Measuring Outcomes Promotes Quality Improvement
Measuring and understanding outcomes of medical treatments promotes quality improvement. Cleveland Clinic has created a series of Outcomes books similar to this one for its clinical institutes. Designed for a physician audience, the Outcomes books contain a summary of many of our surgical and medical treatments, with data on patient volumes and outcomes and a review of new technologies and innovations.

The Outcomes books are not a comprehensive analysis of all treatments provided at Cleveland Clinic, and omission of a particular treatment does not necessarily mean we do not offer that treatment. When there are no recognized clinical outcome measures for a specific treatment, we may report process measures associated with improved outcomes. When process measures are unavailable, we may report volume measures; a relationship has been demonstrated between volume and improved outcomes for many treatments, particularly those involving surgical and procedural techniques.

In addition to these institute-based books of clinical outcomes, Cleveland Clinic supports transparent public reporting of healthcare quality data. The following reports are available to the public:

- Joint Commission Performance Measurement Initiative (qualitycheck.org)
- Centers for Medicare and Medicaid Services (CMS) Hospital Compare (hospitalcompare.hhs.gov), and Physician Compare (medicare.gov/PhysicianCompare)
- Ohio Department of Health (ohiohospitalcompare.ohio.gov)
- Cleveland Clinic Quality Performance Report (clevelandclinic.org/QPR)

Our commitment to transparent reporting of accurate, timely information about patient care reflects Cleveland Clinic’s culture of continuous improvement and may help referring physicians make informed decisions.

We hope you find these data valuable, and we invite your feedback. Please send your comments and questions via email to:

OutcomesBooksFeedback@ccf.org or scan here.

To view all our Outcomes books, please visit Cleveland Clinic’s Quality and Patient Safety Institute website at clevelandclinic.org/outcomes.
Dear Colleague:

Welcome to this 2013 Cleveland Clinic Outcomes book. Every year, we publish Outcomes books for 14 clinical institutes with multiple specialty services. These publications are unique in healthcare. Each one provides a summary overview of medical or surgical trends, innovations, and clinical data for a particular specialty over the past year. We are pleased to make this information available.

Cleveland Clinic uses data to manage outcomes across the full continuum of care. Our unique organizational structure contributes to our success. Patient services at Cleveland Clinic are delivered through institutes, and each institute is based around a single disease or organ system. Institutes combine medical and surgical services, along with research and education, under unified leadership. Institutes define quality benchmarks for their specialty services, and report on longitudinal progress.

All Cleveland Clinic Outcomes books are available in print and online. Additional data are available through our online Quality Performance Report (clevelandclinic.org/QPR). The site offers process measure, outcome measure, and patient experience data in advance of national and state public reporting sites.

Our practice of releasing annual outcomes reports has received favorable notice from colleagues and healthcare observers. We appreciate your interest and hope you find this information useful and informative.

Sincerely,

Delos M. Cosgrove, MD
CEO and President
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and email you when next year’s books are online.
Dear Colleagues,

I am pleased to present the 2013 Outcomes for Cleveland Clinic's Dermatology & Plastic Surgery Institute. This book provides an overview of the institute’s advances, trends and innovations for referring physicians, alumni, potential patients and others around the nation. Our continued efforts to improve quality, access and efficiencies in the care of our patients are guided by the institute’s Quality and Compliance Committee.

Last year, we added full-time clinical staff in dermatology and plastic surgery to provide greater access for our patients across Northeast Ohio. Our multidisciplinary collaborative programs include the Cosmetic Center, Photodynamic Therapy Center, Multicultural Skin Center, Dermatopathology Center and Center for Reconstructive Transplantation.

Major 2013 advancements featured:

- The ongoing development of innovative care programs, including the Multidisciplinary Wound Care Center and shared medical appointments that are offered to organ transplant patients in our skin cancer clinic.
- Expansion of efforts in basic science, clinical and healthcare management research in the areas of migraine headache treatment, software systems for sustained innovation in lean healthcare, new drug delivery systems for wound care and increasing the diagnostic sensitivity for melanoma.
- A full-on initiative to redesign patient care through care paths. This collaboration among our subspecialties will be the platform for standardizing efficient care guidelines to improve the quality and value of patient care.

We welcome your feedback, questions and ideas for collaboration. Please contact me via email at OutcomesBooksFeedback@ccf.org and reference the Dermatology & Plastic Surgery Outcomes book in your message.

Respectfully,

Frank A. Papay, MD, FACS, FAAP
Chairman, Dermatology & Plastic Surgery Institute
Institute Overview

Cleveland Clinic’s Dermatology & Plastic Surgery Institute (DPSI) is one of the largest such practices in the nation offering patients a full range of dermatologic, reconstructive and aesthetic services. Our physicians and staff offer the most up-to-date procedures performed by specialists in leading-edge facilities.

The institute includes the Department of Dermatology, with 37 dermatologists who offer a full array of subspecialized care for adult and pediatric patients, and the Department of Plastic Surgery, including 17 plastic surgeons with significant expertise in all areas of aesthetic and reconstructive plastic surgery. The Dermatology & Plastic Surgery Institute continues to benefit from the integration of its two subspecialties into a single institute, which occurred six years ago. This model of care takes advantage of the collective expertise of the institute’s two component departments, using a collaborative approach that promotes comprehensive, patient-focused care while creating broad new research and educational opportunities. This integration also has allowed continued growth through the acquisition of new regional markets throughout Northeast Ohio.

Following three years of unprecedented growth in clinical staff, the institute continued to add to its ranks in 2013 with seven new full-time and part-time staff. This resulted in a 4.3 percent increase in total patient visits and shorter wait times for appointments. Last year saw the continuation of high volumes of Mohs surgery skin cancer cases with Mohs surgeons performing 3,007 procedures at four sites.
### Patient Visit Volume

<table>
<thead>
<tr>
<th>Service</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermatology</td>
<td>114,754</td>
</tr>
<tr>
<td>Plastic surgery</td>
<td>35,353</td>
</tr>
<tr>
<td>Mohs micrographic surgery</td>
<td>3007</td>
</tr>
<tr>
<td>Phototherapy/ultraviolet light treatments</td>
<td>6883</td>
</tr>
</tbody>
</table>

### Facial Cosmetic Surgeries

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facelift</td>
<td>92</td>
</tr>
<tr>
<td>Necklift</td>
<td>22</td>
</tr>
<tr>
<td>Blepharoplasty (upper &amp; lower)</td>
<td>123</td>
</tr>
<tr>
<td>Browlift</td>
<td>63</td>
</tr>
</tbody>
</table>

### Primary and Secondary Rhinoplasty

<table>
<thead>
<tr>
<th>Type</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>70</td>
</tr>
<tr>
<td>Secondary</td>
<td>11</td>
</tr>
</tbody>
</table>

### Cosmetic Breast Surgery

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast reduction</td>
<td>156</td>
</tr>
<tr>
<td>Breast augmentation</td>
<td>168</td>
</tr>
<tr>
<td>Mastopexy</td>
<td>33</td>
</tr>
</tbody>
</table>

### Body Contouring

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominoplasty</td>
<td>124</td>
</tr>
<tr>
<td>Liposuction trunk/extremities</td>
<td>198</td>
</tr>
<tr>
<td>Liposuction head/neck</td>
<td>4</td>
</tr>
</tbody>
</table>

### Breast Reconstruction

<table>
<thead>
<tr>
<th>Type</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction TRAM&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7</td>
</tr>
<tr>
<td>Reconstruction w/prosthesis</td>
<td>337</td>
</tr>
<tr>
<td>Reconstruction w/latissimus dorsi flap</td>
<td>18</td>
</tr>
<tr>
<td>Oncoplasty</td>
<td>99</td>
</tr>
<tr>
<td>DIEP&lt;sup&gt;b&lt;/sup&gt; flap</td>
<td>122</td>
</tr>
</tbody>
</table>

### Endoscopic and Open Carpal Tunnel Surgery

<table>
<thead>
<tr>
<th>Type</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endoscopic</td>
<td>141</td>
</tr>
<tr>
<td>Open</td>
<td>115</td>
</tr>
</tbody>
</table>

<sup>a</sup>TRAM = transverse rectus abdominis myocutaneous

<sup>b</sup>DIEP = deep inferior epigastric perforator
Cleveland Clinic’s large population of malignant melanoma patients can receive evaluation and treatment in one location from a multidisciplinary melanoma clinic staff comprising dermatologists, surgeons, oncologists, and radiation oncologists. This approach ensures the best and most efficient care while enhancing patient convenience. Most nonmetastatic melanoma can be cured by surgical excision. Physicians from the Dermatology & Plastic Surgery Institute perform most of the melanoma excisions at Cleveland Clinic.

