic and overall satisfaction 31, 32, with such flaps.

RT is indicated after mastectomy in T3 and axillary node–positive breast cancer cases (33), but RT of the neo-breast is associated with an increase in complications (34). As a result, there is debate as to whether immediate reconstruction should be performed when the neo-breast may need to be irradiated and whether reconstruction should be "immediate-delayed" (a temporary expander placed after

mastectomy until RT is completed) or delayed until the completion of RT. Some studies have advocated that autologous immediate reconstruction such as DIEP or SIEA should still be performed despite pending RT [12, 35, 36, 37], while others have supported delayed or immediate-delayed reconstruction [10, 38, 39, 40, 41].

It has been our local policy to perform subcutaneous mastectomy with immediate autologous free flap reconstruction and follow this with RT when indicated, given the advantages of immediate reconstruction with DIEP or SIEA. In a substudy of the MROC project, we set out to determine our patients' experience with the irradiated neo-breast, overall quality-of-life measures, and the risk of RT-associated surgical complications. In our study of 125 patients, there were no significant differences in the demographic characteristics between the 2 treatment groups, but there were major differences in disease stage and treatment other than RT itself. We found that patient satisfaction and overall quality of life 1 year after surgery differed between the RT and no-RT groups in only 2 of the 24 domains reported (EORTC QLQ-BR23 breast symptoms and arm symptoms). The difference in arm symptoms between the 2 groups was not present on multivariate analysis and may be related to the degree of axillary dissection. The RT group had 9 more nodes removed than the no-RT group (median, 11 vs 2) (Table 1). A review of 30 studies showed axillary dissection strongly correlated with persistent pain after breast surgery (42). In addition, 60 of 64 RT patients also received axillary and/or supraclavicular irradiation (distinct from neo-breast irradiation), possibly contributing to the difference in arm symptoms.

EORTC QLQ-BR23 breast symptoms differed between the RT and no-RT groups by a median difference of 8 points (of 100) on a normalized ordinal scale derived from 4 questions, scored from 1 (not at all) to 4 (very much). It should be noted that the neo-breast rather than the breast per se is the subject of the questionnaire. The questions were as follows: "Have you had any pain in the area of your affected breast?," "Was the area of your affected breast swollen?," "Was the area of your affected breast oversensitive?," and "Have you had skin problems on or in the area of your affected breast (eg, itchy, dry, flaky)?" A difference in symptoms, however, was not seen in the other 22 domains listed in Table 3, including the remaining 3 of 5 domains of the EORTC questionnaire (future perspective, body image, and sexual functioning); all domains of the reconstruction-specific instrument BREAST-Q (satisfaction with having chosen to undergo the procedure and outcome, satisfaction with the reconstructed breast, satisfaction with local symptoms and abdominal donor-site symptoms, physical well-being, psychosocial well-being, and sexual well-being); all 7 domains of PROMIS-29 (anxiety, depression, fatigue, pain interference, physical function, satisfaction with social role, and sleep disturbance); NPRS; McGill Pain Questionnaire (sensory and affective); GAD-7; and PHQ-9.

Overall, this study demonstrates that patient-reported quality-of-life measurements 1 year after surgery and cumulative surgical complications are similar whether RT is given or not. Despite significant differences in prognosis, stage, and intensity of surgical, RT, and systemic therapy, which would tend to bias results in favor of the no-RT group, the outcomes of the 2 groups were remarkably similar, with an expected but apparently tolerable level of symptoms in the neo-breast attributable

to RT.

An important deficiency of this study is that assessment 1 year after surgery will generally occur only a few months after RT is complete; therefore, this study reflects only the results as the acute side effects of RT are subsiding and will not reflect a long-term assessment of RT effects on the neo-breast. However, in this study surgical complications including fat necrosis were uncommon and did not significantly differ between the RT and no-RT groups, suggesting such effects will not alter later outcomes. Other late side effects of RT take months to appear and may further evolve over several years. Later quality-of-life measures will be reported with the planned 2-year MROC questionnaires. Although the results of this study are promising, outcomes for longer follow-up remain to be seen.

