Plastic Surgery

Division Details

Division Data Summary

<table>
<thead>
<tr>
<th>RESEARCH AND TRAINING DETAILS</th>
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<tr>
<td>Number of Faculty</td>
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<td>Number of Joint Appointment Faculty</td>
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<tr>
<td>Number of Research Fellows</td>
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<td>Number of Research Students</td>
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<td>Number of Support Personnel</td>
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<tr>
<td>Direct Annual Grant Support</td>
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<tr>
<td>Direct Annual Industry Support</td>
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<td>Peer Reviewed Publications</td>
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<tr>
<th>CLINICAL ACTIVITIES AND TRAINING</th>
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<tr>
<td>Number of Clinical Staff</td>
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<td>Number of Clinical Fellows</td>
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<td>Number of Other Students</td>
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<td>Inpatient Encounters</td>
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<td>Outpatient Encounters</td>
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Significant Accomplishments

Exploring the Genetic Roots of Craniofacial Development

Samantha Brugmann, PhD, studies the function of primary cilia in craniofacial development; the role of the Hedgehog (Hh) pathway during the development of the craniofacial complex; and the role of Kif3a in the mandibular prominence and how loss of this protein affects GliA::GliR ratios.

Brugmann in collaboration with Rolf Stottmann, PhD, Human Genetics, is using next generation sequencing technology to identify genetic variants in three families currently being cared for here at Cincinnati Children's. This research has significant potential to influence the families’ care and could include crucial discoveries in basic developmental biology.

Christopher Gordon, MD, visiting research scientist Armando Uribe-Rivera, DDS, and Bruce Aronow, PhD, are investigating the role of microRNAs as master controllers of craniofacial development. Armando Uribe-Rivera and Gordon recently won the first prize investigator award at the American Cleft Palate Craniofacial Association.

Donna Jones, PhD, investigates the determinants of bone development, function and shape. In particular, she focuses on the influences of ontogeny, function and evolution on craniofacial morphology. The goal of her research is to assist clinicians treating children with craniofacial abnormalities, either congenital or acquired, through translational and laboratory-based research endeavors.
Jones also collaborates with James Wells, PhD, Developmental Biology, on a project entitled, “Generating human intestinal organoids with an ENS.” The goal of this project is to engineer human intestinal organoids that are innervated with a neural crest-derived enteric nervous system.

**Translational and Bench Research to Improve Reconstruction**

Gordon collaborates with Alessandro DeAlarcon, MD, and Michael Rutter, MD, on a tissue-engineered neotracea using decellularized cadaveric scaffolding. The grafts appear to be fully mucosalized with ciliated respiratory epithelium, a key milestone to translating this technology to a human model. Gordon also is pursuing tissue-engineered mandible reconstruction as an alternative to traditional microsurgical reconstruction.

Using shape analysis, our research team is characterizing quantifiable growth curves of craniofacial shape in children from three-dimensional photographs. Results from this project are intended for use by clinicians during repair or reconstruction of facial features.

Working with *in vitro* cells and *in vivo* mouse models, our lab is examining how muscle forces influence the developing shape of bone, particularly in the mandible. Using a variety of cell markers, tension sensors, and morphological investigations, this research aims to improve our understanding of the cause of developmental abnormalities of the lower jaw. Findings from this work eventually could help reduce the need for surgeries and long hospital stays in children affected with these disorders.

Yu Lan, PhD, has established a new mutant mouse model for cleft palate research by using ENU mutagenesis and exome sequencing approaches. The mouse model is providing new insight into the cellular mechanisms of palate development.

Lan, in collaboration with Rulang Jiang, PhD, Developmental Biology, has contributed to exciting new discoveries regarding molecular mechanisms involving the odd-skipped family transcription factors in patterning the mammalian dentition and tongue. They also have collaborated with Jing Hu, DDS, PhD, at Sichuan University in China in discovering a critical role of Smad7, an endogenous modulator of the TGF-beta signaling pathway, in the regulation of cranial suture development.

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

**Protecting Skin Integrity**

Our Skin Sciences Program, led by Marty Visscher, MD, studies premature infants who lack vernix caseosa, have an incompetent skin barrier and are predisposed to infection. She also studies the ontogeny of stratum corneum barrier development in premature infants, using quantitative measures of barrier integrity, hydration, pH, and collection of 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 massage oils on neonatal skin integrity. She also uses multiple imaging modalities to characterize the disease and healing processes of skin conditions including hemangiomas, pressure ulcers, irritant contact dermatitis and burn scars. Affected sites are evaluated with high-resolution color imaging, thermal imaging and three-dimensional surface scans.


**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

Trainees

William Abouhassan, MD, Resident, 2004, Cleveland Clinic, PGY9
Haithem Elhadi, MD, Resident, 2000, Kasturba Medical College, PGY6
Darlene Guse, MD, Resident, 2010, Mayo Clinic, PGY2
Jason Hedrick, MD, Resident, 2006, Loma Linda University, PGY5
Audrey Kesselring, MD, Resident, 2007, University of Cincinnati, PGY5
Scott Rapp, MD, Resident, 2008, Medical College of Ohio, PGY4
Chris Runyan, MD, Resident, 2009, University of Cincinnati, PGY3

Grants, Contracts, and Industry Agreements

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<td>The Role of Primary Cilia in Craniofacial Development</td>
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<td>National Institutes of Health</td>
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Current Year Direct $150,189

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Current Year Direct Receipts $329,541

Total $479,730