The incidence of local recurrence after surgery using approaches standardized at Cleveland Clinic reveals excellent outcomes. The T stage is based on depth of invasion. In all groups, the primary tumor was controlled in 95% to 99% of patients 1 year postexcision.
Noninvasive Analysis of Pigmented Lesions

In 2013, the Department of Dermatology initiated use of MelaFind® to analyze clinically and dermatoscopically ambiguous pigmented lesions. Most physicians struggle to determine which of these lesions should be observed and which should be biopsied. The MelaFind device helps identify lesions most at risk for atypia and malignancy, potentially allowing some patients to avoid an unnecessary surgical procedure.

MelaFind is the only FDA-approved device to analyze pigmented lesions with a noninvasive, multispectral optical handpiece that emits 10 spectral light bands (430-950 nm) penetrating to a depth of 2 mm below the skin surface. Patterns in the light reflected back to the handpiece are analyzed for the presence of atypia and malignancy (in situ to mature) by algorithms based on a database of more than 10,000 pigmented lesions. Each lesion examined is scored on a low to high disorganization scale.

The analysis is applicable only to pigmented melanocytic nevi. The device is not indicated for lesions that are amelanotic; present in scars; located on the palms, soles, or mucosal surfaces; ulcerated; in close proximity to the eyes; or adjacent to or within areas of exogenous pigment such as tattoos.

Institute patients with a personal or family history of atypical/dysplastic nevi or a personal or family history of malignant melanoma or melanoma in situ are potential candidates for MelaFind analysis. An initial total body skin examination is performed, and dermoscopy is used to evaluate all pigmented nevi. Clinically and dermatoscopically banal lesions are not candidates for MelaFind analysis, and those grossly suspicious for atypia or frank malignancy are biopsied directly.
In an initial cohort of 30 patients (24 female and 6 male, age ranging from 17 to 66 years) meeting the criteria, 166 pigmented lesions were identified as suspicious by visual inspection and dermoscopy. Of those, 64 were identified for biopsy based on a MelaFind high disorganization score. All were diagnosed as normal to moderately dysplastic upon biopsy. None were melanoma in situ or invasive melanomas. For the 102 lesions with low disorganization scores, a decision was made to observe the lesions.

Clinical Decisions After MelaFind Analysis of Pigmented Melanocytic Nevi in 30 Patients (N = 166)
2013

These results are important in that 61% (N = 102) of the clinically suspicious pigmented lesions in an at-risk population were deferred from biopsy, indicating that MelaFind analysis may prevent overly aggressive biopsy decisions. There may also be an overall improvement in biopsy risk.
Malignant Melanoma

National Quality Measures for Cutaneous Malignant Melanoma Staging

In 2009, the American Joint Committee on Cancer defined and described pathologic characteristics that can enhance the accuracy of primary cutaneous melanoma tumor staging.\(^1\) The recommendations include adding mitotic rate (stage pT1 and higher) and ulceration characteristics, in addition to tumor thickness, to pathology reports. The institute’s Dermatopathology Section reported the quality measures for all primary malignant melanoma specimens processed at Cleveland Clinic’s main campus in 2013.

Primary Malignant Melanoma Pathology Reports Meeting AJCC\(^a\) Criteria (N = 116)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report lists pT(^b) category</td>
<td>115</td>
<td>99</td>
</tr>
<tr>
<td>Tumors staged pT1</td>
<td>84</td>
<td>—</td>
</tr>
<tr>
<td>pT1 report lists mitotic rate</td>
<td>84</td>
<td>100</td>
</tr>
<tr>
<td>Report includes a statement on thickness</td>
<td>115</td>
<td>99</td>
</tr>
<tr>
<td>Report includes information on ulceration</td>
<td>115</td>
<td>99</td>
</tr>
</tbody>
</table>

\(^a\)AJCC = American Joint Committee on Cancer

\(^b\)pT = primary tumor

Reference

Conversions to Aesthetic Surgery Following Cosmetic Injection Treatments

There are few objective data documenting the generally held supposition that patients who undergo minimally invasive cosmetic procedures ultimately undergo more invasive ones. The Dermatology & Plastic Surgery Institute documented the conversion rate to invasive aesthetic surgery among all patients receiving onabotulinum toxin A and hyaluronic acid filler treatments during a 10-year period in one surgical practice. The goal was to identify those with no initial intention to undergo an invasive aesthetic surgical procedure. Therefore, patients seeking both injectable and surgical treatment at the first visit were excluded.

From 2004 to 2013, 375 patients underwent 1049 injection sessions. Onabotulinum toxin A was the most common treatment (78%) followed by hyaluronic acid fillers (64%), and 43% received both. A total of 59 of the 375 patients (16%) underwent a subsequent invasive aesthetic procedure at an average interval of 19 months after their initial injection session. Patients underwent an average of three injectable sessions prior to surgery.

Number of Injectable Sessions (N = 1049) and First Aesthetic Surgeries (N = 98) by Year

![Graph showing the number of injectable sessions and first aesthetic surgeries per year from 2004 to 2013. The graph indicates a slight increase in both categories from 2004 to 2010, with a peak in 2011, followed by a decrease in 2012 and a slight increase in 2013.]

First aesthetic surgeries
Injectable sessions
There was no difference in conversion rate between male and female patients. The conversion rate among those receiving only one type of injectable was 14%, with no difference between those receiving onabotulinum toxin A and those receiving fillers. An 18% ($P < 0.01$) conversion rate was seen among those who received both onabotulinum toxin A and filler.

**Location of Filler Placement in Patients Subsequently Undergoing Surgery (N = 47)**

2004 – 2013

<table>
<thead>
<tr>
<th>Location</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasolabial Fold</td>
<td>25</td>
</tr>
<tr>
<td>Marionette Lines</td>
<td>12</td>
</tr>
<tr>
<td>Periorbital</td>
<td>5</td>
</tr>
<tr>
<td>Cheeks</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
</tbody>
</table>

**Location of Onabotulinum Toxin A Placement in Patients Subsequently Undergoing Surgery (N=107)**

2004 – 2013

<table>
<thead>
<tr>
<th>Location</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glabella/Corrugators</td>
<td>35</td>
</tr>
<tr>
<td>Forehead/Brow</td>
<td>29</td>
</tr>
<tr>
<td>Crow’s Feet</td>
<td>24</td>
</tr>
<tr>
<td>Perioral</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
</tr>
</tbody>
</table>
Overall, 114 aesthetic surgical procedures were performed on patients initially having onabotulinum toxin A or filler treatments. The 59 patients opting for invasive treatment underwent 98 initial aesthetic surgical procedures, and 13 patients (22%) went on to have an additional 21 procedures. Thirty-four (58%) of the surgical patients continued injectable treatments after their procedures.

**Types of Aesthetic Surgeries Performed Following Injectable Treatment (N=114)**
2004 – 2013

<table>
<thead>
<tr>
<th>Percent</th>
<th>Facelift</th>
<th>Upper Blepharoplasty</th>
<th>Browlift</th>
<th>Peel</th>
<th>Other</th>
<th>Lower Blepharoplasty</th>
<th>Rhinoplasty</th>
<th>Laser</th>
<th>Breast &amp; Body</th>
<th>Facial Fat Grafting</th>
<th>Body Liposuction</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>22</td>
<td>21</td>
<td>15</td>
<td>15</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Breast Reconstruction: Analysis of Health-Related Quality of Life and Satisfaction

The Department of Plastic Surgery aimed to critically and quantitatively evaluate breast reconstruction patients’ health-related quality of life and satisfaction throughout the reconstructive process.