Conclusions

At 1 year after skin-sparing mastectomy with immediate autologous free flap reconstruction for breast cancer, findings of questionnaires measuring an array of quality-of-life domains did not differ between patients receiving and those not receiving locoregional RT in 22 of 24 domains. In 2 domains of the EORTC QLQ-BR23, breast symptoms and arm symptoms, there were differences favoring no RT. In particular, a breast reconstruction–specific instrument, BREAST-Q, showed no difference. The extent of axillary surgery and prevalence of nodal irradiation differed between groups because of cancer stage and may explain the difference in arm symptoms. Postmastectomy RT is indicated in patients with advanced breast cancer, and our results at 1 year after immediate autologous reconstruction suggest such reconstruction is not contraindicated when RT is indicated and is indeed well tolerated. Longer-term follow-up will be required to exclude differences in late effects.

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FEEDBACK

The risk of reconstruction failure following a mastectomy, breast reconstruction and radiotherapy depending on the reconstruction technique

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The US National Cancer Institute (NCI 1RO1CA152192) funded the Mastectomy Reconstruction Outcomes Consortium (MROC), a 5-year prospective, multicenter cohort study of mastectomy reconstruction patients.

Conflict of interest: none.

View Abstract

Conference Paper

MRI of the Reconstructed Breast after Mastectomy: Does It Do More Harm Than Good?

November 2010

Conference: Radiological Society of North America 2010 Scientific Assembly and Annual Meeting

Authors:

Benjamin Mark Schneider

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Dianne Georgian-Smith
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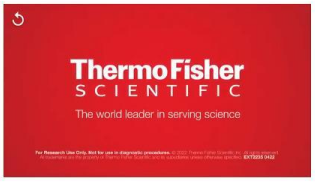
Leong Chee Hao Lester
Singapore General Hospital

Show all 5 authors

Abstract

PURPOSE To evaluate the risks and benefits of contrast enhanced MRI in the post mastectomy reconstructed breast. METHOD AND MATERIALS IRB approved retrospective review of women with a history of mastectomy and reconstruction (neobreast) including muscle flap and/or implant who had at least one MRI of the neobreast was performed over the period of 4/1/05 – 4/31/09. RESULTS 190 women had an MRI of their neobreast (8 with known malignancies excluded) for a total of 182 women (209 breasts). Indications for the MRI were symptoms referable to the neobreast (n= 76, 36%) and neobreast surveillance (asymptomatic) (n=133, 64%); each neobreast was categorized by the highest BIRADS assigned over the study period. For the 76 symptomatic neobreasts BIRADS were: 1 or 2 (n=55), 3 (n=17), 4 (n=2), and 0 (n=2). For the 133 asymptomatic neobreasts BIRADS were: 1 or 2 (n=119), 3 (n=6), 4 (n= 7), and 0 (n=1). Of 13 total biopsies, 7 (54%) were in symptomatic neobreasts and 6 (46%) in asymptomatic neobreasts. Four of 13 (31%) biopsies were malignant. (See flow chart.) Three of the 4 (75%) malignancies were in asymptomatic breasts (2% [4 of 133] of the asymptomatic breasts). The 4 malignancies were all invasive tumors in women who were ≤ 45 years old and with invasive tumors ≥ 1.5 cm at the time of initial diagnosis. Of 23 breasts assigned BIRADS 3, 15 (65%) had at least one follow-up MRI and of those 12 were downgraded to BIRADS 1 or 2. Of 3 breasts assigned BIRADS 0, two were downgraded to BIRADS 1or 2 after correlative ultrasound or mammogram. CONCLUSION



Despite the risk of false positive findings (defined here as benign biopsies and additional imaging) this study demonstrates a benefit of surveillance MRI in the asymptomatic neobreast. The positive predictive value for symptomatic breasts was 4% (1 of 24) and for asymptomatic breasts was 21% (3 of 14), p =0.13. Three of 4 invasive recurrences were detected in asymptomatic breasts of women ≤ 45 years old with invasive tumors ≥ 1.5 cm at the time of the primary diagnosis. CLINICAL RELEVANCE/APPLICATION More cancers and fewer false positives were found in asymptomatic as compared with symptomatic neobreasts suggesting a role for surveillance MRI in the appropriate patient population.

