those discoveries into new therapeutics. Examples such as Children’s Hospital of Philadelphia’s development of the first FDA-approved gene therapy - licensed to Spark Therapeutics and later sold to Roche for $4.3B - demonstrate how academic research can facilitate important new therapies and create significant economic value for sponsoring institutions. Yet, meaningful advances from target discovery to preclinical and clinical translation are rare in AMCs, leaving much of this value and impact unrealized. We sought to identify roadblocks to effective therapeutic translation and discover methods for improvement.

Methods: Our methodology centered on four elements. First, we assessed faculty engagement by conducting interviews with 40 researchers engaged in therapeutic translation across our institution. We also culled the last 5 years of technology disclosures to the Johns Hopkins Technology Transfer office to identify therapeutically translatable discoveries. Second, we examined infrastructure across the institution that supports therapeutic translation including core facilities and advisory services. Third, we visited and interviewed leaders at Children’s Hospital of Philadelphia, University of Pennsylvania, and Harvard Medical School who have made major commitments to therapeutic translation. Finally, we spoke to leaders in the pharmaceutical, biotechnology, and venture capital industries to better understand how professionals approach drug development and academic partnership.

Results: More than 500 therapeutically-relevant discoveries were disclosed to the Technology Transfer office since 2015, confirming a broad appetite among faculty for therapeutic translation. The University received nearly $200M in licensing revenue over that period. Yet, relatively few of the 500 discoveries resulted in significant deals, with the majority deemed too early for partnership. The value of discoveries increases substantially as they advance into preclinical and early clinical development suggesting that AMCs should invest in therapeutic translation to better create and capture that value. Current impediments to doing so include lack of education and faculty guidance, needed improvements in policy and infrastructure, and financial constraints under current granting mechanisms. We identified a dozen steps AMCs can take to overcome these impediments, falling into three broad categories of investment: (1) leadership and governance, (2) therapeutics infrastructure, and (3) translational financing.

Conclusion: The time is propitious to advance basic discoveries into preclinical and clinical development at AMCs. The emergence of new therapeutic modalities that more directly link basic discovery and therapeutic intervention, the democratization of drug development by contract research organizations, and earlier alliance seeking by pharmaceutical and biotechnology partners combine to lower barriers to entry. Yet, significant, generalizable challenges remain, requiring investments in the three areas identified above. Success in turning basic discoveries into novel therapeutics at AMCs can bridge their research and patient care missions, redounding to the benefit patients, faculty, and the institutions.

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Chartsweep: A Hipaa-compliant Tool To Automate Chart Review For Plastic Surgery Research

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Purpose: Retrospective chart review (RCR) is the process of manual patient data review to answer research questions. Large study populations and heterogeneous data make this a tedious, biased and error-prone process1. The authors therefore designed and developed ChartSweep, a HIPAA-compliant Windows (Microsoft, WA, USA) application leveraging the Python coding language to streamline and expedite the RCR process while remaining faithful to its methodological rigor as outlined by Matt and Matthew. ChartSweep is open-source and can be customized for use with any electronic medical record system as part of any study requiring retrospective chart review.

Methods: ChartSweep is a tool developed at the Massachusetts General Hospital. It uses the Selenium Python library to pull information from electronic medical records and securely store it in .csv,.txt,.pdf or.jpeg format. As a proof-of-concept, a retrospective review of 172 patient records stored in Epic (electronic medical record storage) was performed to identify subjects who had undergone radiofrequency ablation (RFA) of the greater or lesser occipital nerves (for treatment of migraine headache). The first search was conducted manually according to standard RCR methodology, the second automatically using ChartSweep. Automated ChartSweep output was then reviewed and patient charts describing RFA in other contexts (lumbar ablation, endometrial ablation) were manually excluded.

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Total time required for each review and discrepancies between data output were evaluated.

**Results:** Overall manual review time was 1,371 minutes (23 hours) with a mean evaluation time per medical record of 8 minutes. Automated ChartSweep review was significantly faster requiring 56 minutes overall, and 0.3 minutes per patient record (P< 0.0001). Time saved was 7.6 minutes per chart and 1,315 minutes (21.9 hours) total. Both reviews identified 16 patients who had undergone RFA out of 172 total patients.

**Conclusion:** Open-source Python libraries as leveraged by ChartSweep significantly accelerate the retrospective chart review process in plastic surgery research. Quality of data review is not compromised. Further analyses with larger study populations are required to validate ChartSweep as a reliable research tool.

1Matt, V., Matthew, H. J. J. o. e. e. f. h. p. The retrospective chart review: important methodological considerations. 2013;10.

**Immediate Lymphatic Reconstruction After Axillary Lymphadenectomy Makes A Difference: A Two Year Comparative Analysis**

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**Purpose:** Axillary lymph node dissection (ALND) in the treatment of breast cancer increases the risk of iatrogenic lymphedema. Current rates after ALND range from 11-30%. We hypothesize that our lymphedema prevention surgical (LPS) paradigm, ALND with axillary reverse mapping (ARM) and lymphatic-venous bypass (LVB), lowers the risk of lymphedema. Here, we present findings from a case control study from patients undergoing this procedure.

**Methods:** A review of our prospectively maintained lymphedema surgical registry was performed. Ninety-six consecutive patients with complete ALND underwent LPS at our institution from 9/2016-10/2019. A control group was selected consisting of 92 patients who underwent ALND without LPS in a concurrent time interval from 9/2016-11/2017 to prevent surgical technique or learning curve bias. Patients were followed for both signs and symptoms of lymphedema throughout the post treatment interval and underwent serial assessments for lymphedema via standardized arm circumference measurements by a certified lymphedema therapist. Lymphedema was defined as more than a 10% difference in volume between upper limbs in conjunction with characteristic symptoms and signs. Demographic, procedural and oncologic data was compared between groups.

**Results:** Lymphedema occurrence rates were significantly different between control and treatment groups during the followup period (16.3% non-LPS vs. 5.3% LPS, p=0.006). Of the 15 non-LPS patients who developed lymphedema, 14 received PMRT and 5 had neoadjuvant chemotherapy. Five LPS patients acquired lymphedema, two had PMRT and all five underwent neoadjuvant chemotherapy. Clinical staging differed with a higher proportion of advanced nodal stage in LPS patient group. The mean lymph nodes removed per case was slightly higher in the LPS group (14.4 vs. 11.2). Rates of post mastectomy radiation therapy (PMRT) were similar (77% to 89%, respectively), but neoadjuvant chemotherapy rates were lower in non-LPS patients (43% vs 74%). The follow-up time was 15.3 months for the LPS group and 31.3 months for the non-LPS group. Following reverse mapping in LPS, an average of 2.1 blue transected lymphatics were identified per case. An average of 0.1 blue lymphatic vessels was left in continuity per case and 1.6 vessel anastomoses performed per case with intussusception being performed more frequently than end to end technique (55% vs 44%).

**Conclusion:** In one of the largest controlled studies in this topic to date, our findings support that optimizing lymphatic preservation and restoring antegrade lymphatic flow with LPS significantly decreases short term lymphedema rates in patients undergoing axillary lymphadenectomy for breast cancer.