From August 2012 to October 2013, breast reconstruction patients were provided with electronic tablets containing the BREAST-Q questionnaire, a rigorously evaluated, patient-reported outcome instrument. Appropriate question sets were adapted automatically through a computerized algorithm based on timing of staged reconstructive procedures. A total of 182 preoperative questionnaires were administered, and during reconstruction treatment, 150 patients completed 256 postoperative questionnaires.

Health-related quality of life domains included physical, psychosocial, and sexual well-being; breast reconstruction-specific satisfaction domains included satisfaction with breasts, overall outcome, and processes of care. Specialized software transformed Likert scale patient responses into a total score ranging from 1 to 100 for each domain.

Satisfaction with overall breast reconstruction outcome was high (mean score 73 ± 19.5) and was not significantly different in implant vs autologous reconstruction groups (P = 0.13).

Patients reported a very high degree of satisfaction with the reconstructive experience and care they received from surgeons, medical staff, and office staff.

Satisfaction with preoperative reconstruction information was high (mean score 76 ± 17). Multidisciplinary coordination between department staff, the Cleveland Clinic Breast Center, and hospital nursing staff has fostered continual improvements in preoperative counseling, as well as in dissemination of important patient care information during hospital admission and at postoperative follow-up.
The study revealed several additional important findings:

- Satisfaction with nipple reconstruction was significantly higher among patients who chose autologous reconstruction ($P = 0.07$).

- Physical well-being in the chest area among all reconstructive patients and in the abdominal area among those who underwent autologous reconstruction was somewhat diminished postoperatively ($P < 0.05$). This may be the result of pain or scarring. This result has led to proactive referral to a newly established physical therapy/occupational therapy breast rehabilitation program.

- There was a nonsignificant decrease of $17 \pm 11$ in mean psychosocial well-being score after reconstruction ($P = 0.138$). This may suggest that breast reconstruction helps maintain women’s quality of life during and after multidisciplinary breast cancer treatment. Postoperative sexual well-being was unchanged compared with premastectomy scores.

- Patients in both implant and autologous reconstruction groups reported no significant difference between premastectomy and postreconstruction satisfaction with their breasts ($P = 0.443$). This suggests that the restoration of the breast form after mastectomy returns patients to the level of satisfaction enjoyed prior to reconstruction.

Reference

Postmastectomy Breast Reconstruction Using Redundant Abdominal Tissue

Each patient presenting for breast reconstruction surgery is given individualized treatment, including evaluation of initial body type and consideration of the patient’s goals for the final reconstructive result. Patients and their surgeons review the risks and benefits of reconstruction using expanders and implants, or autologous flap-based reconstruction, often using abdominal tissue, before procedure type is recommended.

In recent years, more patients are selecting autologous tissue reconstruction when both options are suitable.

The Department of Plastic Surgery surveyed patients with at least 1 year of follow-up who underwent abdominal flap reconstruction between August 2007 and June 2011. The goal was to determine postoperative satisfaction in terms of overall results, breast results, and abdominal results on a scale of 0 (very unsatisfied) to 5 (very satisfied). The anonymous survey was mailed and 92 patients responded.

Patient Satisfaction Following Autologous Tissue Breast Reconstruction by Perioperative Weight (N = 92)

August 2007 – June 2011

<table>
<thead>
<tr>
<th>Score</th>
<th>Normal weight (N = 18)</th>
<th>Overweight (N = 47)</th>
<th>Obese (N = 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>4.5</td>
<td>4.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Breast Specific</td>
<td>4.5</td>
<td>4.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Abdomen Specific</td>
<td>4.5</td>
<td>4.0</td>
<td>3.5</td>
</tr>
</tbody>
</table>

a0 = very unsatisfied; 5 = very satisfied

Patients who were obese or overweight and lost a significant amount of weight prior to their breast reconstruction were more satisfied with results, especially with the abdomen-specific portion of the operation.
**Patient Satisfaction Following Autologous Tissue Breast Reconstruction by Preoperative Weight Loss Status (N = 92)**

August 2007 – June 2011

Score\(^a\)

<table>
<thead>
<tr>
<th>Overall</th>
<th>Breast Specific</th>
<th>Abdomen Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>No weight loss</td>
<td>Some weight loss</td>
<td>Significant weight loss</td>
</tr>
</tbody>
</table>

\(^a\)0 = very unsatisfied; 5 = very satisfied

A breast cancer patient after mastectomy (left) and 5 years after autologous abdominal tissue breast reconstruction (right)
This BRCA+ patient lost significant weight prior to elective bilateral mastectomy, as shown in the top four photographs. The lower four photographs show results of the autologous reconstruction 6 months postoperatively.
**DIEP Flap Improvements**

The most frequent complex microsurgical procedure performed in the Department of Plastic Surgery is a perforator breast reconstruction abbreviated deep inferior epigastric perforator (DIEP) flap. This multistep procedure can take 15 hours or more, and its complexity makes it a good target for improving both efficiency and patient safety. The institute performs several DIEP procedures each week, and surgeons continually improve their approach and outcomes through interactions at national educational meetings. However, given the large number of variables involved, the department sponsored a 2-day observational trip for surgeons to visit a center with the highest DIEP volume in the US and a reputation for efficiency and low morbidity.

Comparison of data on DIEP flaps performed at Cleveland Clinic in the 6 months before the off-site training with data from the 6 months after the training demonstrates the successful incorporation of new knowledge to improve efficiency and patient safety with a trend toward fewer complications. Efficiency was increased by reducing the percentage of DIEP cases requiring two highly trained senior microsurgical staff. The routine use of eyeglass loupe magnification instead of microscopes allows microsurgeons to operate with both the breast surgeons and their own fellows so that parts of the procedure previously performed in succession can be performed simultaneously. The number of procedures performed with a single staff member rose from 10.7% to 43.8%, while those requiring two senior staff decreased to < 50%. Time that highly trained microsurgical personnel would have spent assisting in a reconstruction is now freed for other cases, including additional DIEP flap procedures. Additional gains in efficiency occurred with optimized instrument organization.

**Number of Senior Staff Required for DIEP Flap Procedures (N = 60ᵃ)**

<table>
<thead>
<tr>
<th>Percent of Surgeries</th>
<th>Before training</th>
<th>After training</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Before training</td>
<td>After training</td>
</tr>
<tr>
<td>80</td>
<td>Before training</td>
<td>After training</td>
</tr>
<tr>
<td>60</td>
<td>Before training</td>
<td>After training</td>
</tr>
<tr>
<td>40</td>
<td>Before training</td>
<td>After training</td>
</tr>
<tr>
<td>20</td>
<td>Before training</td>
<td>After training</td>
</tr>
<tr>
<td>0</td>
<td>Before training</td>
<td>After training</td>
</tr>
</tbody>
</table>

ᵃN = total number of bilateral DIEP flap reconstructions
Incorporating improvements in technique learned during off-site training has resulted in fewer complications. Improved efficiency was achieved by changing the dissection technique through the muscle to include more vessels. In addition, the routine use of mesh reinforcement of the abdomen leads to a reduction in abdominal laxity and hernia, resulting in lower morbidity and improved patient safety.

Overall, the complication rate for DIEP flap procedures decreased from 24% before off-site training to 10% after. Conversely, procedures without complication increased to 89.9%, exceeding national averages.

**DIEP Flap Complications Requiring Reoperation Within 30 Days (N = 122\(^a\))**

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent of Surgeries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td><img src="chart" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>

\(^a\)N = total number of unilateral and bilateral DIEP flap reconstructions
Breast Reconstruction and Surgical Site Infection: An Evidence Based Protocol

Institute residents collected and analyzed data on breast cancer reconstruction patients returning to the clinic with surgical site infections. Between May 2012 and October 2013, a total of 645 breast reconstruction procedures were performed with the following characteristics and infection rates:

- Breast reconstruction, immediate or delayed, with tissue expander, including subsequent expansion (N = 446)
- Immediate insertion of breast prosthesis following mastopexy, mastectomy, or in reconstruction (N = 199)
- Patients admitted for treatment of a grade 2 or higher surgical site infection (N = 46, 7.1%)

Among the 46 patients admitted for infection treatment, five (11%) responded to antibiotic therapy, resulting in a successful reconstruction, and 41 (89%) ultimately underwent a second surgery related to infection.