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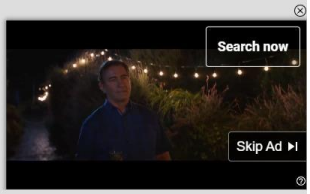

December 2013

Manish Dhyani · Anuradha S Shenoy-Bhangle · Peter F Hahn · Michael Gee

PURPOSE We undertook this study to determine the negative predictive value of PET for splenic lesions. Although PET has been used extensively for evaluation of space-occupying lesions in other organs, the current medical literature is contradictory on the current role of 18F-FDG-PET for characterization of splenic masses. Some studies have demonstrated high accuracy with good sensitivity and ... [Show full abstract]

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February 2016 · Journal of Clinical Oncology

Namrata Vijayvergia · Jenny Y Seo · Karthik Devarajan · [...] · Efrat Dotan

386 Background: Older mPC pts are less likely to receive chemotherapy (Ctx) and receive fewer agents compared to younger pts, yet have similar overall survival (OS). Both obesity and malnutrition are linked with poorer outcomes in pancreatic cancer. We evaluated the effect of body mass index (BMI) and nutritional state on survival in 65 y (GpB) mPC pts. Methods: With IRB approval, we ... [Show full abstract]

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Midline shift in relation to thickness of traumatic acute subdural hematoma predicts mortality

October 2015 · BMC Neurology

Ronald H M A Bartels · Frederick J A Meijer · Jg Van der Hoeven · [...] · Mathias Prokop

Background: Traumatic acute subdural hematoma has a high mortality despite intensive treatment. Despite the existence of several prediction models, it is very hard to predict an outcome. We investigated whether a specific combination of initial head CT-scan findings is a factor in predicting outcome, especially non-survival. Methods: We retrospectively studied admission head CT scans of all ... [Show full abstract]

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Article

An IRB Approved Prospective Accelerated Partial Breast Intensity Modulated Radiotherapy Protocol

October 2005 · International Journal of Radiation Oncology, Biology, Physics

Charles E Leonard · Kevin L Howell · Phyllis L. Henkenberns · [...] · Janis Kondrat

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Conference Paper

The Role of Inter-Reader Variability in the Assessment of Mammographic Probably Benign Breast (BI-RA...

November 2012

Bianca Carpentier · Deborah Anne Cunningham · Justine LaVoye · [...] · B. Nicolas Bloch

PURPOSE To assess the influence of inter-reader variability of radiologists interpreting mammograms during the course of a two-year BI-RADS 3 follow up protocol. METHOD AND MATERIALS In this IRB approved retrospective study, medical records from February 1, 2002 to May 31, 2009 were reviewed, using a dedicated mammography database and the electronic

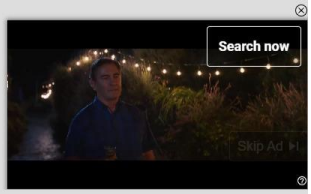
Article Full-text available

The Abandoned Radical Hysterectomy for Cervical Cancer: Clinical Predictors and Outcomes

January 2010 · Obstetrics and Gynecology International

Heidi J. Gray · Erin Seifert · Gaz Sal · [...] · Barbara A Goff

Objective. Cervical cancer patients who had an abandoned radical hysterectomy were evaluated for preoperative clinical predictors, complication rates, and outcomes. Study Design. IRB approval was obtained for this retrospective analysis and chart review was performed. Results. From 268 women with early-stage (IA2 to IIA) cervical cancer, 19 (7%) had an abandoned hysterectomy for finding grossly ... [Show full abstract]



medical record database. All mammograms ... [Show full abstract]

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Article

Comparison of Contrast Enhancement and Diffusion-Weighted Magnetic Resonance Imaging in Healthy and...

