



LEADING MEDICINE:
A TOWN HALL CONVERSATION
WITH DR. MARC BOOM

Town Hall Conversation XLI

HOUSTON
Methodist[®]
LEADING MEDICINE

How Artificial Intelligence Benefits Facial Reconstructive Surgery

Jaime Gateno, DDS, MD

Sylvia and James E. Norton Distinguished New Century Chair in Oral and Maxillofacial Surgery

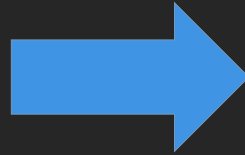
Houston Methodist Hospital

Professor of Clinical Surgery

Weill Cornell Medical College and Houston Methodist Academic Institute

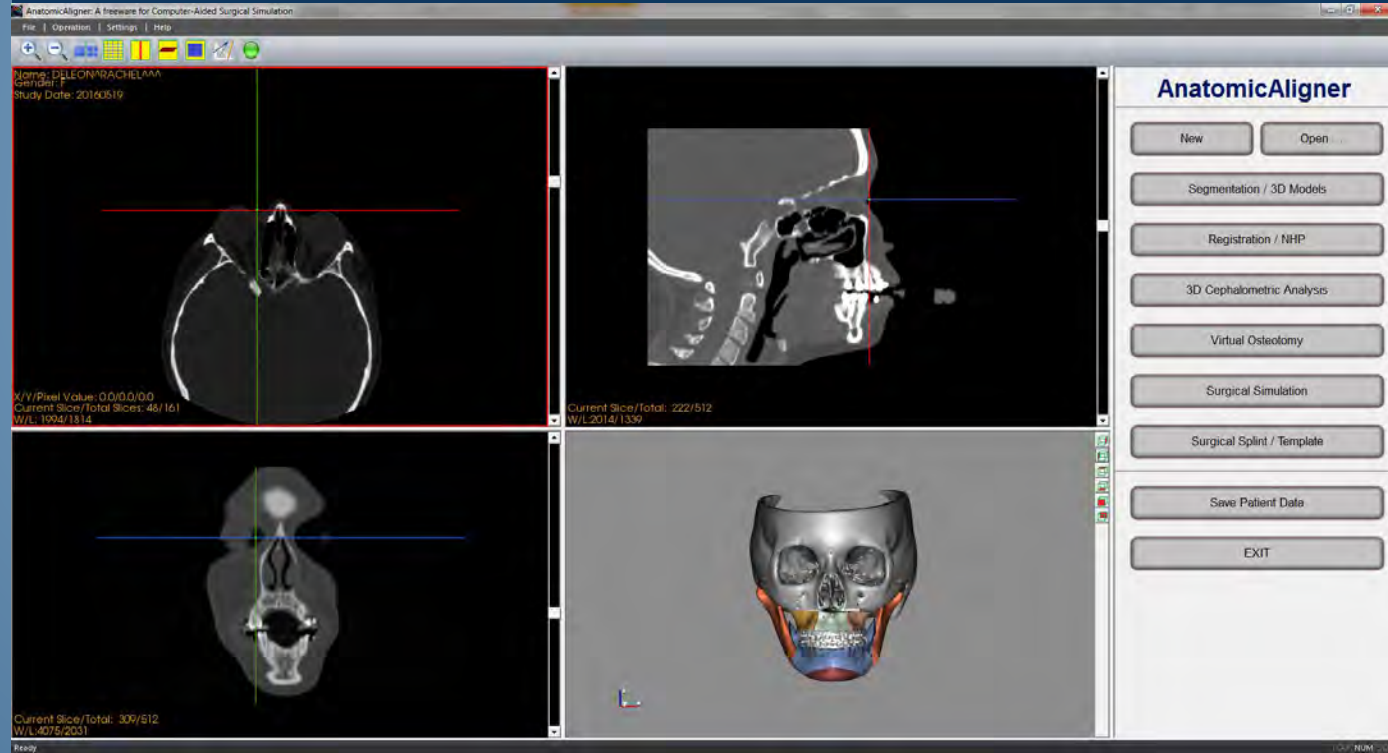
December 7, 2023

Facial Reconstruction Requires Extensive Presurgical Planning



AnatomicAligner

Software for Computer Aided Surgical Simulation

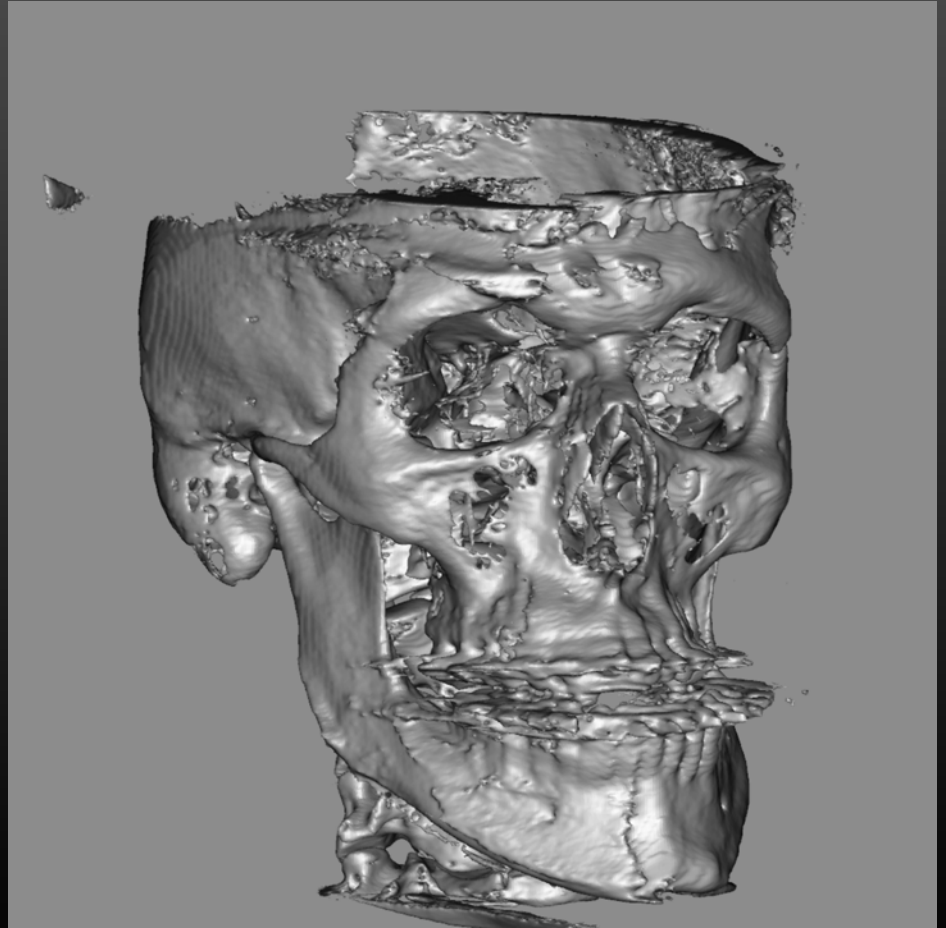




Threshold Segmentation

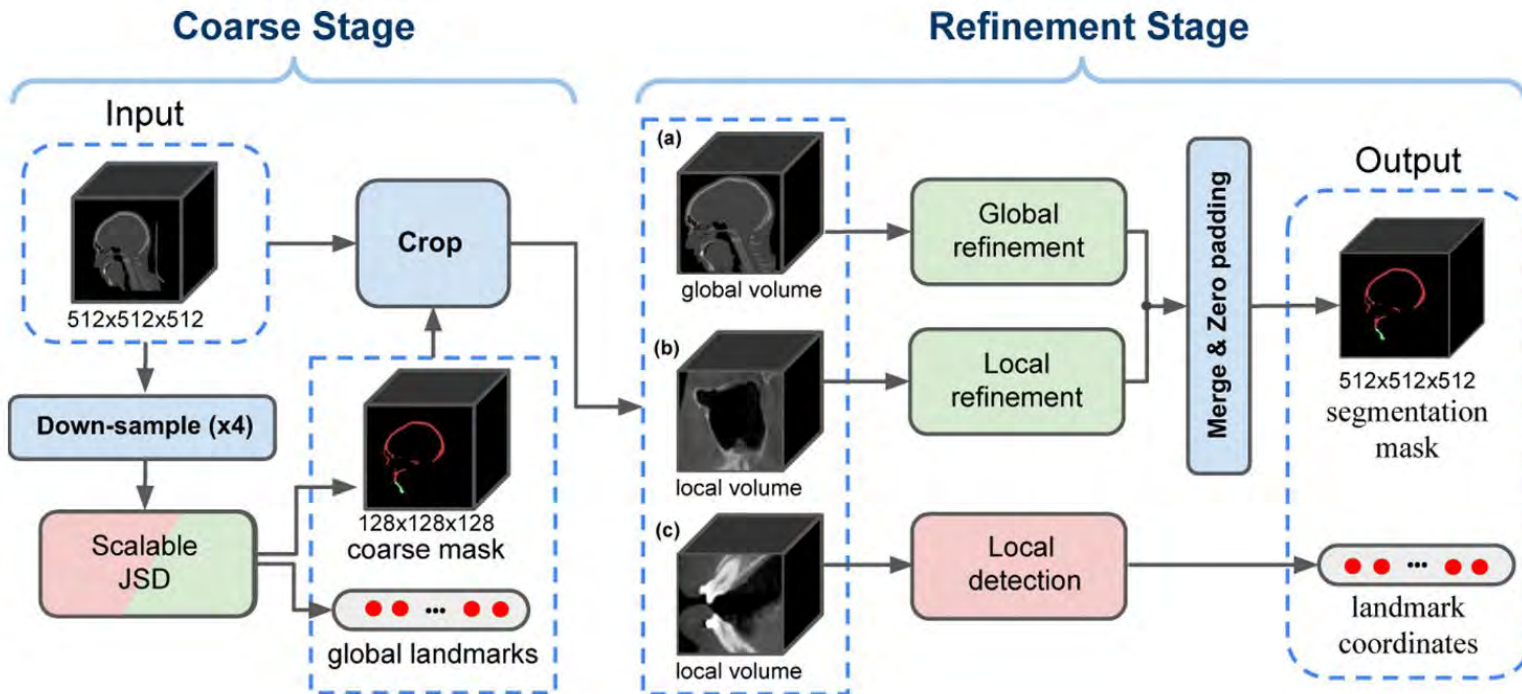


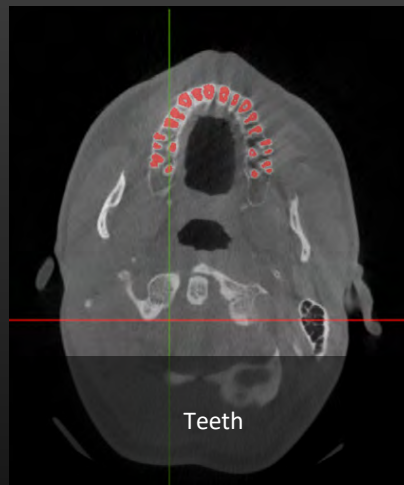
8 hours
to clean



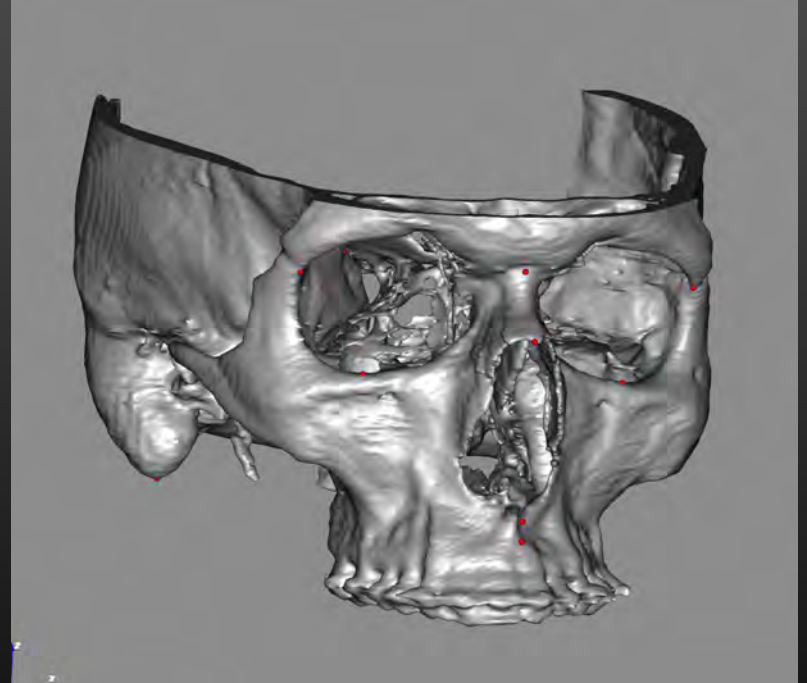
SkullEngine

Multi-Stage CNN Framework for Collaborative CBCT Segmentation and Landmark Detection

