

# 2014 Research Annual Report

## Plastic Surgery



### Division Summary

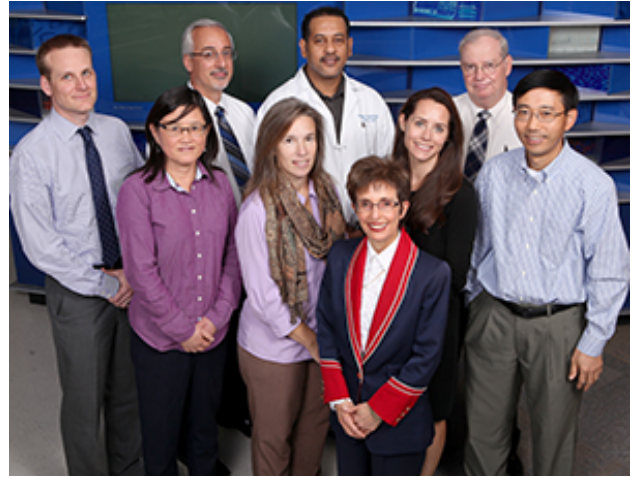
#### RESEARCH AND TRAINING DETAILS

Number of Faculty	10
Number of Joint Appointment Faculty	1
Number of Research Fellows	1
Number of Research Students	2
Number of Support Personnel	1
Direct Annual Grant Support	\$325,000
Direct Annual Industry Support	\$147,572
Peer Reviewed Publications	20

#### CLINICAL ACTIVITIES AND TRAINING

Number of Clinical Staff	3
Number of Staff Physicians	6
Number of Clinical Fellows	1
Number of Other Students	3
Inpatient Encounters	693
Outpatient Encounters	6,122

### Division Photo



Row 1: M Visscher

Row 2: Y Lan, D Jones, S Brugmann, R Jiang

Row 3: T Sitzman, J vanAalst, H Elhadi Babiker, D Billmire

## Significant Accomplishments

### The Genetics of Craniofacial Development

**Samantha Brugmann, PhD**, was awarded a grant from the National Institute of Dental and Craniofacial Research for her work on the role primary cilia play in a mouse model of craniofacial development. With **Rolf Stottmann, PhD**, Human Genetics, Brugmann uses next-generation sequencing technology to identify genetic variants in three families being cared for at Cincinnati Children's. The research could significantly influence their care and lead to crucial discoveries in developmental biology.

### Producing neurons and glial cells from iPSCs

Brugmann and **James Wells, PhD**, Developmental Biology, use pluripotent stem cells to generate neural crest cells that can differentiate into enteric neurons and glial cells. Their goal is to integrate a generated enteric nervous system into a human intestinal organoid and make it capable of intestinal contraction.

To understand the cellular mechanisms of palate development, **Yu Lan, PhD**, has established a mouse model for cleft palate research using ENU mutagenesis and exome sequencing approaches. Lan was awarded a grant from the National Institute of Dental and Craniofacial Research for her work with the role of Golgi function in cleft palate syndrome.

Lan and **Rulang Jiang, PhD**, Developmental Biology, explore molecular mechanisms involving odd-skipped family transcription factors in patterning mammalian dentition and tongue. They collaborate with Jing Hu, DDS, PhD, at Sichuan University in China, on the critical role of Smad7 in regulating cranial suture development.

Working with mouse mandibles, **Donna Jones, PhD**, has shown that muscle forces affect bone shape by altering bone deposition and resorption, particularly during early growth. She presented findings in September 2014 at the national meeting of the American Society for Bone and Mineral Research.

### Research to Improve Reconstruction

**Christopher Gordon, MD**; **Alessandro DeAlarcon, MD**; and **Michael Rutter, MD**, have produced a tissue-engineered neotrachea. The grafts appear fully mucosalized with ciliated respiratory epithelium, crucial to translating this technology to a human model. Gordon also is pursuing tissue-engineered mandible reconstruction as an alternative to microsurgical reconstruction.

Using shape analysis from 3D photographs, **Donna Jones, PhD**, characterizes growth curves of craniofacial shape in children. Analyzing ear position and symmetry demonstrates that ear placement alters through growth, and developmental constraint of the ears is less than that of the midface, providing important guidelines for surgical planning.