July 2015 · European Journal of Radiology

Gene Young Cho · Linda Moy · Sungheon Gene Kim · [...] · Eric E Sigmund

To measure background parenchymal enhancement (BPE) and compare with other contrast enhancement values and diffusion-weighted MRI parameters in healthy and cancerous breast tissue at the clinical level. This HIPAA-compliant, IRB approved retrospective study enrolled 77 patients (38 patients with breast cancer - mean age 51.8±10.0 years; 39 high-risk patients for screening evaluation - mean age ... [Show full abstract]

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Article

Rugby World Cup 2011: International Rugby Board Injury Surveillance Study

June 2012 · British Journal of Sports Medicine

Colin W Fuller · Kelly Sheerin · Steve Targett

Objective To determine the frequency and nature of injuries sustained during the IRB 2011 Rugby World Cup. Design A prospective, whole population survey. Population 615 international rugby players representing 20 teams competing at the IRB 2011 Rugby World Cup in New Zealand. Method The study was implemented according to the international consensus statement for epidemiological studies in rugby ... [Show full abstract]

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Parenteral Nutrition Utilization in Bone Marrow Transplant Recipients

March 2014

Sara Wilson · Roopa Kohli-Seth · Ylaine Aldeguer · [...] · Ernest Benjamin

Bone marrow transplant (BMT) recipients often require parenteral nutrition (PN) to meet their nutrient needs. While general guidelines for the provision of PN support by nutrition support teams (NSTs) have been shown to decrease inappropriate PN use, recommendations for nutrition in BMT recipients are lacking. We reviewed the charts of patients status post BMT on PN to determine whether ... [Show full abstract]

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Conference Paper

Cone Beam Breast Computed Tomography (CBBCT) on Breast Cancer Assessment

December 2013

Lu Yin · Zhao-Xiang Ye

PURPOSE To assess the diagnostic value of CBBCT in breast cancer detection and diagnosis with comparison to conventional full field digital mammography (FFDM) . METHOD AND MATERIALS This study was performed from October 2012 to March 2013. 28 patients with pathologically confirmed breast cancer were studied. All patients met the inclusion criteria and were enrolled under an IRB approved study ... [Show full abstract]

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Article

SAVI SCOUT® localization as a practical alternative to wires: Outcomes and suggestions for trouble-s...

July 2018 · Clinical Imaging

Shannon L Falcon · R. Jared Weinfurtner · Blaise P Mooney · Bethany L. Niell

Objective: The purpose of our study was to determine the frequency of successful SAVI SCOUT® localizations, to identify the factors contributing to unsuccessful procedures, and to provide a problem-solving algorithm to address those factors. Subjects and methods: This retrospective study was performed following IRB approval. We included all consecutive patients with SCOUT® reflector placement ... [Show full abstract]

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Conference Paper

Multimodality Breast Imaging: Comparison of Digital Mammography, Tomosynthesis, Breast Ultrasound, M...

November 2005

Sara C. Chen · ann-katherine korneel Carton · Yen-Hong Kao · [...] · Andrew D A Maidment

LEARNING OBJECTIVES 1. To illustrate breast lesion detection, characterization, and conspicuity with multimodality imaging. 2. To compare lesion management based on blinded single modality readings versus consensus readings of multimodality breast imaging. 3. To demonstrate the impact of multimodality imaging on specificity and cancer detection rate. ABSTRACT Cases were accrued through an IRB ... [Show full abstract]

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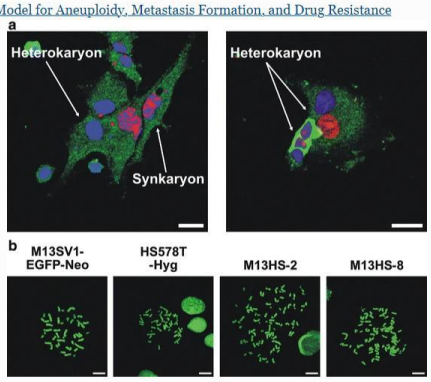
Fig. 2

From: Fusion in Cancer: An Explanatory Model for Aneuploidy, Metastasis Formation, and Drug Resistance



Spontaneous fusion between HS578T breast cancer cells and M13SV1-EGFP-Neo breast epithelial cells. (**a**) M13Sv1-EGFP-Neo and HS578T breast cancer cells, which were previously fed with BrdU, were co-cultivated for 48 h. Subsequently, cells were fixed with 4 % paraformaldehyde and stained for EGFP (*green*) and BrdU (*red*) and DNA (Syto60, *blue*). Heterokaryons are characterized by being positive for EGFP and containing at least two nuclei: a tumor cell derived BrdU positive and an epithelial derived BrdU negative. Synkaryons are characterized by EGFP expression and only one BrdU positive nucleus. (**b**) Hybrid cells derived from HS578T breast cancer cells and M13SV1-EGFP-Neo breast epithelial cells exhibit an increased mean chromosomal number. Metaphase chromosomes of HS578T and M13SV1-EGFP-neo parental cells and hybrid cell clones M13HS-2 and M13HS-8 were stained with Sytox60. Shown are representative data. Bar = 20 μm