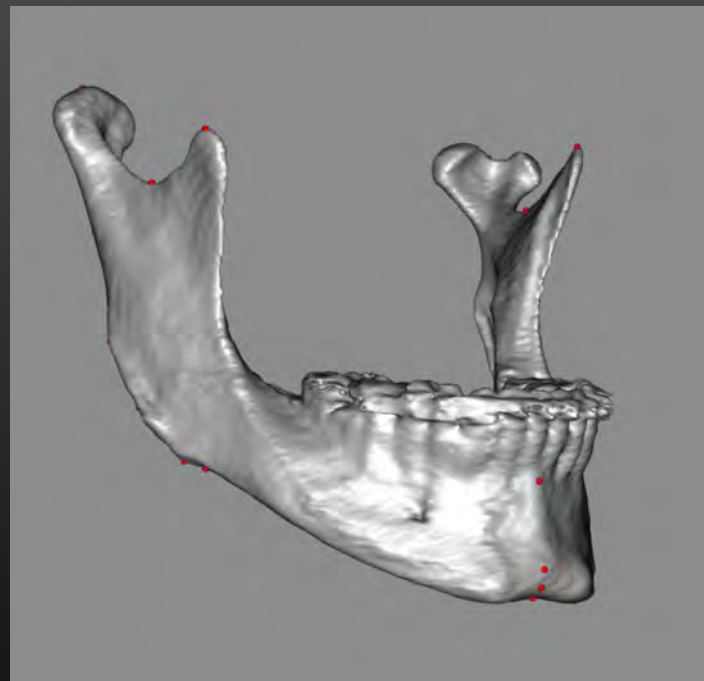




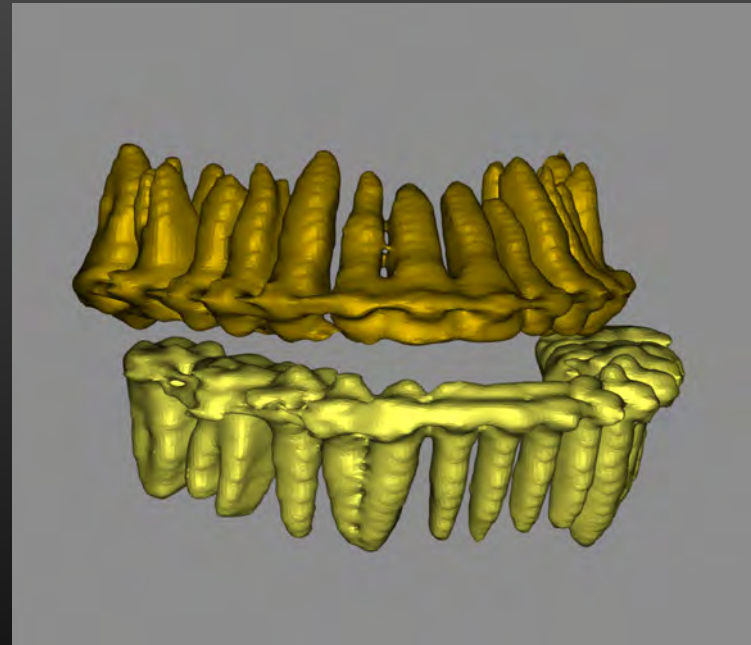
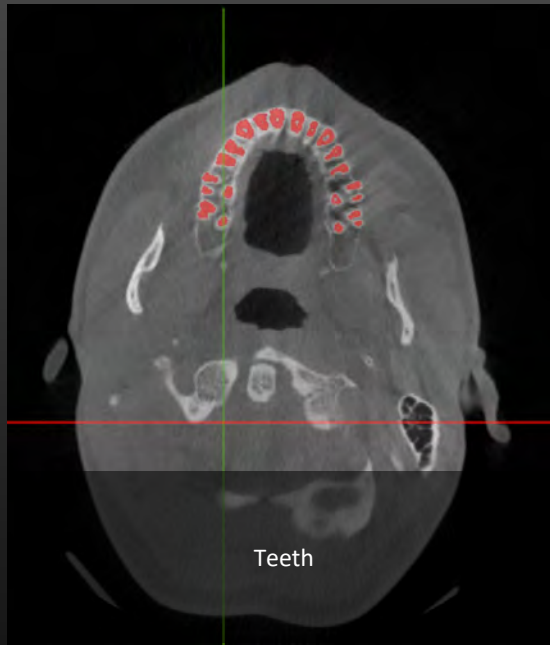
DL Segmentation 3-4 min



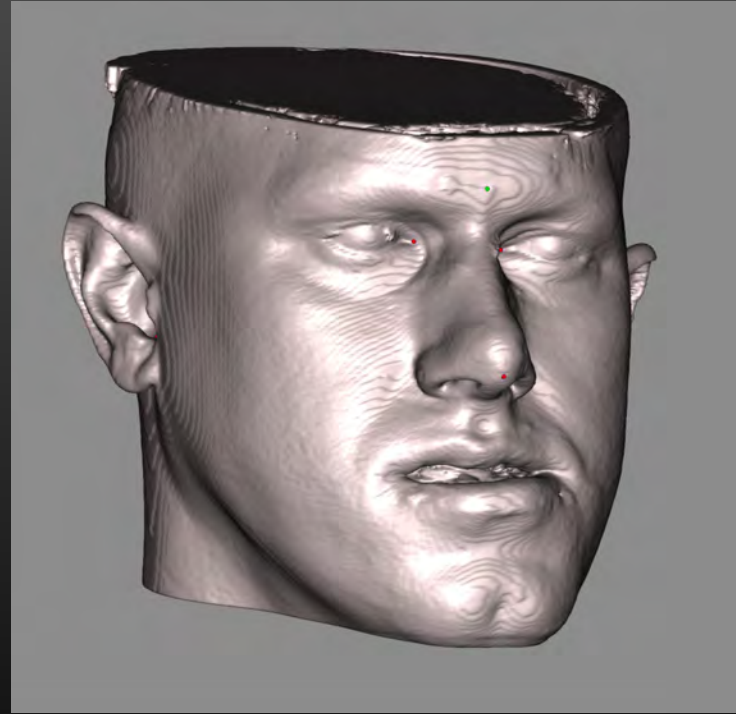
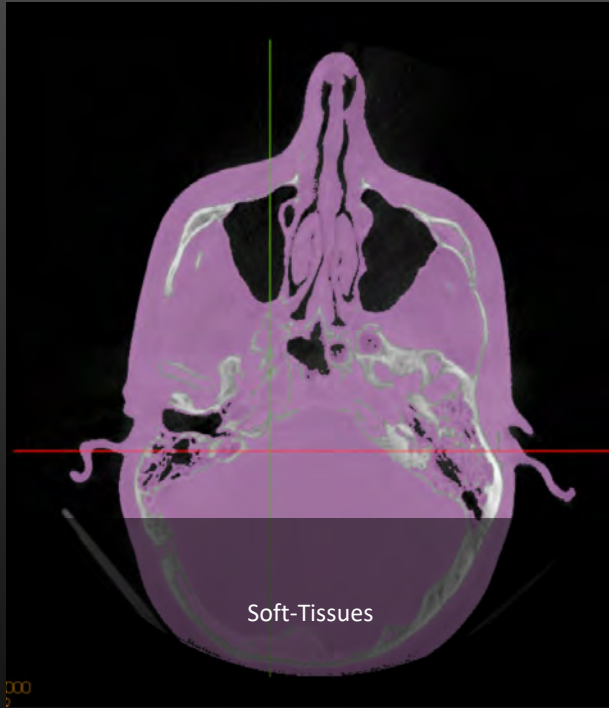
3D Modeling



3D Modeling



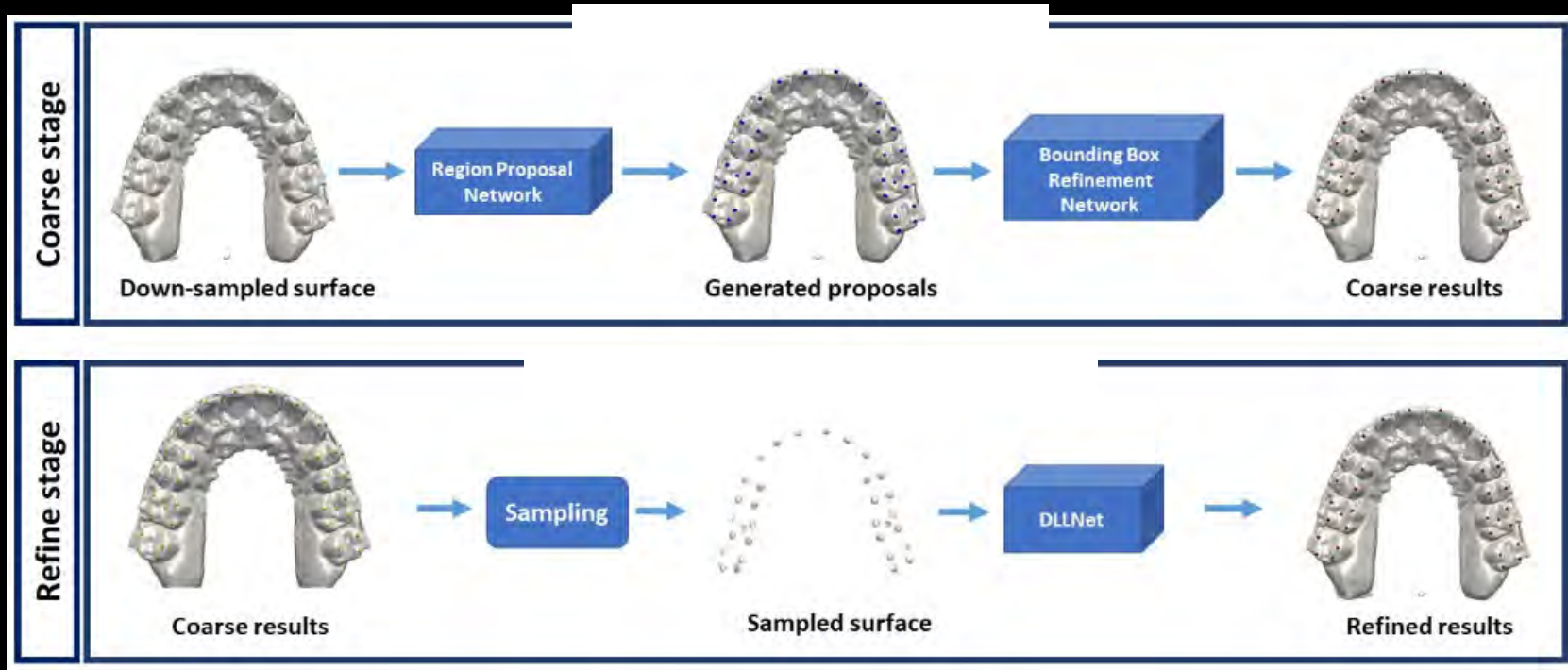
3D Modeling



3D Modeling

DentalPointNet

(Deep-Learning-Based Dental Landmark Localization on High-Resolution 3D Dental Models)



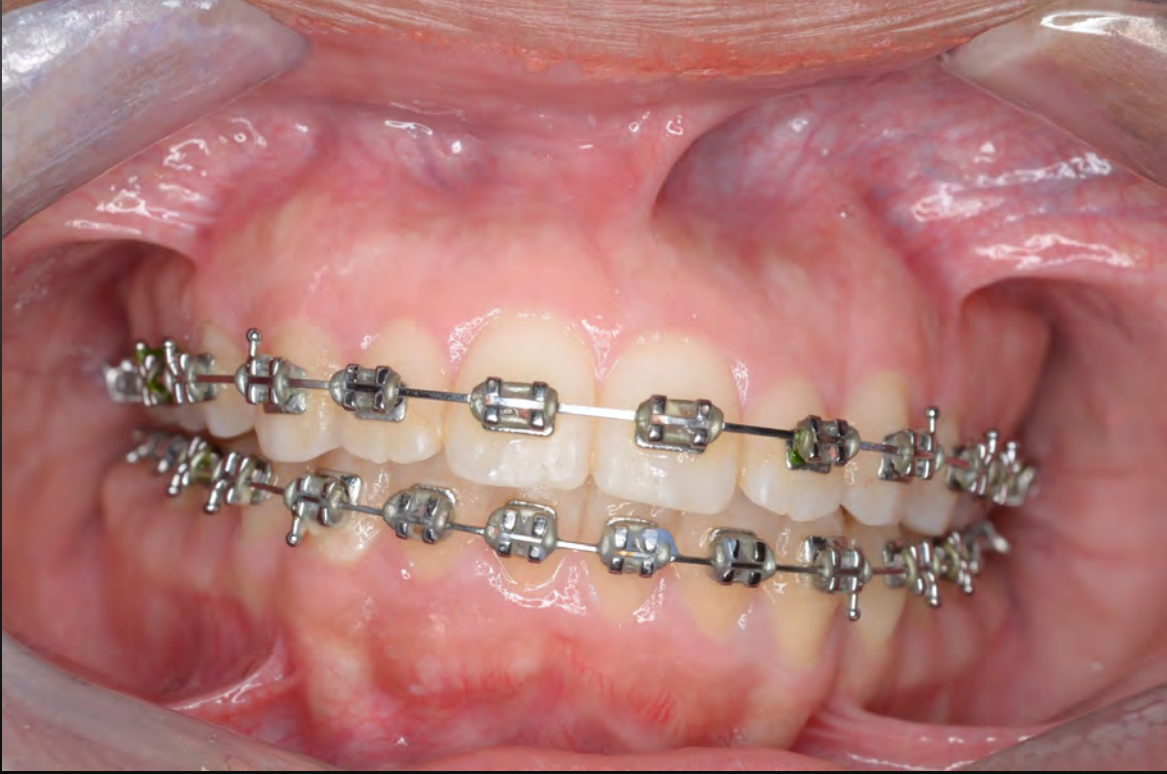
Clinical Photos (profile)