**Ann Schwentker, MD**; **Brian Pan, MD**; and **Bruce Aronow, PhD**, are investigating the impact of autologous and cultured adipocyte injections in a porcine model of hypertrophic burn scarring.

### Skin Sciences Program

**Marty Visscher, MD**, studies premature infants who lack vernix caseosa and are predisposed to infection. She studies the ontogeny of stratum comeum barrier in premature infants, measuring barrier integrity, hydration, pH, and collecting skin surface samples to determine lipid composition, structural proteins and specific cytokines.

Visscher collaborates with researchers from Johns Hopkins University to study the effect of topical oils on neonatal skin integrity. Using high-resolution color imaging, thermal imaging and three-dimensional surface scans, she characterizes the disease and healing processes of skin conditions, including hemangiomas, pressure ulcers, contact dermatitis and burn scars.

## Division Publications

1. Arad E, Li Z, Sitzman TJ, Agur AM, Clarke HM. **Anatomic sites of origin of the suprascapular and lateral pectoral nerves within the brachial plexus.** *Plast Reconstr Surg.* 2014; 133:20e-7e.
2. Bastidas N, Runyan CM, Jones DC, Taylor JA. **Anatomic study of full facial and scalp allografts without cutaneous facial scars.** *J Plast Surg Hand Surg.* 2013; 47:528-31.
3. Brugmann SA, Wells JM. **Building additional complexity to in vitro-derived intestinal tissues.** *Stem Cell Res Ther.* 2013; 4 Suppl 1:S1.
4. Doro CJ, Sitzman TJ, O'Toole RV. **Can intramuscular glucose levels diagnose compartment syndrome?** *J Trauma Acute Care Surg.* 2014; 76:474-8.
5. Kagan RJ, Neely AN, Rieman MT, Hardy A, Warner P, Bailey JK, Yakuboff KP. **A performance improvement initiative to determine the impact of increasing the time interval between changing centrally placed intravascular catheters.** *J Burn Care Res.* 2014; 35:143-7.
6. Lam DJ, Tabangin ME, Shikary TA, Uribe-Rivera A, Meinzen-Derr JK, de Alarcon A, Billmire DA, Gordon CB. **Outcomes of mandibular distraction osteogenesis in the treatment of severe micrognathia.** *JAMA Otolaryngol Head Neck Surg.* 2014; 140:338-45.
7. Lan Y, Jia S, Jiang R. **Molecular patterning of the mammalian dentition.** *Semin Cell Dev Biol.* 2014; 25:61-70.
8. Liu H, Lan Y, Xu J, Chang CF, Brugmann SA, Jiang R. **Odd-skipped related-1 controls neural crest**

- chondrogenesis during tongue development.** *Proc Natl Acad Sci U S A.* 2013; 110:18555-60.
9. Murase D, Hachiya A, Takano K, Hicks R, Visscher MO, Kitahara T, Hase T, Takema Y, Yoshimori T. **Autophagy has a significant role in determining skin color by regulating melanosome degradation in keratinocytes.** *J Invest Dermatol.* 2013; 133:2416-24.
10. Pan B, Billmire D. **Pigmented Lesions and Melanoma.** In: MM Ziegler, RG Azizkhan, D Von Allmen, TR Weber, eds. *Operative pediatric surgery.* New York: McGraw-Hill Education/Medical; 2014:1270-1280.
11. Pan B, Elhadi H, Billmire D. **Craniofacial trauma.** In: D Wheeler, HR Wong, TP Shanley, eds. *Pediatric Critical Care Medicine: Volume 2: Respiratory, Cardiovascular and Central Nervous Systems.* New York: Springer; 2014:221-228.
12. Patel PA, Elhadi HM, Kitzmiller WJ, Billmire DA, Yakuboff KP. **Tissue expander complications in the pediatric burn patient: a 10-year follow-up.** *Ann Plast Surg.* 2014; 72:150-4.
13. Runyan CM, Ali ST, Chen W, Calder BW, Rumburg AE, Billmire DA, Taylor JA. **Bone tissue engineering by way of allograft revitalization: mechanistic and mechanical investigations using a porcine model.** *J Oral Maxillofac Surg.* 2014; 72:1000 e1-11.
14. Sitzman TJ, Allori AC, Thorburn G. **Measuring outcomes in cleft lip and palate treatment.** *Clin Plast Surg.* 2014; 41:311-9.
15. Visscher M, Narendran V. **The Ontogeny of Skin.** *Adv Wound Care (New Rochelle).* 2014; 3:291-303.
16. Vu AT, Patel PA, Elhadi H, Schwentker AR, Yakuboff KP. **Thoracic outlet syndrome in the pediatric population: case series.** *J Hand Surg Am.* 2014; 39:484-487 e2.
17. Xu J, Liu H, Park JS, Lan Y, Jiang R. **Osr1 acts downstream of and interacts synergistically with Six2 to maintain nephron progenitor cells during kidney organogenesis.** *Development.* 2014; 141:1442-52.
18. Yoshida H, Taguchi H, Kitahara T, Takema Y, Visscher MO, Schweizer J, Langbein L. **Keratins of the human occipital hair medulla: androgenic regulation of in vitro hair keratin K37 expression.** *Br J Dermatol.* 2013; 169:218-21.
19. Zhou H, Zou S, Lan Y, Fei W, Jiang R, Hu J. **Smad7 modulates TGFbeta signaling during cranial suture development to maintain suture patency.** *J Bone Miner Res.* 2014; 29:716-24.
20. Zhou J, Gao Y, Lan Y, Jia S, Jiang R. **Pax9 regulates a molecular network involving Bmp4, Fgf10, Shh signaling and the Osr2 transcription factor to control palate morphogenesis.** *Development.* 2013; 140:4709-18.