Back to protocol page ›

Breast Reconstruction With a Deep Inferior Epigastric Perforator Flap: Imaging Appearances of the Normal Flap and Common Complications

Wade Hedegard[1]
Bethany Niell[1]
Michelle Specht[1]
Jonathan Winograd[2]
Elizabeth Rafferty[1]

OBJECTIVE. The purpose of this essay is to illustrate the normal imaging appearance of deep inferior epigastric perforator (DIEP) flap breast reconstruction and common postoperative complications.

CONCLUSION. Familiarity with the anatomy and normal imaging appearance of a DIEP flap reconstruction will help the breast imager recognize normal postsurgical findings and common postoperative complications.

Keywords: breast reconstruction, deep inferior epigastric perforator flap, DIEP flap

DOI:10.2214/AJR.12.9270

Received May 16, 2012; accepted after revision July 3, 2012.

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[2]Department of Plastic Surgery, Massachusetts General Hospital, Wang Ambulatory Care Center, Boston, MA.

WEB
This is a Web exclusive article.

AJR 2013; 200:W75–W84

0361–803X/13/2001–W75

Breast reconstruction after mastectomy can be divided into two categories: implant and autogenous tissue flap reconstruction. Approximately 70% of breast reconstructions are performed with an implant inserted in either a primary or two-stage procedure [1]. The imaging characteristics and complications of implant reconstruction have been previously reported [2, 3]. The potential benefits of flap reconstruction compared with implant reconstruction include a more natural cosmetic outcome, avoidance of placement of a foreign body, and the opportunity for simultaneous abdominal contouring at the donor site.

The earliest and most commonly used flap reconstruction is the pedicled transverse rectus abdominis myocutaneous (TRAM) flap [1]. In that procedure, the abdominal skin, subcutaneous fat, and rectus abdominis muscle with its associated native vasculature are used to create a neobreast. The rectus abdominis muscle is elevated, pedicled on the deep superior epigastric vessels, and tunneled subcutaneously into the mastectomy defect. One of the morbid conditions associated with pedicled TRAM reconstruction is fat necrosis of the neobreast, which can lead to palpable lesions and false-positive breast imaging findings. Morbidity also can occur at the donor site, patients becoming prone to the development of abdominal wall weakness and hernia [4].

In a free TRAM flap, the infraumbilical portion of the rectus abdominis muscle and the deep inferior epigastric vasculature are divided and reanastomosed to the recipient vessels of the chest. The muscle is not tunneled under the skin, so the plastic surgeon can sacrifice less of the rectus muscle. The normal anatomy and imaging characteristics of TRAM flap reconstruction have been previously described [4].

With the goal of equal or superior cosmesis in combination with decreased morbidity, newer muscle-sparing techniques for autogenous tissue reconstruction after mastectomy have been developed. In a perforator flap, the skin and subcutaneous fat overlying the muscle are harvested, and the underlying muscle is left intact except for an incision through the muscle to remove the vessels of interest. The deep inferior epigastric perforator (DIEP) flap is the most common perforator flap breast reconstruction. The frequency of DIEP flap procedures increased 16% between 2009 and 2010 [5]. DIEP flap reconstructions may be imaged for a number of reasons, including suspected recurrence, annual screening of the contralateral breast, and further evaluation of an area of clinical concern. The objective of this essay is to illustrate the normal imaging appearance of a DIEP flap and to review the common postoperative complications.

Deep Inferior Epigastric Perforator Flap Reconstruction

In a DIEP reconstruction, an elliptic flap of abdominal skin and subcutaneous fat is elevated from the rectus fascia, leaving the rectus abdominis muscle in situ and largely intact with only an incision through the infraumbilical portion (Fig. 1). One or more lateral or medial perforator vessels are identified and dissected through the rectus sheath and muscle

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