Clinical Photos (frontal)

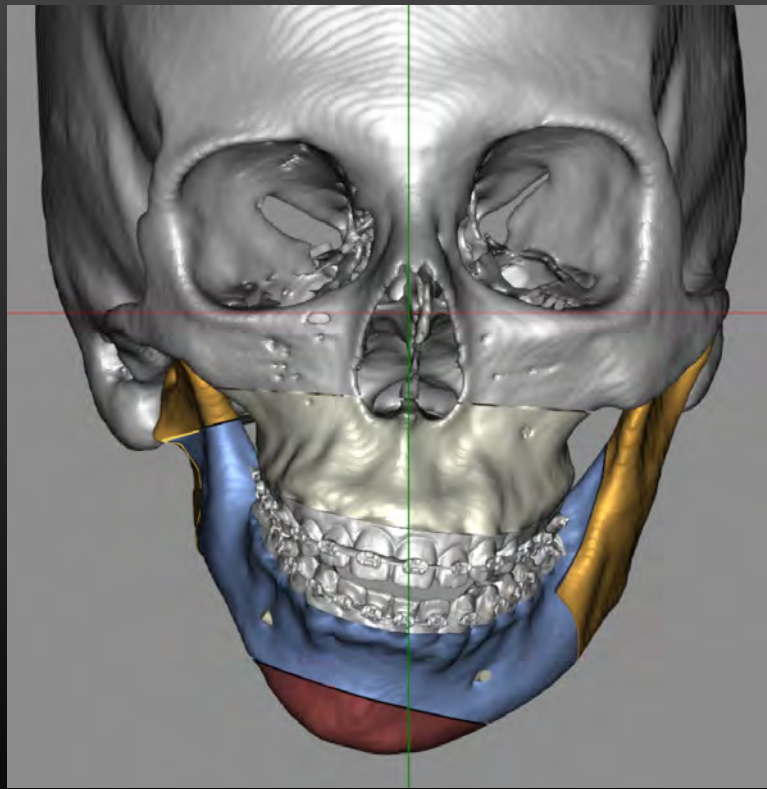


Clinical Photos (occlusion)

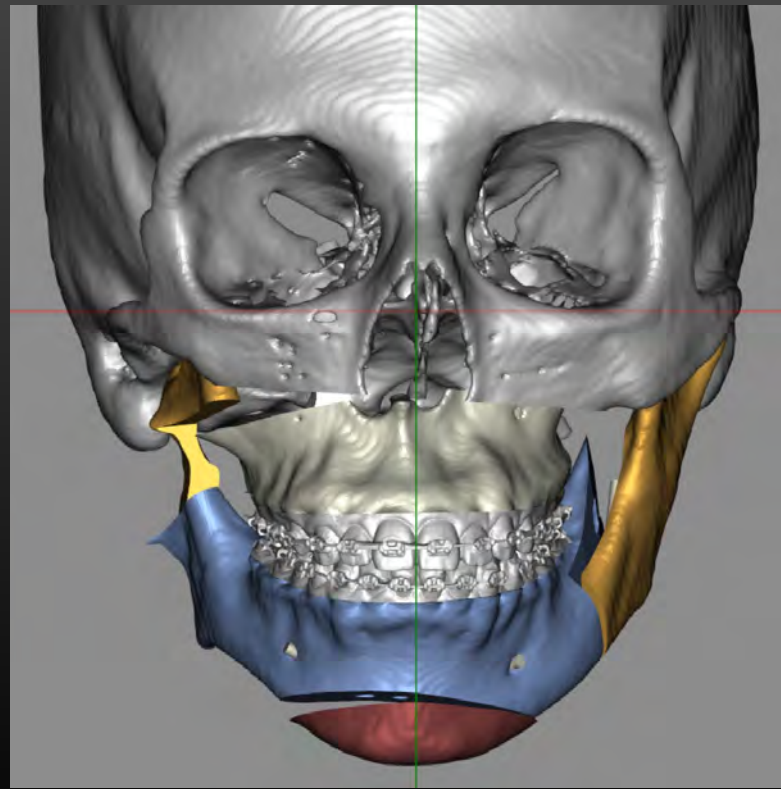


Virtual Plan
(front)

PRE-OP

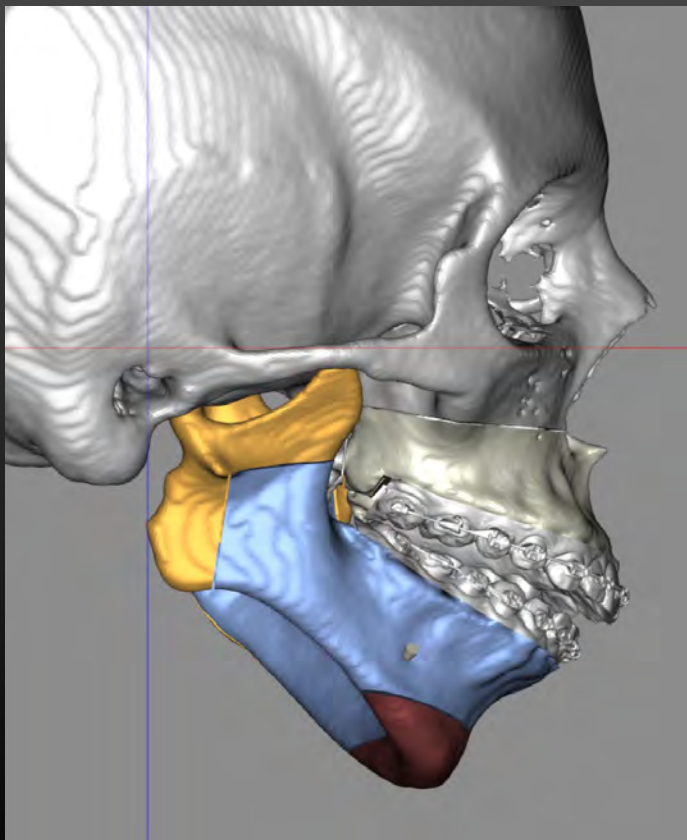


PLAN

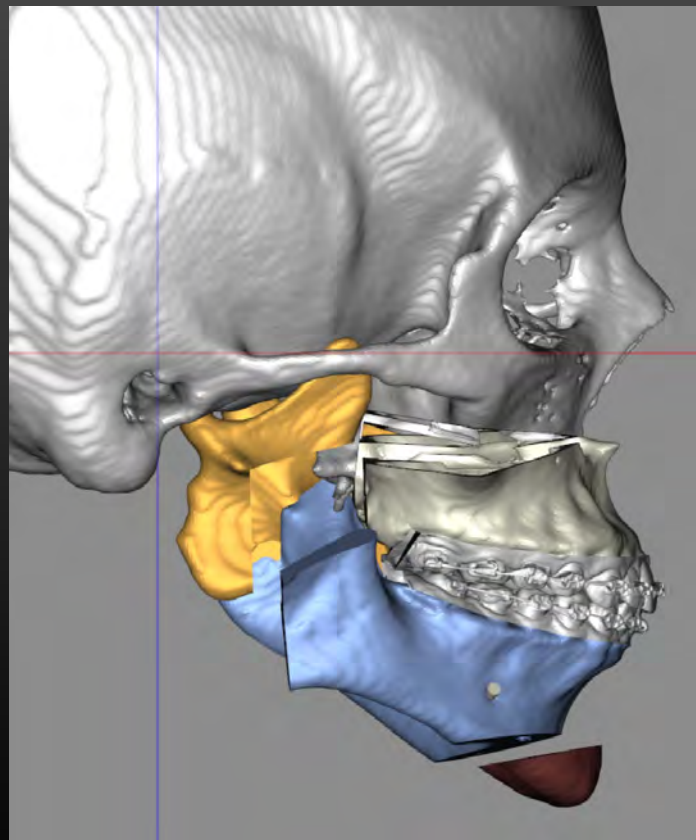


Virtual Plan (side)