Breast Reconstruction Surgical Site Infection Organisms (N = 46)

May 2012 – October 2013

<table>
<thead>
<tr>
<th>Microbiology</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methicillin-resistant <em>Staphylococcus aureus</em></td>
<td>1</td>
</tr>
<tr>
<td>Methicillin-sensitive <em>Staphylococcus aureus</em></td>
<td>9</td>
</tr>
<tr>
<td>Coagulase-negative staphylococci</td>
<td>6</td>
</tr>
<tr>
<td><em>Staphylococcus lugdunensis</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>4</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>3</td>
</tr>
<tr>
<td>Yeast</td>
<td>4 (2 Candida)</td>
</tr>
<tr>
<td>Group A beta-hemolytic streptococci</td>
<td>1</td>
</tr>
<tr>
<td><em>Pasteurella multocida</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Mycobacterium fortuitum</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Mycobacterium abscessus</em></td>
<td>1</td>
</tr>
<tr>
<td>Gram-negative bacilli</td>
<td>1</td>
</tr>
<tr>
<td><em>Serratia marcescens</em></td>
<td>1</td>
</tr>
<tr>
<td>Gordonia</td>
<td>1</td>
</tr>
<tr>
<td>Gram-positive bacilli</td>
<td>1</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>1</td>
</tr>
<tr>
<td>Negative/unidentified</td>
<td>9</td>
</tr>
</tbody>
</table>
A Department of Plastic Surgery committee reviewed the infection data as well as surgical site infection management plans used in other surgical specialties and developed a standardized breast reconstruction surgical site protocol. The standardized protocol was initiated in February 2014 with a short-term goal of reducing the breast reconstruction infection rate by 50% and a long-term goal of eliminating infections.

The key elements of the standardized breast reconstruction surgical site protocol are:

- Standardized surgical draping technique
- Standardized preoperative, intraoperative, and postoperative processes
  - Patient showering and cleansing
  - Sterile surgical field creation and maintenance
  - Intraoperative implant management
  - Surgical drains and drain dressing
  - Wound care
- At-home patient instructions for breast reconstruction with placement of tissue expander(s)
Zero Oronasal Fistulae With Cleft Palate Repairs

The primary goal of palatoplasty is anatomic reconstruction of an intact palate to allow for normal speech development, while ensuring long-term harmonious facial growth and minimizing the incidence of oronasal fistula. Despite the wealth of literature on palate repair techniques, there is a lack of consensus on which technique yields optimal speech results while limiting the number of oronasal fistulae. The postoperative incidence of palatal fistulae has been reported to range from 11% to 23%.1-3

Between September 2010 and December 2013, 64 patients underwent cleft palate repair at the Dermatology & Plastic Surgery Institute. Median age at time of repair was 12 months. Soft palate construction was achieved with a Furlow palatoplasty (double-opposing Z-plasty) in 70% of patients and with intravelar veloplasty in 30%. For the hard palate, a Bardach two-flap repair was most commonly used (52%), followed by a von Langenbeck repair (41%). The incidence of oronasal fistula was 0%.

References
Psychological Outcomes Three Years After Face Transplantation

In 2008, the Dermatology & Plastic Surgery Institute performed a near total face transplant in a 45-year-old woman who suffered a gunshot wound to the head in 2004. After more than 23 reconstructive procedures were unable to restore form and function, a decision was made to proceed with facial allotransplantation. At the time it was performed, this face transplant was only the fourth procedure of its kind and the most extensive in terms of the variety of tissue and percentage of facial structure transplanted.

The advent of face transplantation has raised both ethical and psychological issues. Psychological outcomes are as important in face transplantation as is restoring the face physically. Few quantitative data have been published in this area. Data systematically collected over 3 years for this patient included appearance self-rating, body image, mood changes, pain rating, perception of teasing, quality of life, self esteem, and social reintegration.

Because of a significant gap in rating instruments for prioritizing patients for a face transplant registry, the institute developed the Perception of Teasing-FACES, Facial Anxiety Scale-State, and the Cleveland Clinic FACES score, analogous to the Model for End-Stage Liver Disease score for patients awaiting liver transplant.

Appearance self-rating rose from 3/10 prior to transplantation to 7/10 3 years later. Anxiety about body image and the Facial Anxiety score were halved by the end of year 3. The Beck Depression Inventory score fell from 16 (prior to transplant) to 8. Chronic daily pain was 6/10 to 7/10 prior to transplant and 0/10 by day 50. Perception of Teasing-FACES scores fell from 25 to 8 by the end of year 3.

Quality of life improved on the social environment domain of the Psychosocial Adjustment to Illness Scale—Self Report, where the score dropped from 15 to 1 after 3 years, indicating marked improvement in social reintegration.

Standardized data collection may help quantify psychological outcomes with facial transplantation to determine whether the risks of immunosuppression over time are offset by improved quality of life for recipients.

Reference

Perception of Teasing-FACES Scores Pretransplant vs 3-Year Follow-Up
2008 – 2011

<table>
<thead>
<tr>
<th>Item</th>
<th>2008 (Pretransplant)</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made Fun</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jokes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Names</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pointed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screamed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laughed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whispered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pathology Review of the Near Total Face Transplant

After undergoing a near total face transplant, the patient was monitored for signs of rejection assessed by paired skin and mucosa biopsies. A histologic review of 120 biopsy specimens collected during the first 4 years posttransplant was conducted. All samples were stained with hematoxylin and eosin, periodic acid-Schiff, and immunohistochemical and terminal deoxynucleotidyl transferase dUTP nick end labeling assays, and then graded using the Banff 2007 classification.

Grade III rejection was diagnosed clinically at weeks 45 and 66 posttransplant; the week 45 diagnosis was determined to be folliculitis while an erythema episode at week 66 was confirmed as an acute rejection (AR) requiring hospitalization. The mucosa frequently showed interface inflammation without clinical signs of rejection and was not present in skin biopsies. In all, 34 of 45 mucosal biopsies (75%) showed these interface changes. Clinical symptoms concurred with skin pathology in two grade III rejections. The mucosa showed histologic signs of rejection more frequently, which may indicate increased mucosal sensitivity to rejection, a different type or subtype of AR specific to the mucosa, or a nonspecific process such as a drug effect.

The institute treated all episodes with clinical signs of rejection that were confirmed by concordant skin and mucosa biopsies to represent grade III AR, and the patient gradually improved during the subsequent 3 weeks as antirejection medication was adjusted. By the end of the second month posttransplant, topical immunosuppression was added to the regimen based on favorable results reported in hand transplant recipients with lower grades of AR.

The Banff 2007 classification was a valuable guide in grading both the skin and mucosal biopsies. These histologic findings were correlated with the clinical findings. With experience, concordance with the clinical and histologic findings was found to be necessary to diagnosis AR. As more data and world experience accrues, face transplant rejection will be better defined and the Banff classification enhanced.

Reference

Site of mucosal graft biopsy

Skin graft biopsy showing entrapped salivary gland with acute inflammation (100x magnification)

Site of skin graft biopsy

Interface mucositis on week 10 mucosal graft biopsy, acute rejection grade II (200x magnification)
Face Transplant

Acute rejection, week 45; final diagnosis acneiform papule/folliculitis

Skin graft biopsy of folliculitis initially diagnosed as chronic folliculitis; Banff acute rejection grade II (100x magnification)

Skin graft biopsy with interface chronic lymphocytic infiltrate and keratinocyte apoptosis; acute rejection grade III (200x and 400x magnification, respectively)

Skin graft erythema, week 66
Alopecia areata (AA) is a nonscarring type of hair loss characterized by well-defined, round, bald patches on the scalp or other body areas. Most affected patients have limited disease with an episodic, remitting course and periods of spontaneous hair regrowth. In some cases, AA can progress to alopecia totalis or alopecia universalis, which are refractory to most treatments.