## Faculty, Staff, and Trainees

### Faculty Members

**David Billmire, MD**, Professor

**Leadership** Director, Pediatric Plastic Surgery

**Samantha Brugmann, PhD**, Assistant Professor

**Research Interests** Craniofacial Development

**Christopher Gordon, MD**, Associate Professor

**Donna Jones, PhD**, Assistant Professor

**Yu Lan, PhD**, Associate Professor

**Brian Pan, MD**, Assistant Professor

**Ann Schwentker, MD**, Associate Professor

**Marty Visscher, PhD**, Associate Professor

**Leadership** Director, Skin Sciences Program

**Research Interests** Skin Science

**Kevin Yakuboff, MD**, Professor

**Leadership** Co-Director, Hand and Upper Extremity Center

**Thomas Sitzman, MD**, Assistant Professor

#### Joint Appointment Faculty Members

**Rulang Jiang, PhD**, Professor (Developmental Biology)

#### Clinical Staff Members

- **Dawn Rothchild, RN, PNP**
- **Stacey Ruth, RN, MSN, CFNP**
- **Lynn Olberding, RN, PNP**

#### Trainees

- **William Abouhassan, MD, Resident**, 2004, Cleveland Clinic, PGY-9
- **Haithem Elhadi, MD, Resident**, 2000, Kasturba Medical College, PGY-6
- **Darlene Guse, MD, Resident**, 2010, Mayo Clinic, PGY-4
- **Sarah Evans, MD, Resident**, 2006, Duke University, PGY-8
- **Ching-Fang Chang, PhD, Research Fellow**, 2012, University of Alabama at Birmingham
- **Scott Rapp, MD, Resident**, 2008, Medical College of Ohio, PGY-4
- **Chris Runyan, MD, Resident**, 2009, University of Cincinnati, PGY-3
- **Betsy Shock, Graduate Student**, University of Cincinnati

## Grants, Contracts, and Industry Agreements

Grant and Contract Awards			Annual Direct
<b>BRUGMANN, S</b>			
<b>The Role of Primary Cilia in Murine Craniofacial Development</b>			
National Institutes of Health			
R01 DE 023804	12/13/13-11/30/18		\$250,000
<b>LAN, Y</b>			
<b>Golgb1 in Craniofacial Development</b>			
National Institutes of Health			
R03 DE 023864	12/13/13-11/30/15		\$75,000
<b>Current Year Direct</b>			<b>\$325,000</b>

#### Industry Contracts

##### VISSCHER, M

KAO Corporation	\$33,741
Medline Industries	\$24,640

The Procter and Gamble Company

\$89,191

**Current Year Direct Receipts**

**\$147,572**

**Total**

**\$472,572**