PRE-OP

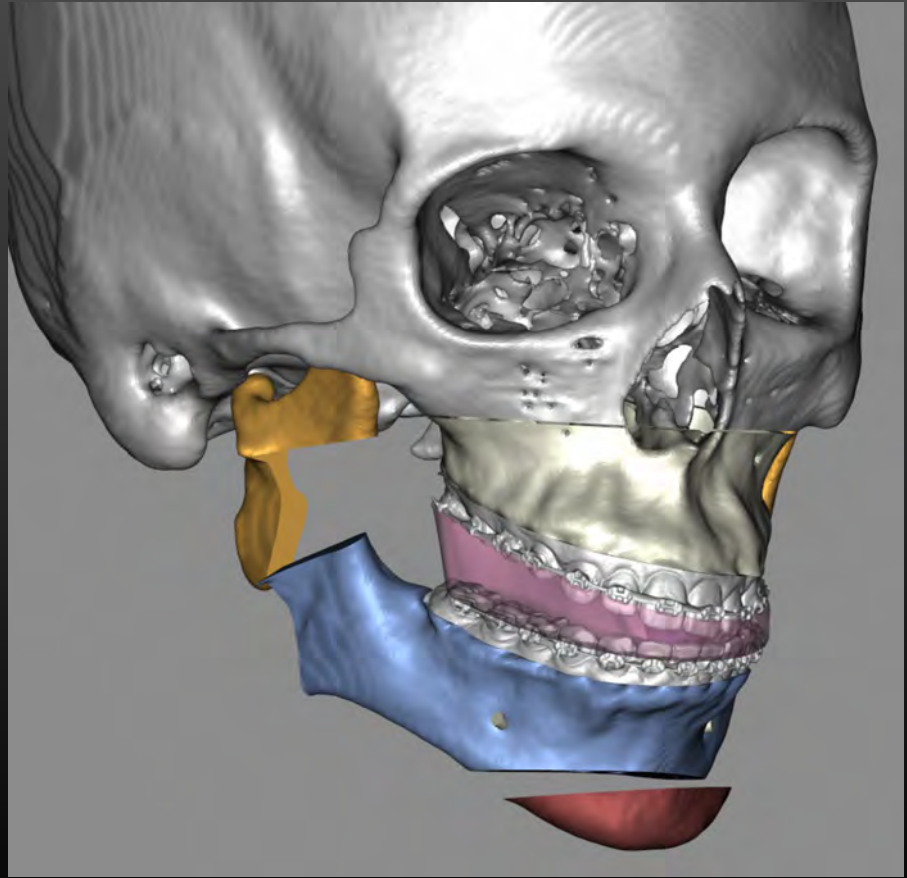


PLAN

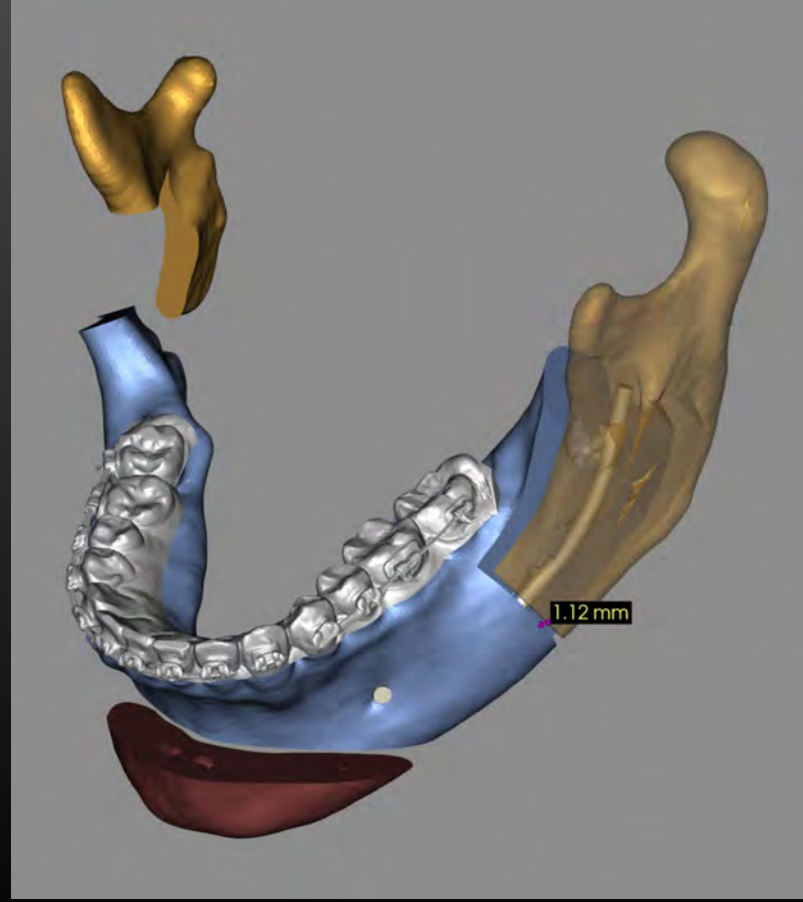
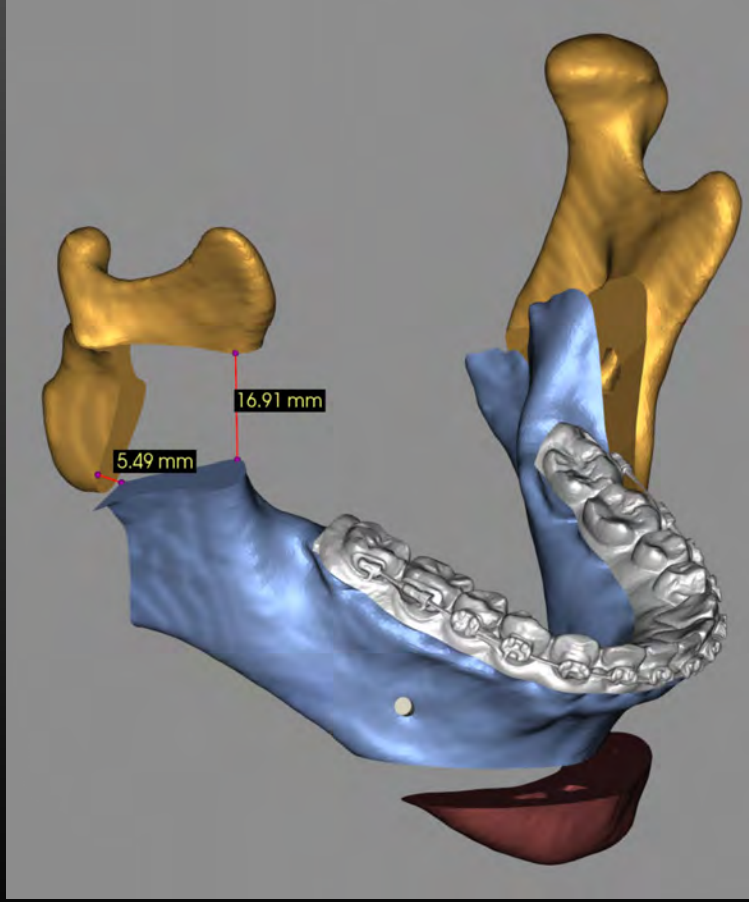


Surgical Sequence

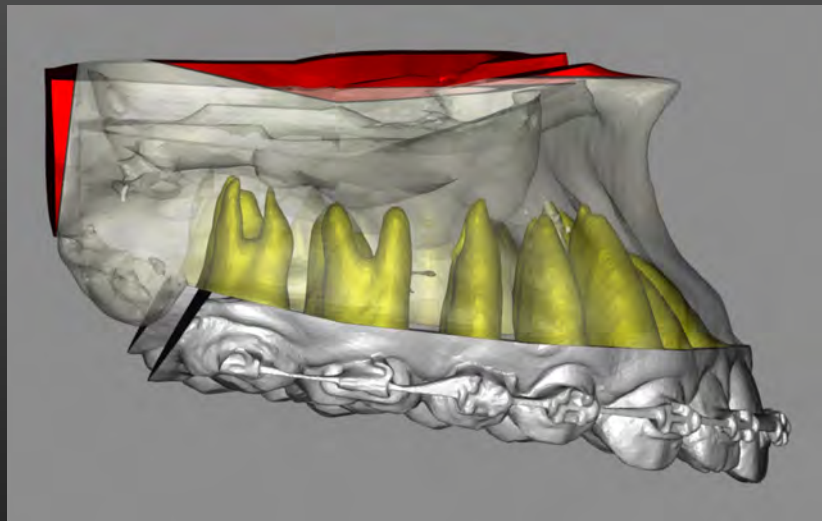
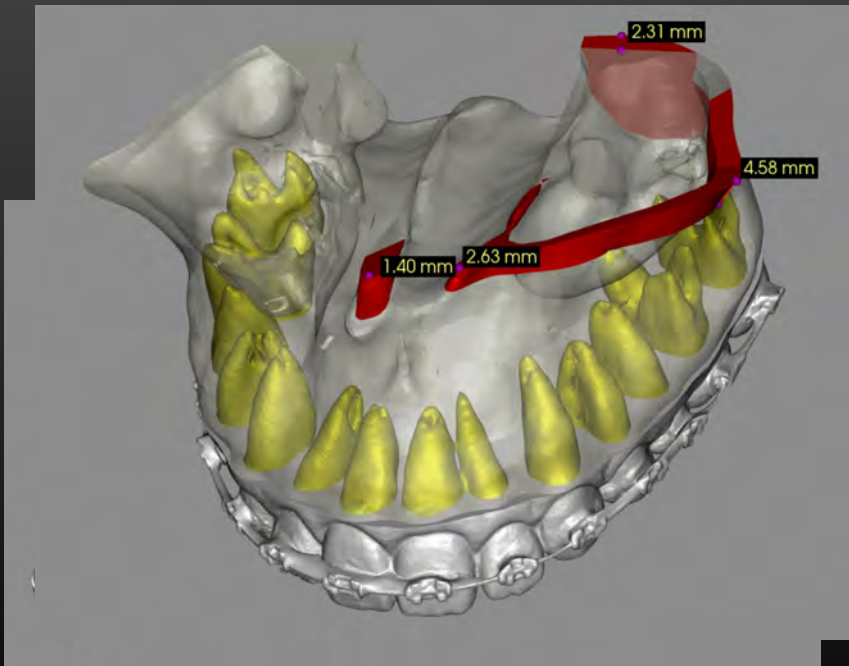
MANDIBLE FIRST

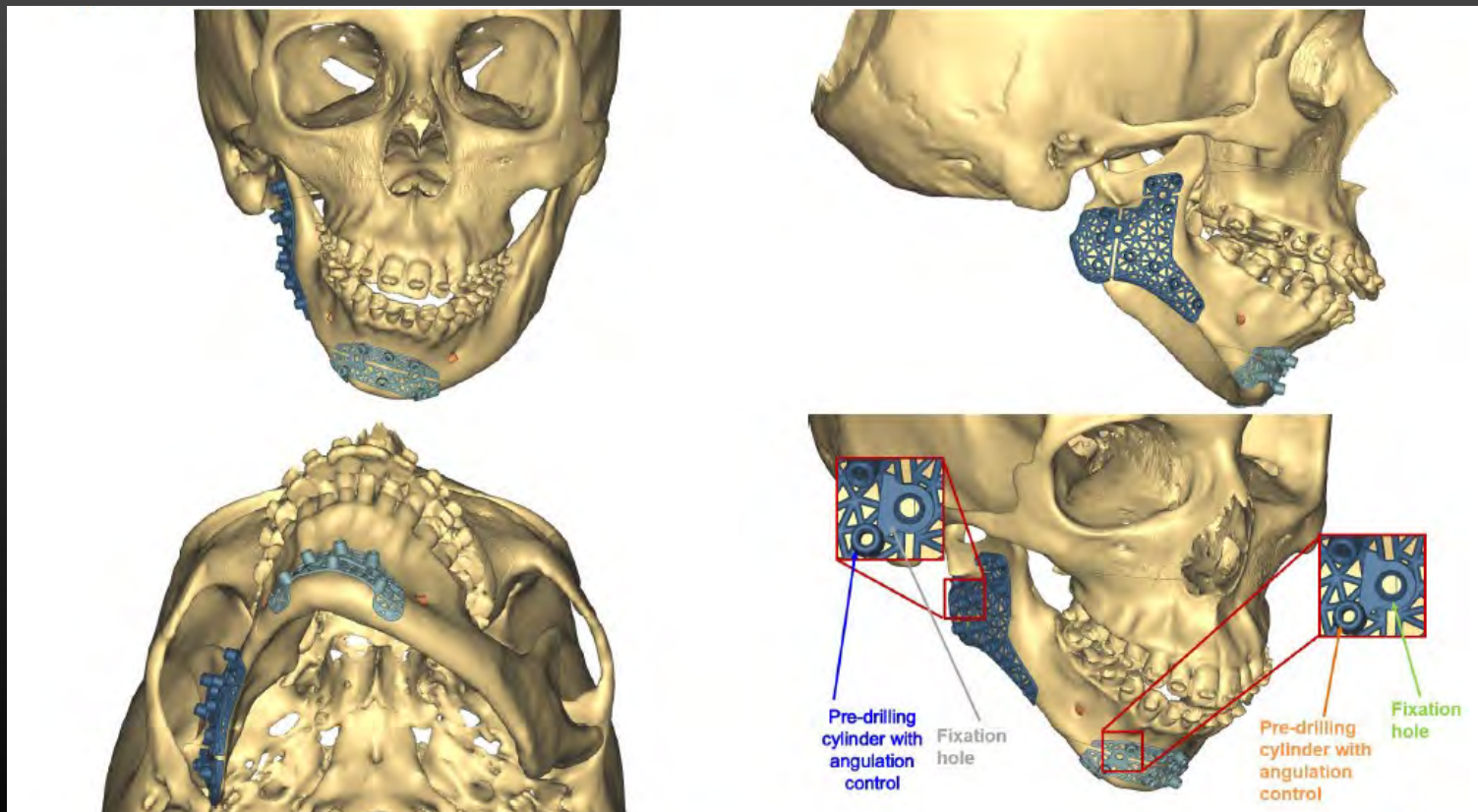


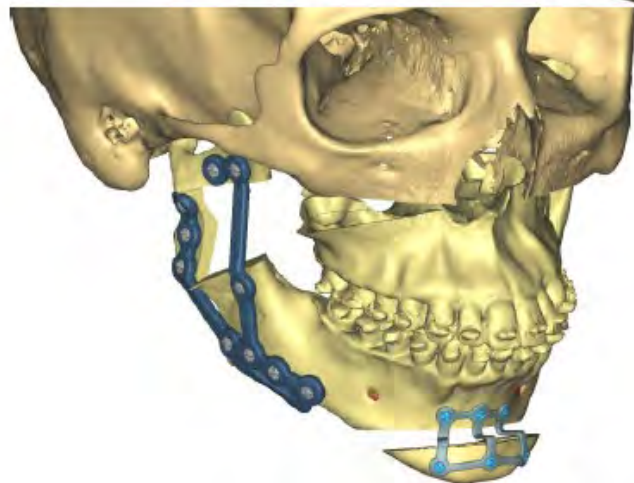
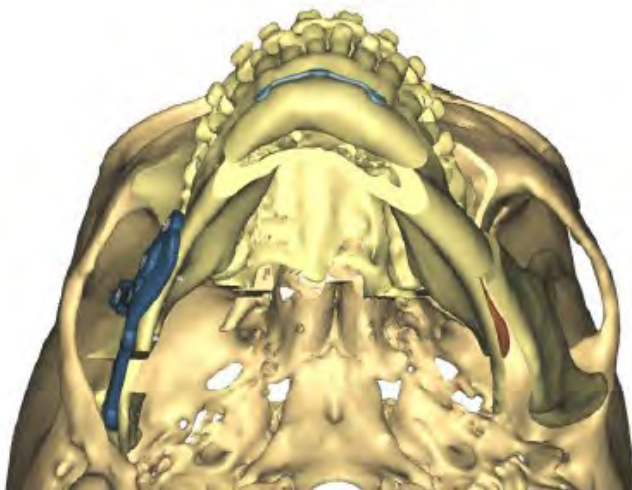
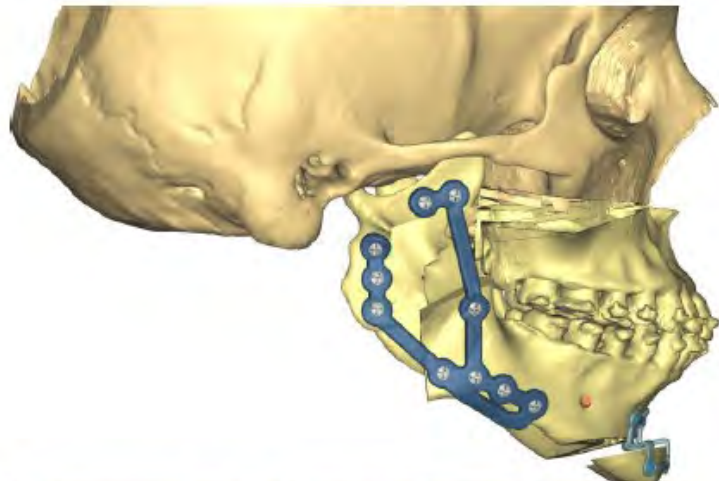
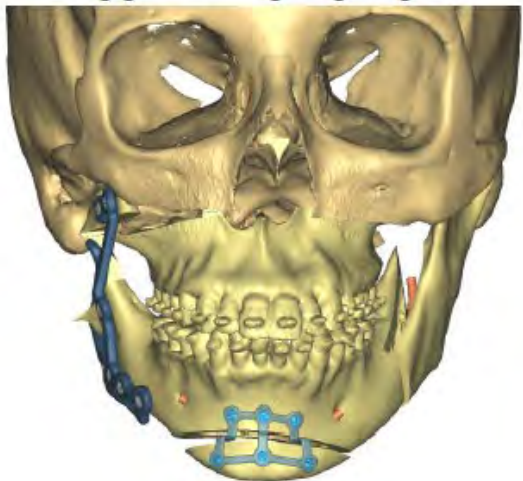
Intra-op (mandible)