Diphenylcyclopropenone (DPCP) is a topical immunotherapy used to treat refractory or extensive AA. Institute dermatologists conducted a study of all Cleveland Clinic AA patients treated with DPCP between 1997 and 2012. There were a total of 50 patients treated including 25 with AA universalis (51%), 14 with AA totalis (29%), and 9 with patchy hair loss (18%). One patient had alopecia ophiasis. An additional patient who was anergic to DPCP treatment was not included in the analysis.

Results showed that DPCP achieved ≥ 50% hair regrowth in 71% of AA totalis and in 56% of AA universalis patients. Median duration of DPCP treatment was 3 years, with 47% of patients experiencing their first regrowth during the first 6 months of therapy.

There were three predictors of poor DPCP treatment outcomes: large extent of scalp hair loss prior to treatment ($P = 0.02$), large extent of body hair loss ($P = 0.03$), and a history of thyroid disease ($P = 0.05$). Relapse was observed in 44% of patients and was significantly associated with history of thyroid disease ($P = 0.01$). Common side effects of DPCP therapy were itching, dermatitis, and local lymphadenopathy, which were controlled with cool compresses, topical steroids, a reduction in DPCP concentration, and if necessary, a short course of oral corticosteroids.

**Hair Regrowth With DPCP$^a$ Treatment by Alopecia Subtype (N = 48$^b$)**

1997 – 2012

<table>
<thead>
<tr>
<th>Alopecia Subtype</th>
<th>≤ 50% regrowth</th>
<th>≥ 50% regrowth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patchy</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Totalis</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Universalis</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

$^a$DPCP = diphenylcyclopropenone

$^b$One patient with alopecia ophiasis is excluded
Alopecia

Hair Regrowth With DPCP<sup>a</sup> Treatment by Extent of Pretreatment Hair Loss (N = 49) 1997 – 2012

### Percentage of Patients

<table>
<thead>
<tr>
<th>Extent of Pretreatment Hair Loss</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>1</td>
</tr>
<tr>
<td>Moderate</td>
<td>8</td>
</tr>
<tr>
<td>Severe</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>

<sup>a</sup>DPCP = diphenylcyclopropenone

### Common Side Effects of DPCP<sup>a</sup> Treatment (N = 49) 1997 – 2012

### Percentage of Patients

<table>
<thead>
<tr>
<th>Side Effects</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Lymphadenopathy</td>
<td>10</td>
</tr>
<tr>
<td>Blistering</td>
<td>11</td>
</tr>
<tr>
<td>Dermatitis</td>
<td>11</td>
</tr>
<tr>
<td>Severe Itching</td>
<td>11</td>
</tr>
<tr>
<td>1 ≥ Side Effect</td>
<td>23</td>
</tr>
<tr>
<td>4 ≥ Side Effect</td>
<td>2</td>
</tr>
</tbody>
</table>

<sup>a</sup>DPCP = diphenylcyclopropenone
Methylisothiazolinone, a New and Frequent Contact Allergen: Clinical Practice Relevance and Outcomes

Methylchloroisothiazolinone (MCI) and methylisothiazolinone (MI) are often used in combination as preservatives in industrial products such as cutting oils, paints, paper finishes, and household cleansers, and in cosmetics and toiletries including shampoos, lotions, emulsions, and sunscreens. Both are contact allergens and are commonly listed on product labels. MI has now been found to be a more potent contact allergen than the MCI/MI combination and was named 2013 American Contact Dermatitis Society Allergen of the Year.

The Dermatology & Plastic Surgery Institute included MI alone in its core allergy patch test series beginning in 2012. The prevalence, coreaction patterns, and outcomes of the 8.6% of patients with positive MI patch test reactions are reviewed.

Results of Patch Tests for Methylchloroisothiazolinone/Methylisothiazolinone and Methylisothiazolinone (N = 382)

January 2012 – November 2013

<table>
<thead>
<tr>
<th>Patch Test Reactions</th>
<th>Methylisothiazolinone Positive</th>
<th>Methylisothiazolinone Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylchloroisothiazolinone/</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>methylisothiazolinone positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methylchloroisothiazolinone/</td>
<td>16</td>
<td>348</td>
</tr>
<tr>
<td>methylisothiazolinone negative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Positive Patch Test Reactions to Methylisothiazolinone (N = 33)
January 2012 – November 2013

Number of Patients

<table>
<thead>
<tr>
<th>Reaction</th>
<th>1+</th>
<th>2+</th>
<th>3+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

Positive Patch Test Reactions to Methylchloroisothiazolinone/ Methylisothiazolinone (N = 16)
January 2012 – November 2013

Number of Patients

<table>
<thead>
<tr>
<th>Reaction</th>
<th>1+</th>
<th>2+</th>
<th>3+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Among MI-sensitive patients, 73% were female and the average age was 47 years. Average duration of dermatitis before patch testing was 30 months, and 60% of patients had a history of atopy. The most commonly affected sites were hands (N = 13), face (N = 11), and generalized (N = 10).

Cosmetics, soaps and cleansers (including personal wet wipes), and hair care products accounted for all identified sources. Contact allergy to MI and/or MCI/MI was occupationally related in four cases; three were hairdressers using shampoos containing MI and a fourth was a day care worker using MI-containing wet wipes. The relevance of exposures to the positive patch test reactions was definite (N = 2), probable (N = 12), possible (N = 11), or past (N = 2). Concomitant preservative allergies occurred to methylidibromo glutaronitrile/phenoxyethanol (N = 6), iodopropynyl butylcarbamate (N = 5), formaldehyde (N = 5), and bronopol (N = 4).

Outcomes were available for 12 patients. Most improved significantly with allergen avoidance: cleared (N = 4), mostly cleared (N = 5), and partially cleared (N = 1). The high prevalence of contact allergy to MI supports its addition to core patch test series to identify cases missed by testing with only MCI/MI.

In December 2013, Cosmetics Europe, in conjunction with the European Contact Dermatitis Society, recommended that the use of MI in cosmetic products, including wet wipes, be discontinued for patient safety.\(^1\)\(^2\) Intervention is needed in the United States to reduce the number of products containing these preservatives.

References
Dermatopathology Turnaround Times

The institute reports 2013 intralaboratory timeliness, or turnaround times (TAT), of more than 24,000 routine surgical pathology biopsies and external complex consultations from the time of specimen accessioning to report completion. The goal is to meet or exceed the College of American Pathologists recommended benchmark of 2 working days.\(^1\) The TAT for the vast majority (74\%) of specimens was 1 day with a total of 92\% signed out within 2 days. TATs are variable depending on case complexity as well as other factors such as the presence of a residency training program and the number of hospital beds and surgical pathologists.

Percentage of Dermatopathology Cases Completed Within 2 Days (N = 24,919)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>In House Biopsies</td>
<td>100</td>
</tr>
<tr>
<td>Outside Surgical Consultations</td>
<td>80</td>
</tr>
<tr>
<td>Outside Complex Consultations</td>
<td>60</td>
</tr>
<tr>
<td>Outside Routine Biopsies</td>
<td>40</td>
</tr>
</tbody>
</table>

N = 21,265

Outside surgical consultations = cases referred by Cleveland Clinic clinicians for review and expert opinion by institute pathologists

Outside complex consultations = cases referred by other pathologists for expert opinion

Outside routine biopsies = routine cases referred by clinicians outside Cleveland Clinic

Reference

Skin Cancer in Solid Organ Transplant Recipients

Since 1971, it has been recognized that solid organ transplant recipients have an increased risk of developing skin cancer as a result of ongoing immunosuppressive therapy. Skin cancer is the most common malignancy among these patients and accounts for substantial morbidity and mortality. Transplant patients tend to develop multiple skin cancers that are larger and grow more rapidly, and that have a more aggressive histologic pattern and increased perineural invasion with higher recurrence rates and increased risk of metastasis, than those seen in the general population.

Among those with a history of skin cancer prior to transplantation, more than 75% develop additional posttransplant skin cancers, with an average of 17 tumors per patient. The increased incidence of nonmelanoma skin cancers in organ transplant recipients is alarming, with a 10-fold increase in basal cell carcinoma and a 65- to 250-fold increase in squamous cell carcinoma (SCC) compared with the general population. There is also a 3.4-fold increase in melanoma and an 84-fold increase in Kaposi’s sarcoma.

In July 2011, Cleveland Clinic established a multidisciplinary transplant dermatology clinic that offers patients education, screenings, and risk assessments with individually determined follow-up intervals. Pre- and posttransplant skin screening, early detection and management, and a multidisciplinary care approach are critical to minimize morbidity and mortality.

Number of Pretransplant and Posttransplant Evaluations Performed and Resulting Number of Skin Cancers Diagnosed and Treated

July 2011 – January 2014

<table>
<thead>
<tr>
<th></th>
<th>Pretransplant</th>
<th>Posttransplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluations performed</td>
<td>913</td>
<td>478</td>
</tr>
<tr>
<td>Squamous cell carcinomas</td>
<td>49</td>
<td>392</td>
</tr>
<tr>
<td>Basal cell carcinomas</td>
<td>39</td>
<td>67</td>
</tr>
<tr>
<td>Melanomas</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Other skin cancers</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>(Merkel cell carcinoma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and spindle cell sarcoma</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Because of the strong association between UV irradiation and skin cancer development, especially in immunocompromised patients, sun protection education is emphasized in the transplant dermatology clinic. A small pilot study has shown dramatic improvement in sun protection compliance, with 40% of patients compliant before sun protection education and 90% compliant after sun protection education during follow-up of 1 to 3 years.

Managing patients affected by numerous aggressive skin cancers presents a challenge to dermatologists. Frequent surgical interventions such as Mohs micrographic surgery, wide local excision, electrodessication and curettage, and cryosurgery are used, as well as systemic and topical chemoprevention and photodynamic therapy. For patients with metastatic disease, adjuvant chemotherapy, radiation, and reduction of immunosuppression are also indicated.

A 57-year-old male developed an invasive, poorly differentiated spindle cell SCC on the occipital scalp 13 months after liver transplant. The photograph on the left shows recurrence 3 months after initial Mohs surgery followed by wide local excision and reconstruction. Multiple SCC foci, indicated by blue marker, developed at the edge of the previous surgical site. The photograph on the right shows the bone erosion identified after one stage of Mohs surgery to explore the extent of the tumor invasion. This patient subsequently underwent a craniectomy and cranioplasty and was treated with postoperative radiotherapy to the surgical site and systemic chemotherapy.
Successful Treatment of Primary Focal Hyperhidrosis With Onabotulinum Toxin

Close to 3% of the US population suffers from primary focal hyperhidrosis, which often severely affects quality of life. Treatment with onabotulinum toxin A has been shown to considerably improve this condition, and most importantly, improves the patient’s quality of life and psychosocial well being. Despite known side effects such as pain and bleeding at injection sites or self-limited and reversible muscle weakness (with palmar and plantar hyperhidrosis treatment), patients describe the results as dramatically life changing.

The Hyperhidrosis Disease Severity Scale (HDSS) is a quick and practical way of measuring interference with daily activities, and institute dermatologists use it in the diagnosis and follow-up of patients, as well as to assess treatment success. Successful treatment is defined as a drop in score of 1 to 2 points from a score of severe (HDSS score 3 or 4) or a 1-point reduction from moderate or mild (HDSS score 2 or 1). Treatment failure is defined as no change in the HDSS score, intolerability of treatment, or presence of side effects.

<table>
<thead>
<tr>
<th>Hyperhidrosis Disease Severity Scale</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>My sweating is never noticeable and never interferes with my daily activities.</td>
<td>1 (mild)</td>
</tr>
<tr>
<td>My sweating is tolerable but sometimes interferes with my daily activities.</td>
<td>2 (moderate)</td>
</tr>
<tr>
<td>My sweating is barely tolerable and frequently interferes with my daily activities.</td>
<td>3 (severe)</td>
</tr>
<tr>
<td>My sweating is intolerable and always interferes with my daily activities.</td>
<td>4 (severe)</td>
</tr>
</tbody>
</table>
Hyperhidrosis

There is an increasing trend in the number of hyperhidrosis patients treated at the Dermatology & Plastic Surgery Institute, with 130 patients treated in 2013 compared with 109 in 2012. The distribution of treatment location is shown in this graph.

Assessment of treatment success in a cohort of patients (N=27) was made using the HDSS score before and 2 weeks after treatment. The following graphs show a 100% success rate in the treatment of primary focal hyperhidrosis. No side effects were reported in this cohort of patients.

Change in Average Axillary HDSS\(^a\) Scores (N = 27)

Change in Average Palmoplantar HDSS\(^a\) Scores (N = 27)

\(^a\)HDSS = Hyperhidrosis Disease Severity Scale
Propranolol was serendipitously discovered to be a highly effective treatment for infantile hemangiomas (IH) in 2008, and it has increasingly gained acceptance as first-line therapy for this condition. Since October 2009, the multidisciplinary Cleveland Clinic Vascular Anomalies Program has treated more than 100 IH patients. All have had a decrease in lesion size with propranolol treatment, and there have been no significant adverse effects.

The diversity of IH presentations, the range of subspecialties involved in the care of these patients, and the challenge of cardiac risk assessment are important considerations. In 2012 the Vascular Anomalies Committee designed an innovative Standardized Clinical Assessment and Management Plan (SCAMP) to address issues associated with propranolol treatment. It was the first known application of the SCAMP methodology in an academic dermatologic practice.

**SCAMP Algorithm for Propranolol Treatment of Infantile Hemangiomas**

- **Evaluation by appropriate Vascular Anomalies Committee member**
- **MRI/ultrasound/CT if necessary**
- **Baseline cardiac examination, ECG, echocardiogram, vital signs, photography**
- **Start propranolol 1 mg/kg/day divided q 8 hours (HR, BP, Accu-Chek® at 2 hours after first dose).**
- **After 1 week, increase to 2 mg/kg/day (HR, BP, Accu-Chek at 2 hours after first dose).**
- **Reassess in 6 to 8 weeks for effect and increase to 3 mg/kg/day if needed.**
- **Follow up every 2 months for photography and dose adjustment.**

The SCAMP allows early systematization and continuous evaluation of a clinical management protocol including propranolol in a highly varied patient population, as demonstrated by the following cases.
Infantile Hemangiomas

Right forehead IH with deep and superficial components presenting at 6 months of age with brow distortion, and after 7 months of treatment.

Solitary glabellar IH presenting at age 3 months, and after 15 months of treatment.

Right facial lesion presenting at 1 month of age, and after 16 months of treatment.
Upper lip hemangioma shown at age 6 months, and after 10 months of treatment

Ulcerated labial hemangioma at age 4 months, and 6 months into treatment

Hand lesion with circumferential thumb involvement at age 2 months, and after 11 months of treatment
Infantile Hemangiomas

One-month-old with a nasal tip IH with focal necrosis before and after 11 months of treatment

Right chest IH with extensive deep component presenting at 6 months of age, and after 8 months of treatment

Ulcerated hemangioma causing distortion of the right cheek and jawline in a 2-month-old patient, and after 14 months of treatment
Multiple proliferating lesions in a premature, 29-week infant at 4 months, and 7 months into treatment

Two-month-old with many hemangiomas, some ulcerated, before and after 5 months of treatment
Cleveland Clinic is dedicated to delivering excellent clinical outcomes surrounded by the best possible experience for patients and their families. Reported patient experiences are shared with caregivers and used to identify opportunities to improve care. Cleveland Clinic’s Office of Patient Experience supports caregivers through educational opportunities and training programs designed to help them provide the best possible experience in every patient encounter.

**Outpatient Office Visit Survey — Dermatology & Plastic Surgery Institute**

**CG-CAHPS Assessment**<sup>a</sup> (N = 2663)  
**2013**

<table>
<thead>
<tr>
<th>Percent Best Response</th>
<th>CAHPS Database Average (All Practices)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appointment Access</td>
<td></td>
</tr>
<tr>
<td>Doctor Communication</td>
<td></td>
</tr>
<tr>
<td>Doctor Rating</td>
<td></td>
</tr>
<tr>
<td>Clerical Staff</td>
<td></td>
</tr>
<tr>
<td>Test Results Communication</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>In 2013, Cleveland Clinic began administering the Clinician and Group Practice Consumer Assessment of Healthcare Providers and Systems surveys (CG-CAHPS), standardized instruments developed by the Agency for Healthcare Research and Quality and supported by the Centers for Medicare & Medicaid Services for use in the physician office setting to measure patients' perspectives of outpatient care.