Intra-op (maxilla)







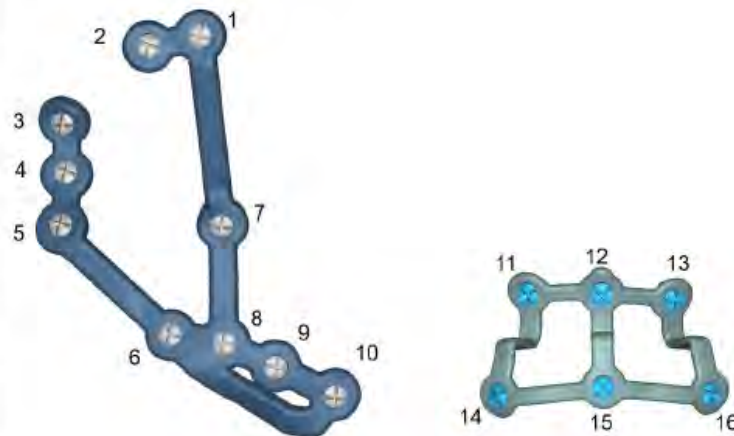
Screws Specifications for use with Titanium 3D Printed Plate for Mandible

| Hole ID | Length* (mm) | Diameter (mm) | Article number | Plating System | Position | Angulation |
|---------|--------------|---------------|----------------|------------------|---------------|------------|
| 1 | 8 | 2.0 | 04.503.408.01C | Matrix MANDIBL E | Ramus right | No |
| 2 | 5 | 2.0 | 04.503.405.01C | Matrix MANDIBL E | Ramus right | No |
| 3-5 | 6 | 2.0 | 04.503.406.01C | Matrix MANDIBL E | Ramus right | No |
| 6 | 8 | 2.0 | 04.503.408.01C | Matrix MANDIBL E | Mandible body | No |
| 7 | 10 | 2.0 | 04.503.410.01C | Matrix MANDIBL E | Mandible body | No |
| 8 | 8 | 2.0 | 04.503.408.01C | Matrix MANDIBL E | Mandible body | No |
| 9 | 10 | 2.0 | 04.503.410.01C | Matrix MANDIBL E | Mandible body | No |
| 10 | 8 | 2.0 | 04.503.408.01C | Matrix MANDIBL E | Mandible body | No |

* Minimal recommended length for screws for a bicortical fixation Surgeon will make the sole determination of the final screw length to be used.

| Hole ID | Length* (mm) | Diameter (mm) | Article number | Plating System | Position |
|---------|--------------|---------------|----------------|----------------------|---------------|
| 11-13 | 6 | 1.85 | 04.511.206.01C | Matrix ORTHOGNA THIC | Mandible body |
| 14-16 | 6 | 1.85 | 04.511.206.01C | Matrix ORTHOGNA THIC | Chin |

* Standard Recommended length for screws. Surgeon will make the sole determination of the final screw length to be used.

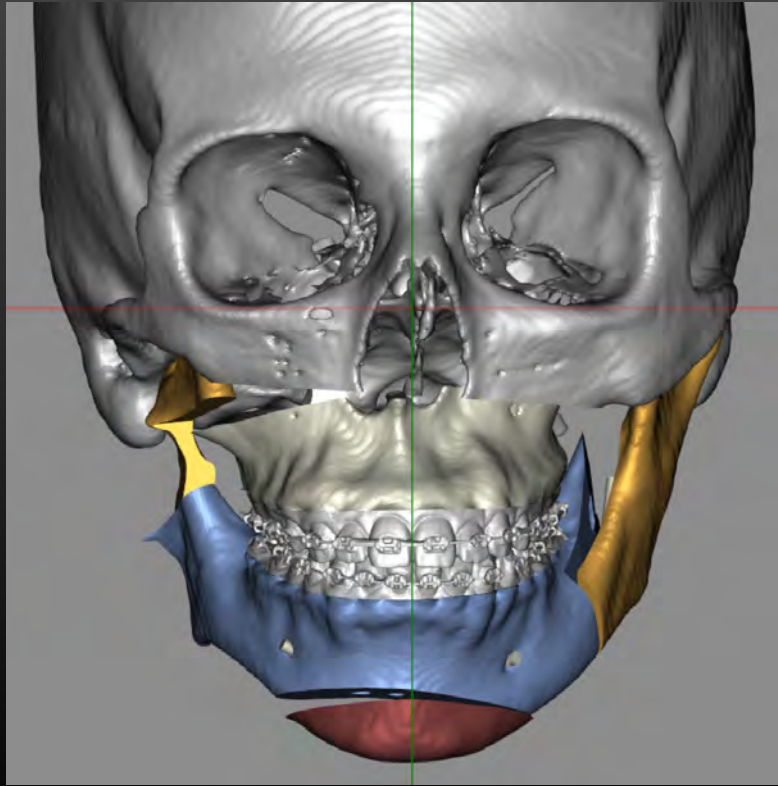


Screw identification

IMPORTANT: Patient specific implants should not be bent in any way in order to preserve their mechanical integrity and fit

Virtual Plan (front)

PLAN



Clinical Photos (frontal)



Bone Driven Planning

1

Skeletal
Deformity



Normalize
Skeleton



Expect Normal
Facial
Appearance

2

Skeletal
Deformity



Normalize
Skeleton



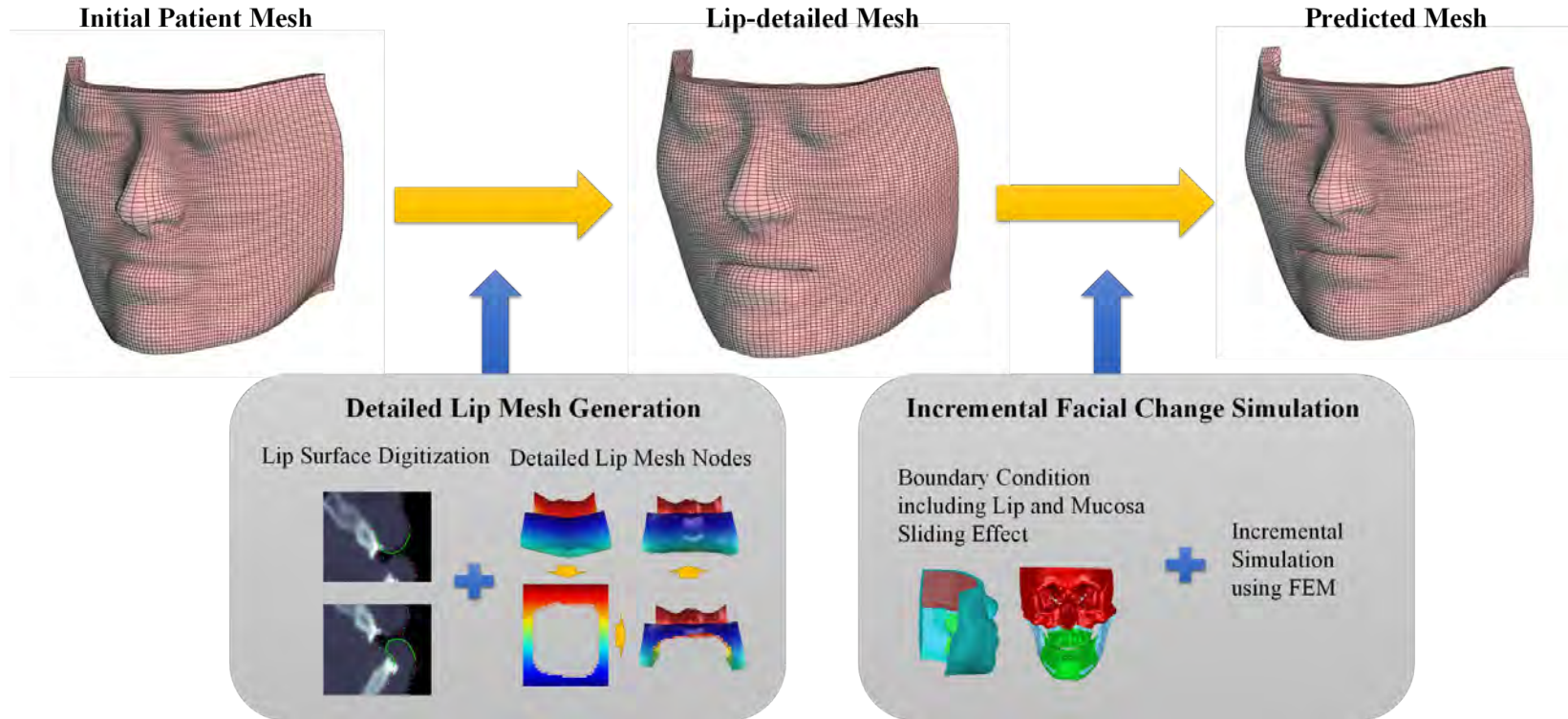
Predict Soft-
Tissue Changes

Adjust Bone Plan

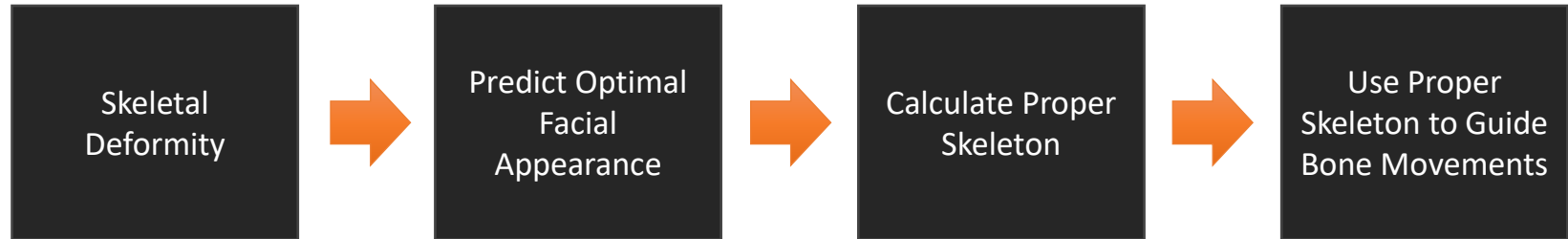


Facial Change Prediction Following Orthognathic Surgery

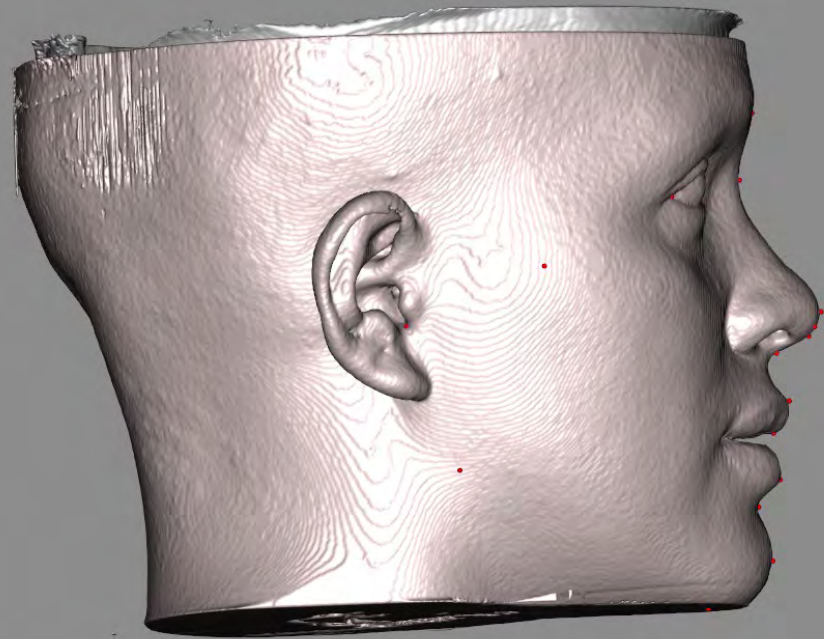
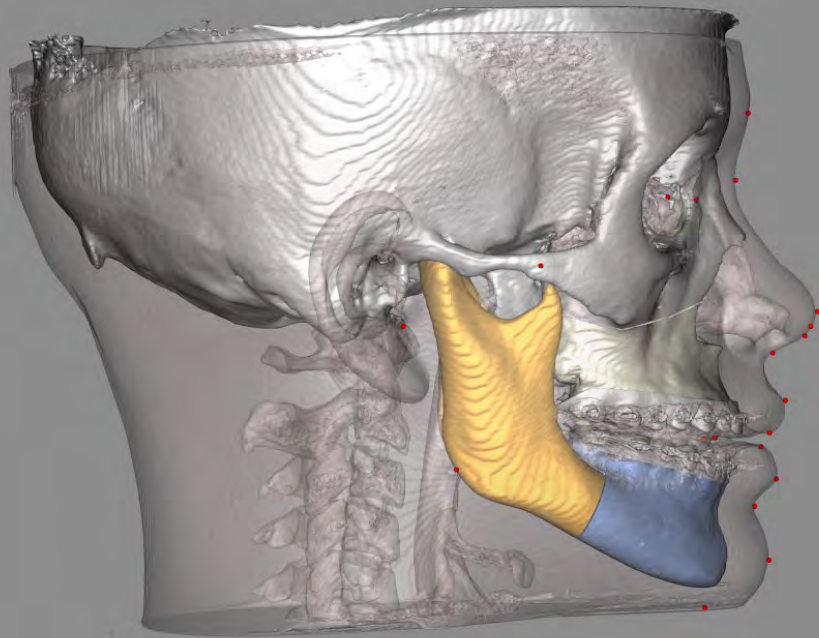
(Incremental FEM Simulation with Realistic Lip Sliding Effect)