<sup>b</sup>Based on results submitted to the CAHPS database from 2399 medical practices in 2012.

Source: Press Ganey, a national hospital survey vendor
The Centers for Medicare & Medicaid Services requires United States hospitals that treat Medicare patients to participate in the national Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, a standardized tool that measures patients’ perspectives of hospital care. Results collected for public reporting are available at medicare.gov/hospitalcompare.

HCAHPS Overall Assessment
2012 – 2013

Percent Best Response

<table>
<thead>
<tr>
<th>Hospital Rating (% 9 or 10) 0 – 10 Scale</th>
<th>Recommend Hospital (% Definitely Yes)</th>
<th>2012 (N = 82)</th>
<th>2013 (N = 122)</th>
<th>National Average All Patients^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>83</td>
<td>85</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

*aResponse options: Definitely Yes, Probably Yes, Probably No, Definitely No
Source: Press Ganey, a national hospital survey vendor

HCAHPS Domains of Care
2012 – 2013

Percent Best Response^a

<table>
<thead>
<tr>
<th>Discharge Information % Yes</th>
<th>Doctor Communication</th>
<th>Nurse Communication</th>
<th>Pain Management</th>
<th>Room Clean % Always</th>
<th>New Medications Communication</th>
<th>Responsiveness to Needs</th>
<th>Quiet at Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>83</td>
<td>85</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

^aExcept for “Room Clean” and “Quiet at Night,” each bar represents a composite score based on responses to multiple survey questions.
Source: Press Ganey, a national hospital survey vendor

^bBased on national survey results of discharged patients, April 2012 – March 2013, from 3938 US hospitals. medicare.gov/hospitalcompare
Focus on Value

Cleveland Clinic is developing and implementing new models of care that focus on “Patients First” and aim to deliver on the Institute of Medicine goal of Safe, Timely, Effective, Efficient, Equitable, Patient-centered care. Creating new models of Value-Based Care is a top strategic priority for Cleveland Clinic as healthcare reform moves care delivery from fee-for-service to a population health and bundled payment delivery system, while concurrently improving patient safety, outcomes, and experience.

What will our new model of care look like?

• The Cleveland Clinic Integrated Care Model is a value-based model of care, designed to improve outcomes while reducing cost.
• The patient remains at the heart of the Cleveland Clinic Integrated Care Model.
• The blue band represents the care system, which is a seamless pathway that patients move along as they receive care in the different settings listed. The care system represents integration of care across the continuum.
• To build this new care system, critical competencies are care paths and care coordination. We have therefore begun to build disease and condition-specific care paths, and are implementing comprehensive care coordination.
• Care paths guide patient care both within a venue (e.g., a hospital) as well as along the care system (blue band) to appropriate care venues. Care paths will improve value by employing evidence and/or experience-based practice to reduce unnecessary variation in care, with the goal of achieving optimal outcomes at the lowest possible cost. Measurement of use and outcomes is integral to care paths.
• Care coordination identifies high-risk patients and risk points in transitions of care, and enhances communication and handoffs between providers and locations.
Cleveland Clinic’s Dermatology & Plastic Surgery Institute continually seeks innovative treatment modalities to address the complex dermatologic and reconstructive problems patients face. In 2013, the institute developed medical devices and pharmaceuticals and designed a new management decision making technology.

**Wound Healing**

Chronic wounds affect 6.5 million patients in the US but are rarely seen in healthy individuals. Sharp rises in the incidence of diabetes and obesity, an aging population, and increasing healthcare costs all contribute to the rapidly growing burden of chronic wounds.

To assist in combating complex wounds in systemically complex patients, the institute has designed a new negative pressure wound therapy device for combined use with drug delivery systems. This model achieves eradication of biofilm and the conduction of wound healing biologics initiated by negative pressure to promote faster wound healing and prevent biofilm recurrence.

**Neurostimulation Technique for Episodic Migraine Headache**

In previous years, the institute assisted in the surgical and clinical design of European multicenter trials to evaluate a sphenopalatine ganglion stimulation device for the treatment of cluster headache. The ATI™ Neurostimulation System is a miniaturized neurostimulator that can be implanted transorally during a minimally invasive, 30- to 60-minute procedure.

The procedure and device were subsequently approved by the European Union for treatment of chronic cluster headache, and ATI is now designing a US multicenter clinical trial to evaluate safety and efficacy in patients with disabling episodic migraine headaches. The company is also currently seeking approval for the procedure and device in Europe for use in chronic and high frequency migraine patients.

**Healthcare Management Software Systems**

The Innovation Engine, a management information system platform, has been developed and is being implemented within the institute as a unique approach to engage frontline medical staff in continuously improving resource utilization and patient flow. As proven in a host of manufacturing and service industries around the world, engaging frontline staff is the best way to improve quality and efficiency and reduce costs. This new software combines the following elements:

- Process improvement consulting to ensure patient care teams achieve maximum results
- Behavioral software to increase and measure staff engagement
- Actionable displays to help staff make quick and informed decisions
- Real-time tracking and data acquisition to quantify results
- A database to capture and share best practices between staff, departments, facilities, and hospital systems

This low cost system, combined with behavioral technologies such as the “smart badge,” causes minimal disruption and has a high acceptance rate among frontline and ancillary staff.
General Dermatology
Appointments/Referrals
216.444.5725 or 800.223.2273, ext. 45725

Surgical Dermatology
Appointments/Referrals
216.444.5724 or 800.223.2273, ext. 45724

Cutaneous Care Center
216.444.2649 or 800.223.2273, ext. 42649

Dermatology Clinical Research
216.445.3157 or 800.223.2273, ext. 53157

Dermatology Financial Counselor
216.445.8662 or 800.223.2273, ext. 58662

Plastic Surgery
Appointments/Referrals
216.444.6900 or 800.223.2273, ext. 46900

Plastic Surgery
Financial Counselor
216.445.1331 option #4 or 800.223.2273, ext. 51331 option #4

On the Web at clevelandclinic.org/dermatology and clevelandclinic.org/plastics

Staff Listing
For a complete listing of Cleveland Clinic’s Dermatology & Plastic Surgery Institute staff, please visit clevelandclinic.org/staff.

Publications
Dermatology & Plastic Surgery Institute staff authored 84 publications in 2013.
For a complete list, go to clevelandclinic.org/outcomes.

Locations
For a complete listing of Dermatology & Plastic Surgery Institute locations, please visit clevelandclinic.org/DPSI.
Additional Contact Information

General Patient Referral
24/7 hospital transfers or physician consults
800.553.5056

General Information
216.444.2200

Hospital Patient Information
216.444.2000

General Patient Appointments
216.444.2273 or 800.223.2273

Referring Physician Center and Hotline
855.REFER.123 (855.733.3712)
Or email refdr@ccf.org or visit clevelandclinic.org/refer123

Request for Medical Records
216.444.2640 or 800.223.2273, ext. 42640

Same-Day Appointments
216.444.CARE (2273)

Global Patient Services/International Center
Complimentary assistance for international patients and families
001.216.444.8184 or visit clevelandclinic.org/gps

Medical Concierge
Complimentary assistance for out-of-state patients and families
800.223.2273, ext. 55580, or email medicalconcierge@ccf.org

Cleveland Clinic Abu Dhabi
clevelandclinicabudhabi.ae

Cleveland Clinic Canada
888.507.6885

Cleveland Clinic Florida
866.293.7866

Cleveland Clinic Nevada
702.483.6000

For address corrections or changes, please call
800.890.2467
About Cleveland Clinic

Overview

Cleveland Clinic is an academic medical center offering patient care services supported by research and education in a nonprofit group practice setting. More than 3,200 Cleveland Clinic staff physicians and scientists in 130 medical specialties and subspecialties care for more than 5.5 million patients across the system, performing more than 202,000 surgeries and conducting more than 476,000 emergency department visits. Patients come to Cleveland Clinic from all 50 states and more than 130 nations around the world.

Cleveland Clinic is an integrated healthcare delivery system with local, national, and international reach. The main campus in midtown Cleveland, Ohio, has a 1,440-bed hospital, outpatient clinic, specialty institutes, labs, classrooms, and research facilities in 44 buildings on 167 acres. Cleveland Clinic patients represent the highest CMS case-mix index in the nation. Cleveland Clinic encompasses 75 northern Ohio outpatient locations, including 16 full-service family health centers, eight community hospitals, an affiliate hospital, and a rehabilitation hospital for children. Cleveland Clinic also includes Cleveland Clinic Florida; Cleveland Clinic Nevada, which includes the Lou Ruvo Center for Brain Health in Las Vegas, and urology and nephrology services; Cleveland Clinic Canada; and Sheikh Khalifa Medical City (management contract). Cleveland Clinic Abu Dhabi is a full-service hospital and outpatient center in the United Arab Emirates (UAE) scheduled to begin offering services in the spring of 2015. Cleveland Clinic is the second-largest employer in Ohio, with more than 43,400 employees. It generates $10.95 billion of economic activity a year.

Cleveland Clinic Global Solutions supports physician education, training and consulting, and patient services around the world through offices in Riyadh, Saudi Arabia; London, England; Istanbul, Turkey; and Dubai, UAE, as well as El Salvador, Panama, Guatemala, Honduras, the Dominican Republic, and other Caribbean nations.

The Cleveland Clinic Model

Cleveland Clinic was founded in 1921 by four physicians who had served in World War I and hoped to replicate the organizational efficiency of military medicine. The organization has grown through the years by adhering to the model set forth by the founders. All Cleveland Clinic staff physicians receive a straight salary with no bonuses or other financial incentives. The hospital and physicians share a financial interest in controlling costs, and profits are reinvested in research and education.

The Cleveland Clinic system began to grow in 1987 with the founding of Cleveland Clinic Florida and expanded in the 1990s with the development of 16 family health centers across Northeast Ohio. Fairview Hospital, Hillcrest Hospital, and six other community hospitals joined Cleveland Clinic over the past decade and a half, offering Cleveland Clinic institute services in heart and neurological care, physical rehabilitation, and more. Clinical and support services were reorganized into 27 patient-centered institutes beginning in 2007. Institutes combine medical and surgical specialists around specific diseases or body systems under single leadership and in a shared location to provide optimal team care for every patient. Institutes work with the Office of Patient Experience to give every patient the best outcome and experience.
Cleveland Clinic Lerner Research Institute

At the Lerner Research Institute, hundreds of principal investigators, project scientists, research associates, and postdoctoral fellows are involved in laboratory-based translational and clinical research. Total research expenditures from external and internal sources exceeded $248 million in 2013. Research programs include cardiovascular, oncology, neurology, musculoskeletal, allergy and immunology, ophthalmology, metabolism, and infectious diseases.

Cleveland Clinic Lerner College of Medicine

Lerner College of Medicine of Case Western Reserve University is known for its small class size, unique curriculum, and full-tuition scholarships for all students. The program is open to 32 students who are preparing to be physician investigators. Cleveland Clinic is building a new Health Education Campus as the new home for the college and for its partner Case Western Reserve University’s schools of medicine, dental medicine, and nursing.

Graduate Medical Education

In 2013, nearly 1,800 residents and fellows trained at Cleveland Clinic and Cleveland Clinic Florida, which is part of a continuing upward trend.

U.S. News & World Report Ranking

Cleveland Clinic is consistently ranked among the top hospitals in America by U.S. News & World Report, and its heart and heart surgery program has been ranked No. 1 in the nation since 1995. In 2013, five programs were ranked No. 2 in the nation—diabetes and endocrinology, gastroenterology and GI surgery, nephrology, rheumatology, and urology.

For more information about Cleveland Clinic, please visit clevelandclinic.org.
Referring Physician Center and Hotline

For the 24/7 hotline to streamline access to an array of medical services and schedule patient appointments, call 855.REFER.123 (855.733.3712), email refdr@ccf.org, or visit clevelandclinic.org/refer123. A free Physician Referral App is now available so you can get in touch immediately with one click of your iPhone®, iPad®, or Android™ phone or tablet.

Remote Consults

Online medical second opinions from Cleveland Clinic’s MyConsult® are particularly valuable for patients who wish to avoid the time and expense of travel. Cleveland Clinic offers online medical second opinions for more than 1,200 life-threatening and life-altering diagnoses. For more information, visit clevelandclinic.org/myconsult, email eclevelandclinic@ccf.org, or call 800.223.2273, ext. 43223.

Request Medical Records

216.444.2640 or 800.223.2273, ext. 42640

Track Your Patients’ Care Online

DrConnect® offers referring physicians secure access to their patients’ treatment progress while at Cleveland Clinic. To establish a DrConnect account, visit clevelandclinic.org/drconnect or email drconnect@ccf.org. MyPractice Community gives referring physicians online access to their patients’ test results, medications, and treatment plans during Cleveland Clinic care. Cleveland Clinic’s eRadiology system offers teleradiology consultation for physicians nationwide.

Medical Records Online

Cleveland Clinic continues to expand and improve electronic medical records (EMRs) to provide faster, more efficient, and more accurate care by sharing patient data through a highly secure network. Patients using MyChart® can renew prescriptions and review test results and medications from their personal computers. MyChart provides a link to Microsoft HealthVault, a free online service that helps patients securely gather and store health information. It connects to Cleveland Clinic’s social media and Internet site, currently the most visited hospital website in America. For more information, visit clevelandclinic.org/mychart.

Critical Care Transport Worldwide

Cleveland Clinic’s critical care transport team and fleet of mobile ICU vehicles, helicopters, and fixed-wing aircraft serve critically ill and highly complex patients across the globe. To arrange a transfer for STEMI (ST elevation myocardial infarction), acute stroke, ICH (intracerebral hemorrhage), SAH (subarachnoid hemorrhage), or aortic syndrome, call 877.379.CODE (2633). For all other critical care transfers, call 216.444.8302 or 800.553.5056.

CME Opportunities: Live and Online

Cleveland Clinic’s Center for Continuing Education operates one of the largest and most successful CME programs in the country. The center’s website (ccfcme.org) is an educational resource for healthcare providers and the public. Available 24/7, it houses programs that cover topics in 30 areas. Among other resources, the website contains a virtual textbook of medicine (Disease Management Project) and myCME, a system for physicians to manage their CME portfolios. Live courses, however, remain the backbone of the center’s CME operation. Most live courses are held in Cleveland, but outreach plans are underway.
**Clinical Trials**

Cleveland Clinic has promoted research from its earliest days, and has since participated in historic, large, multicenter clinical trials. Today, Cleveland Clinic is running more than 2,200 clinical trials of various types. Researchers are focused on an array of conditions, including breast and liver cancer, coronary artery disease, heart failure, epilepsy, Parkinson disease, chronic obstructive pulmonary disease, asthma, high blood pressure, diabetes, depression, and eating disorders. To learn more, go to clevelandclinic.org/research.

Cancer Clinical Trials is a new mobile app that provides up-to-date information on the more than 100 active clinical trials available for cancer patients. Download the free Cancer Clinical Trials App at clevelandclinic.org/cancertrialapp.

**Healthcare Executive Education**

Cleveland Clinic’s executive education program offers its programs to caregivers worldwide seeking insights into the business, operations, and logistics of a major medical center. The **Executive Visitors’ Program** is an intensive three-day behind-the-scenes view of Cleveland Clinic’s organization for the busy executive. The **Samson Global Leadership Academy** is a two-week immersion into the challenges of leadership, management, and innovation. The curriculum includes coaching and a personalized three-year leadership development plan. Learn more at clevelandclinic.org/execed.
This project would not have been possible without the commitment and expertise of a team led by James S. Taylor, MD, Barbara S. Leslie, and Nancy F. Toll. Photography by Patricia Shoda and Janine Sot. Graphic design and additional photography were provided by Cleveland Clinic's Center for Medical Art and Photography.