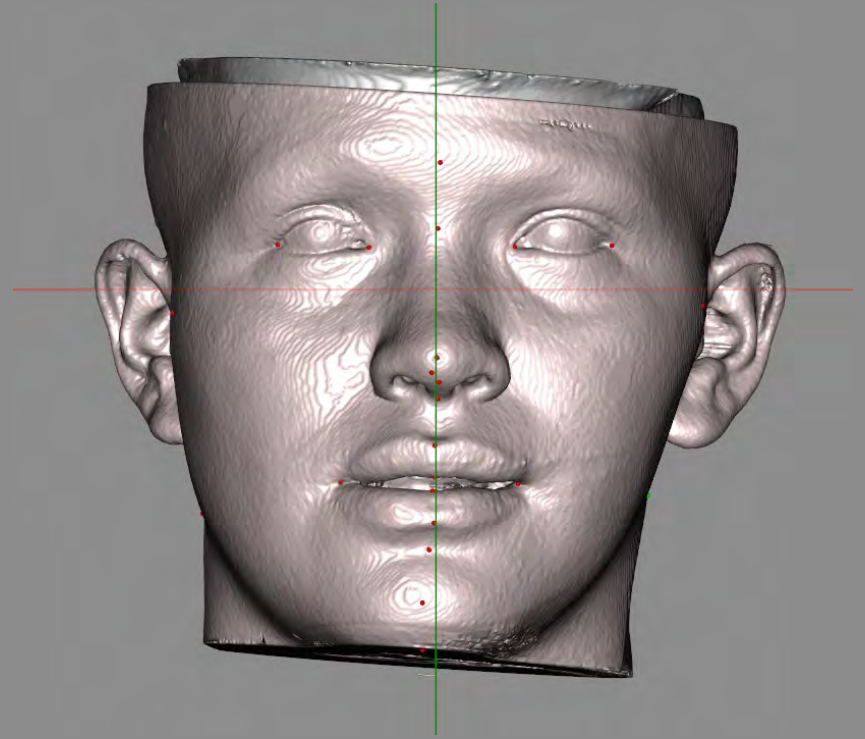
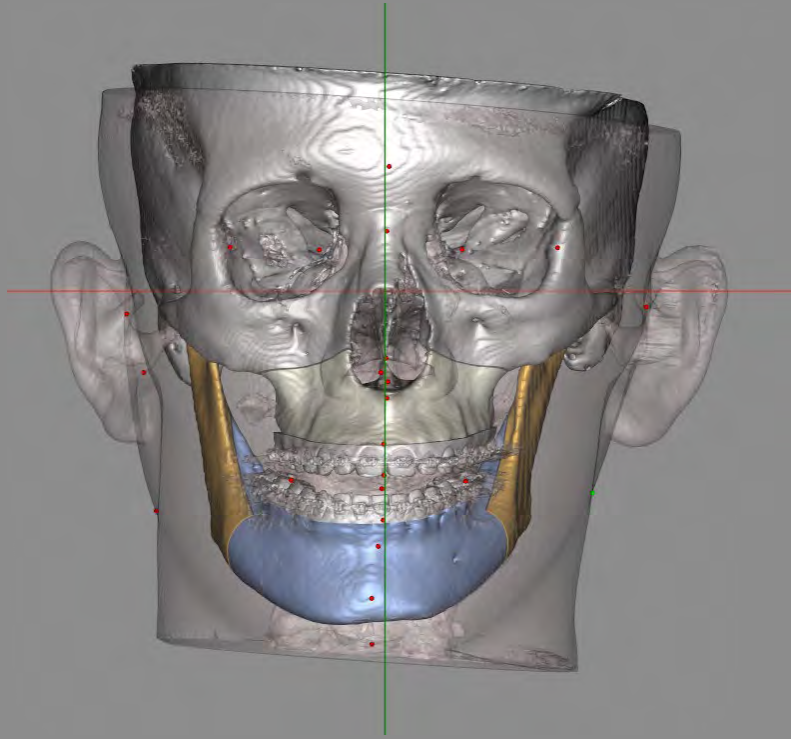
Soft-Tissue Driven Planning



Preoperative (deformed)

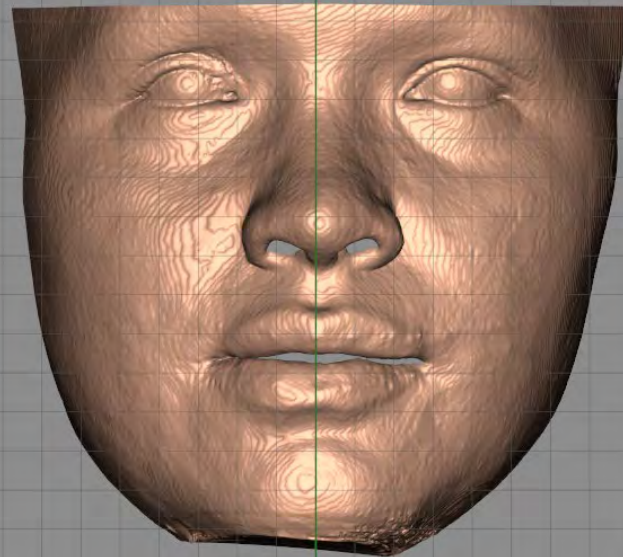
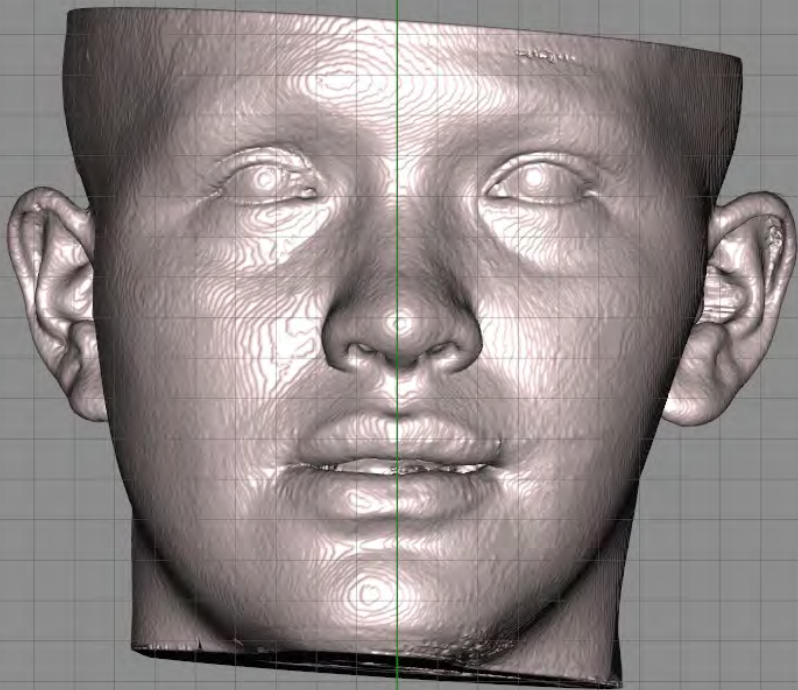


Preoperative (deformed)



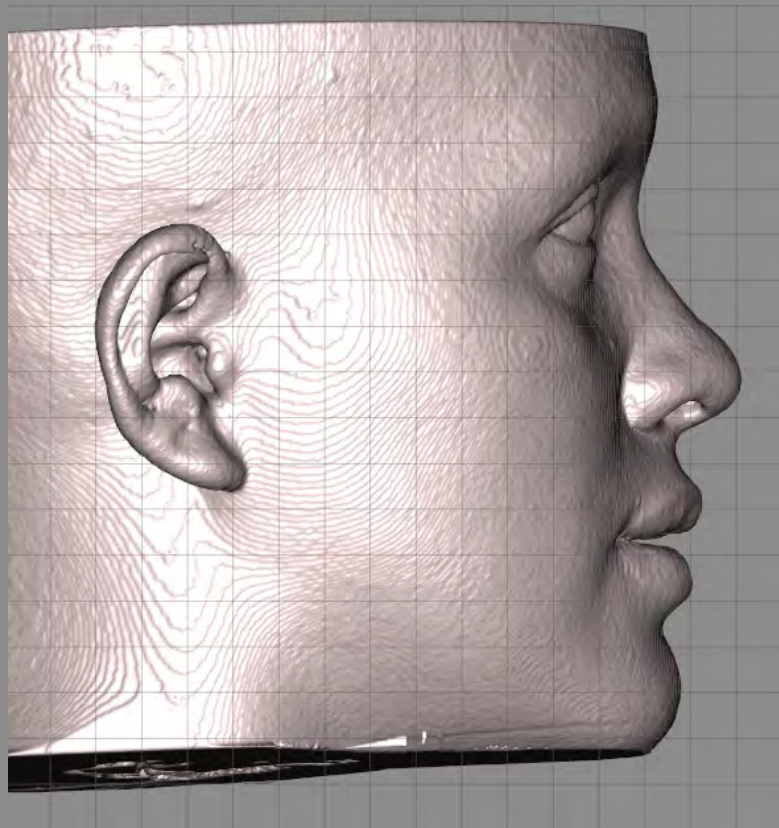
Preoperative

Prediction
Optimal Appearance

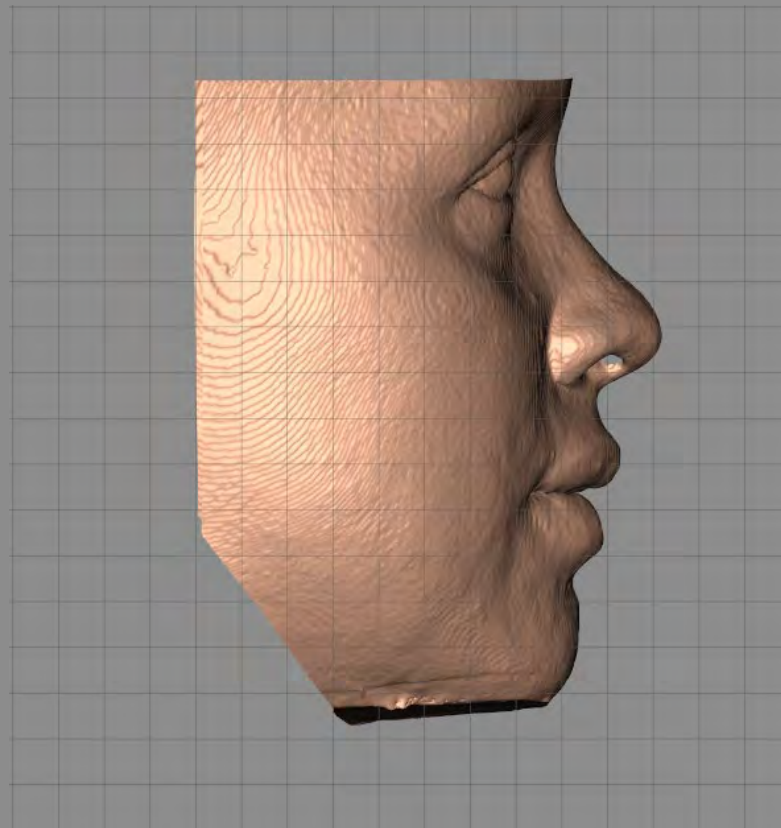


$$\underset{\mathbf{d}}{\operatorname{argmin}} \left(\sum_{i \in CM} \lambda_i \frac{(M_i(\mathbf{x} + \mathbf{d}) - \mu_i)^2}{\sigma_i^2} + \lambda_{L2} \|\mathbf{d}\|^2 \right)$$

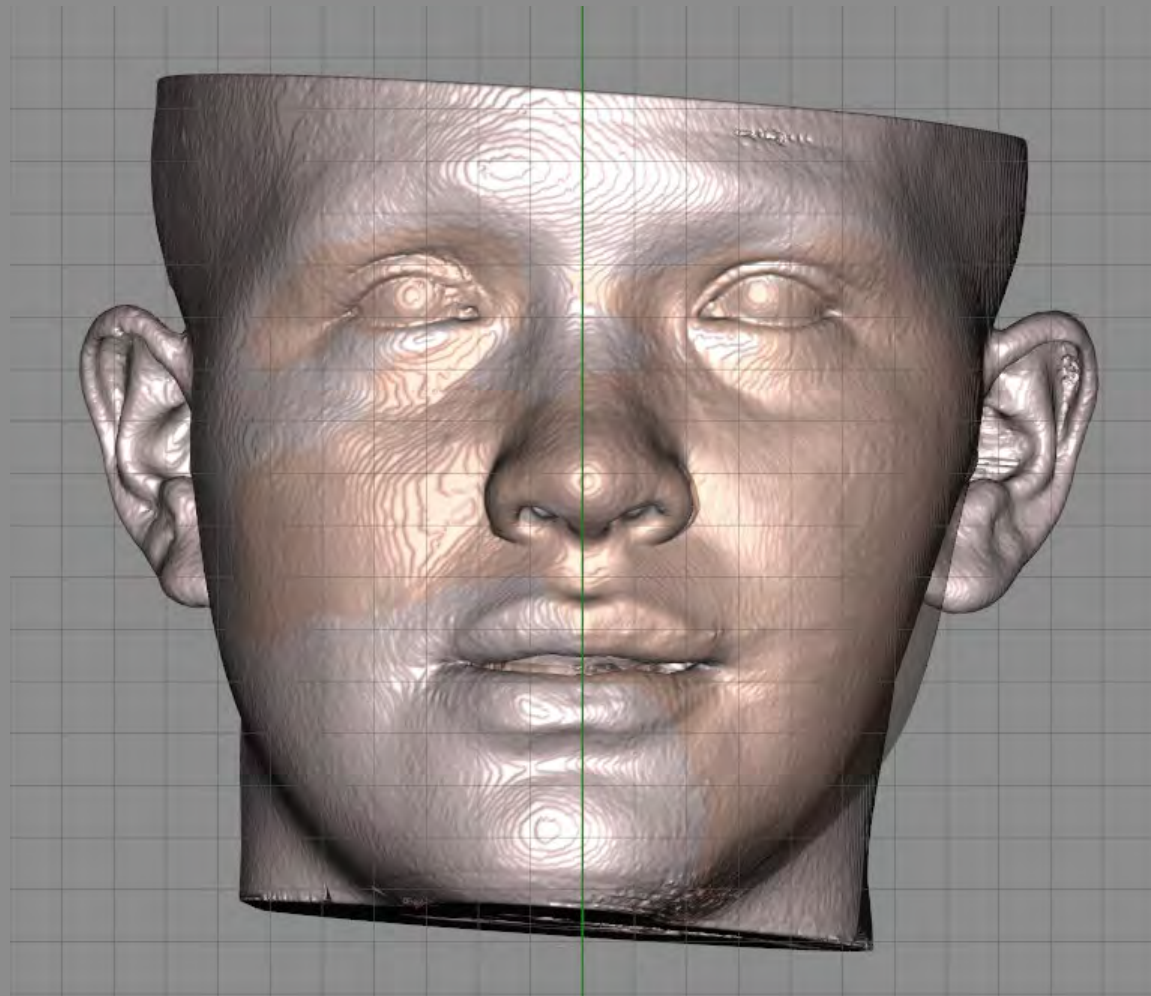
Preoperative



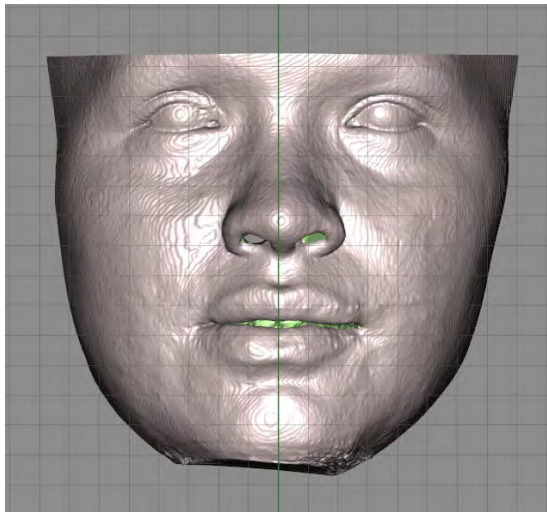
Prediction
Optimal Appearance



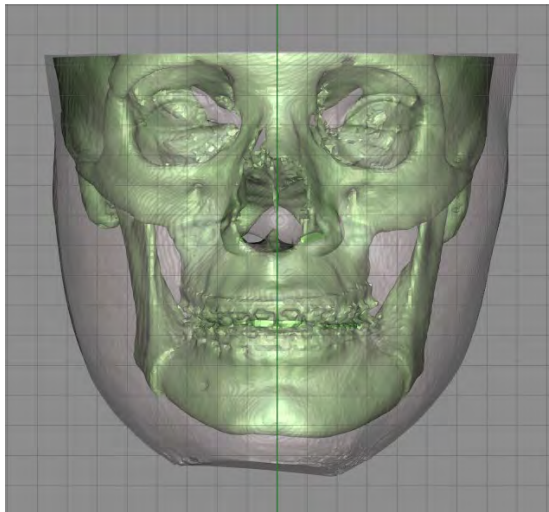
- Within the normal, NOT average
- Preserves Phenotype
- Surgically Feasible



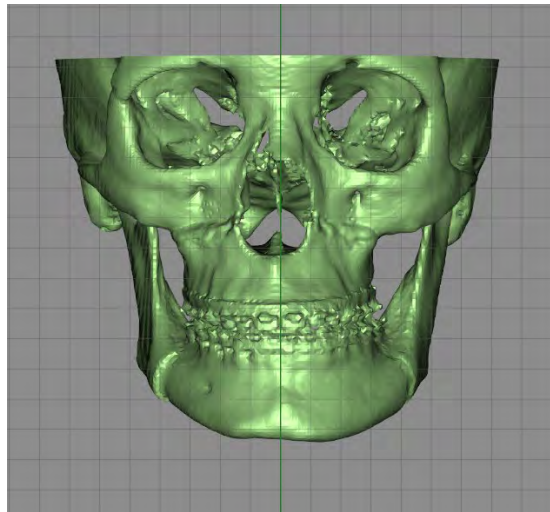
Optimal Facial Appearance

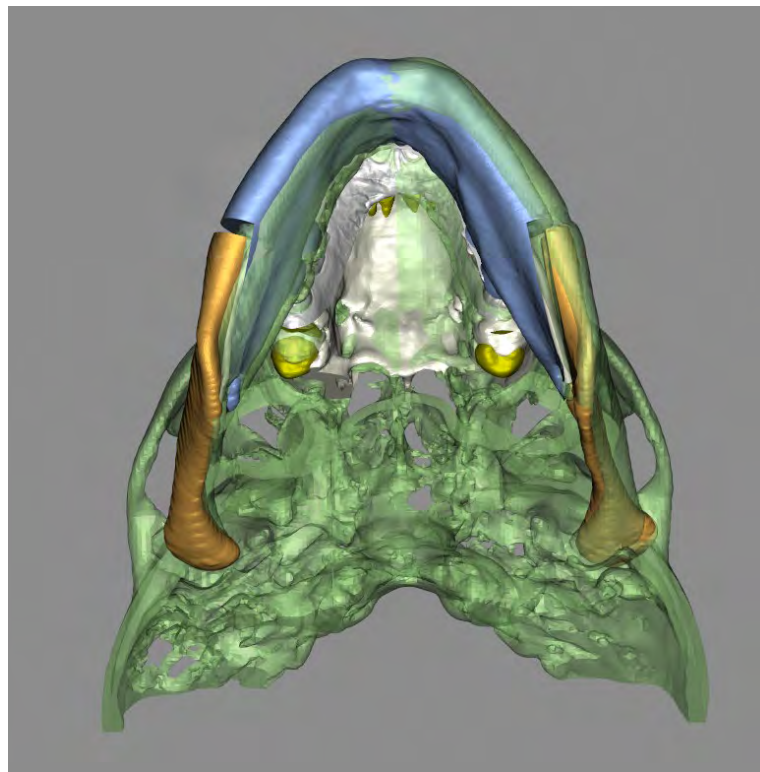
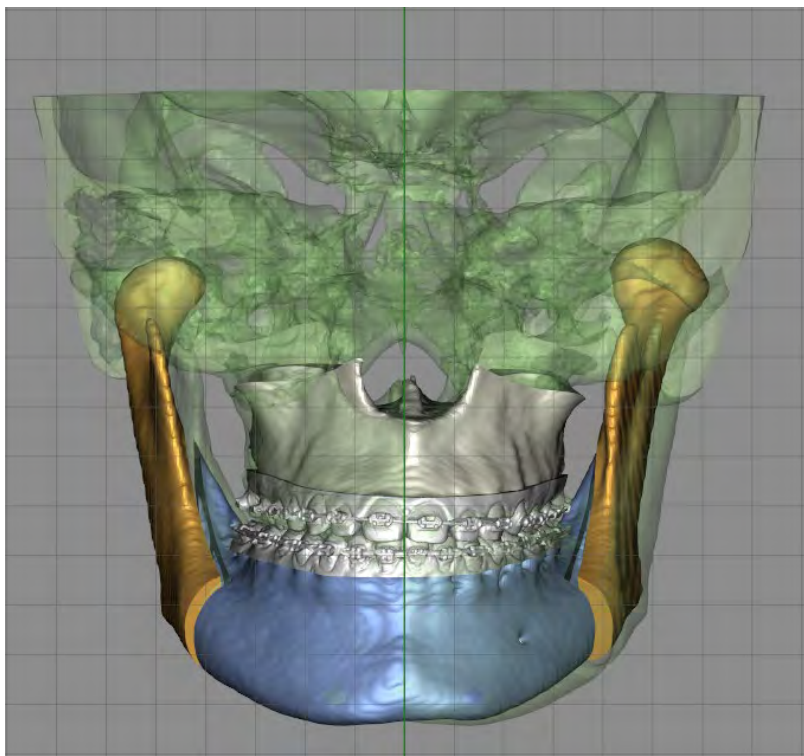


Predicted Optimal Skeleton



Optimal Skeleton









2D face photo

**3D
Reconstruction**



3D face key-points



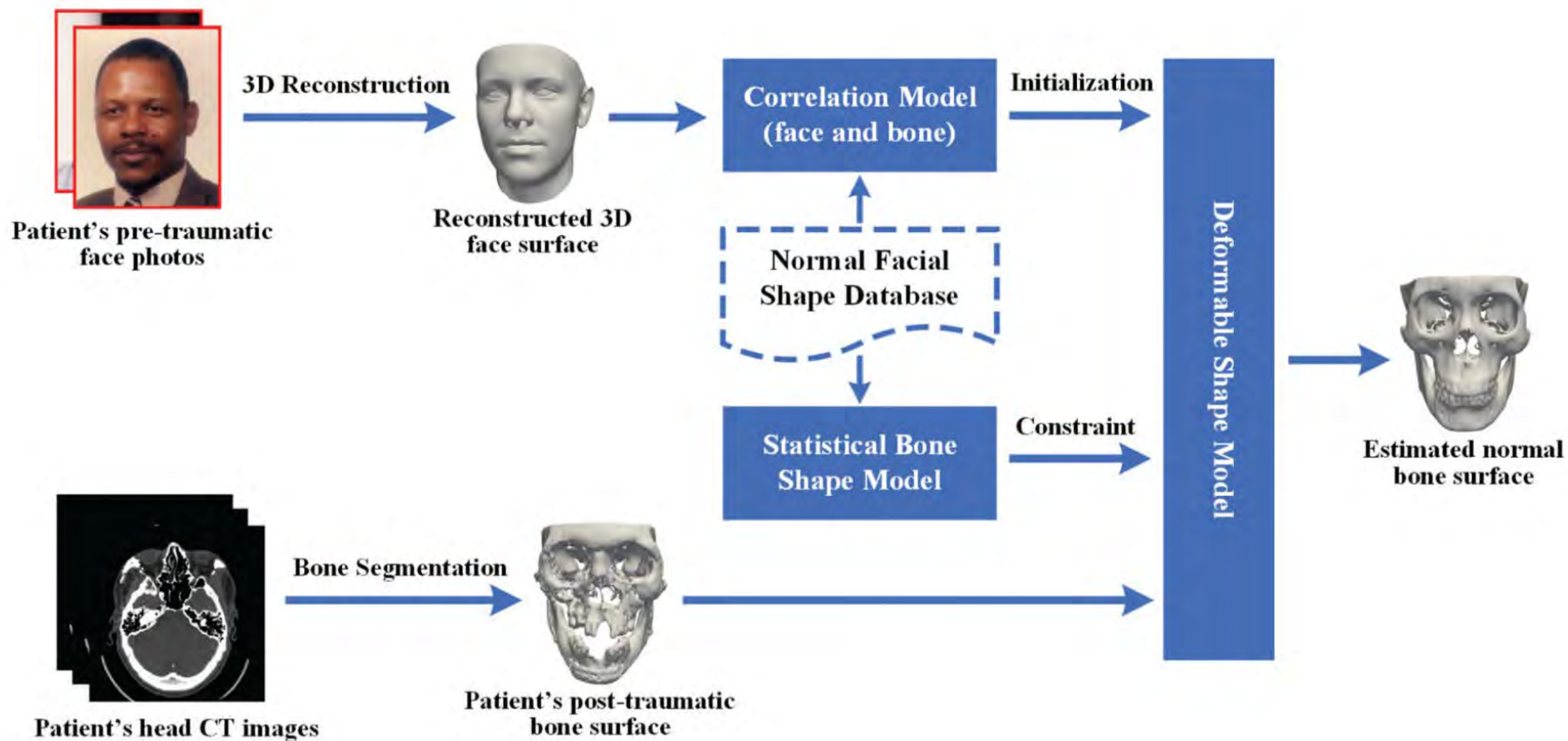
BFM mean face



TPS Interpolation



3D face surface



Synthetic post-traumatic bone



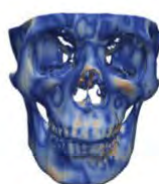
Estimated normal bone



Original normal bone (groundtruth)



Surface distance heatmap



Case 1 (VAS: 1)

Synthetic post-traumatic bone



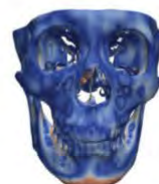
Estimated normal bone



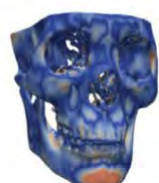
Original normal bone (groundtruth)



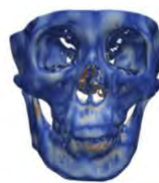
Surface distance heatmap



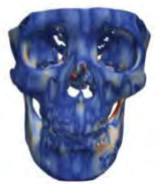
Case 2 (VAS: 1)



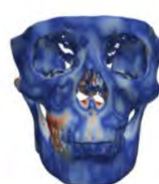
Case 3 (VAS: 1)



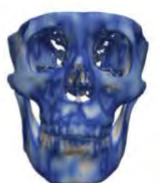
Case 4 (VAS: 1)



Case 5 (VAS: 1)



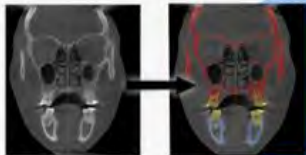
Case 6 (VAS: 1)



Case 7 (VAS: 2)



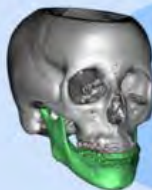
Case 8 (VAS: 1)



Milestone 1.
Automatic CBCT
Segmentation



Milestone 2.
Automatic
Landmark
Localization



Milestone 3.
SkullEngine Joint
Segmentation and
Landmarking



Milestone 7.
Clinical Validation
of *SkullEngine*



Milestone 8.
Federated
Learning

Improved
Diagnosis and
Treatment of CMF
Deformities



Milestone 4.
Automatic
Landmark
Localization in
Dental Models

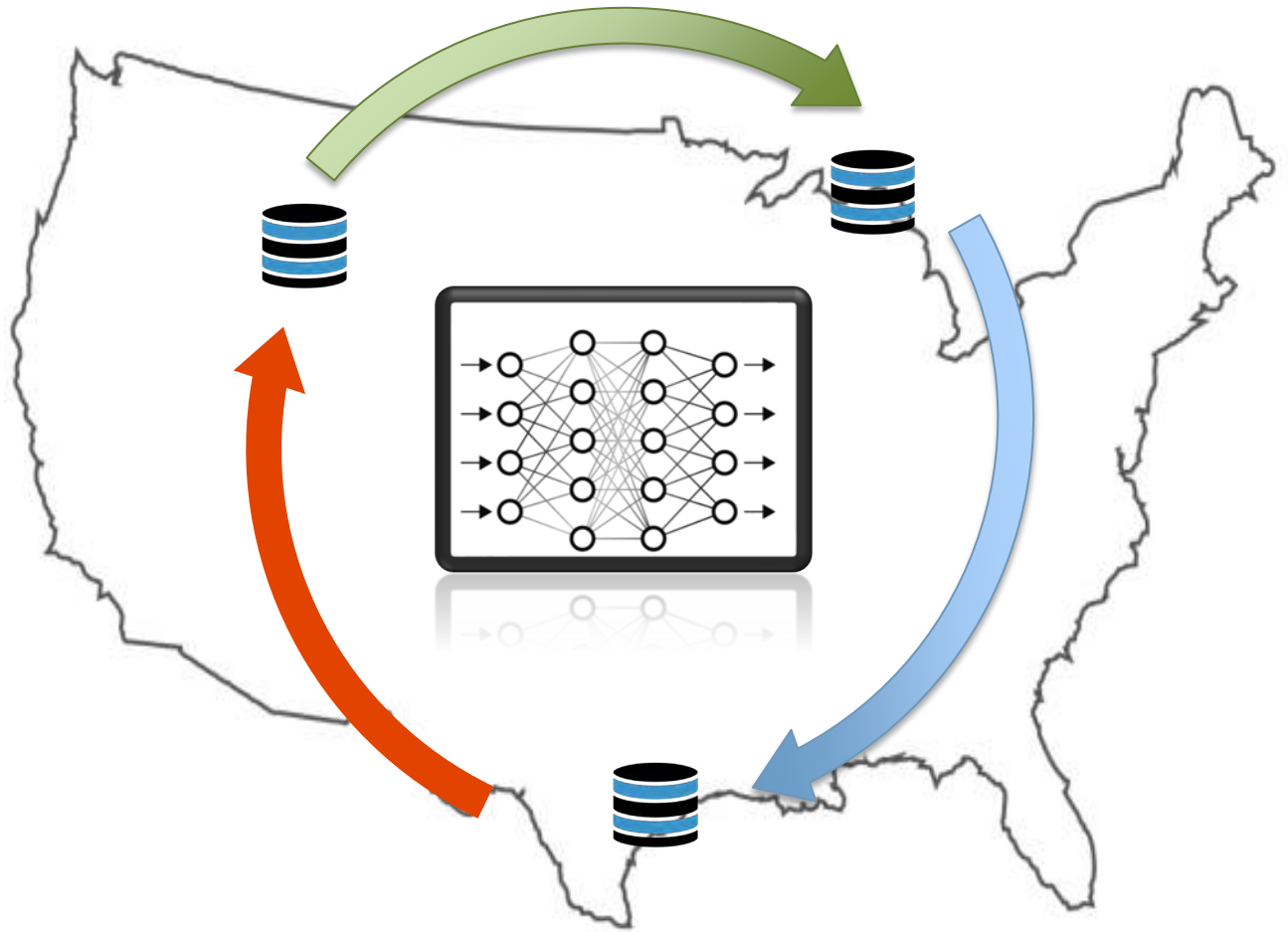


Milestone 6.
Interlipping and
Automatic Dental
Articulation



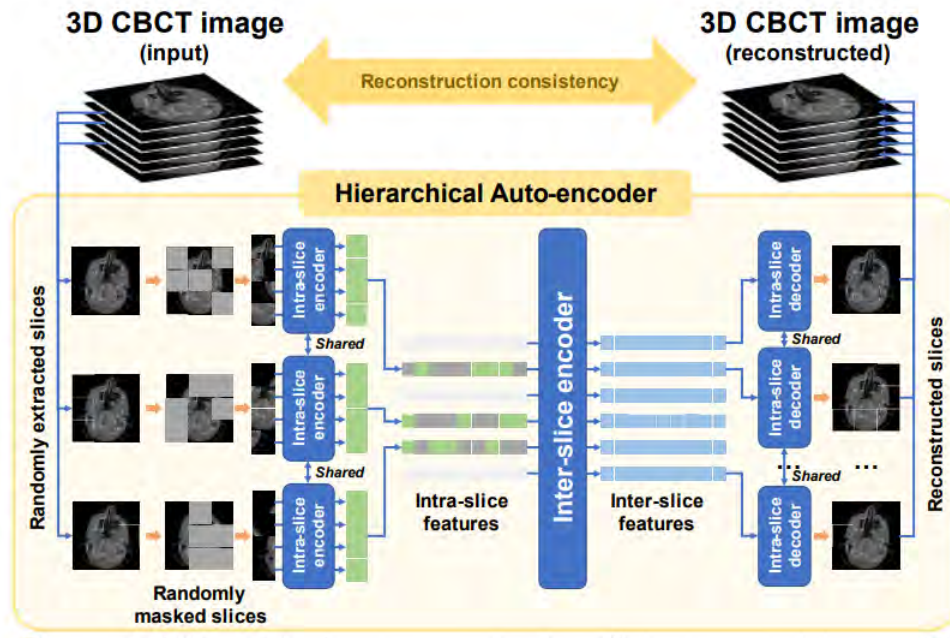
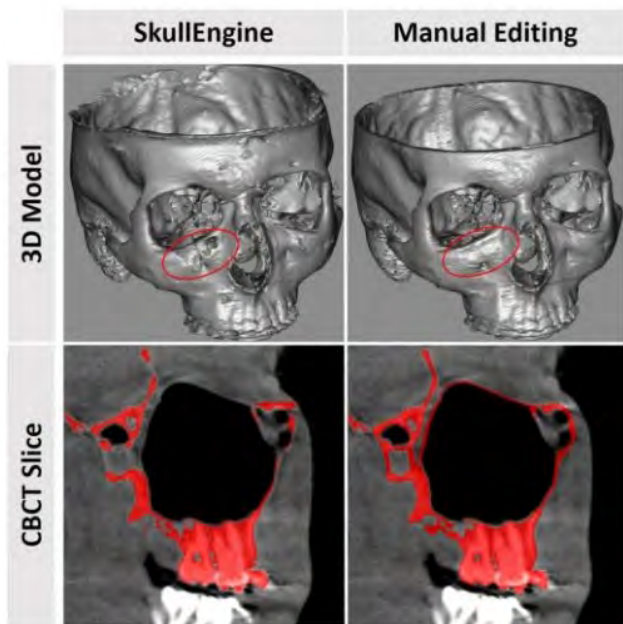
Milestone 5.
MRI Bone
Segmentation

Federated Learning



SkullEngine+

Improving Automatic Image Segmentation and Landmarking



Ethnic Sensitive Considerations in Facial Rejuvenation

Anthony E. Brissett MD, FACS

Professor and Vice Chair

Department of Otolaryngology/HNS

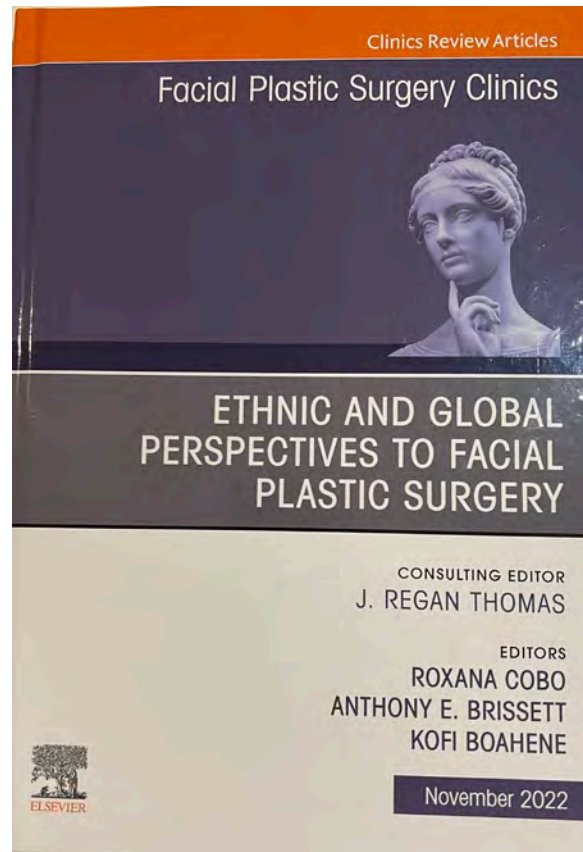
Division Chief

Division of Facial Plastic and Reconstructive Surgery

Weill Cornell Medicine

Ethnic Sensitive Considerations in Facial Rejuvenation

- Common conversation occurring in academic settings
- Change in our racial & cultural landscape
- Positive perception and widespread acceptance and accessibility of plastic surgery
- Significant increase in plastic surgery procedures for patients from varying ethnic and cultural backgrounds
- For physicians it's important to demonstrate awareness and cultural competency
- Creating awareness for the patient



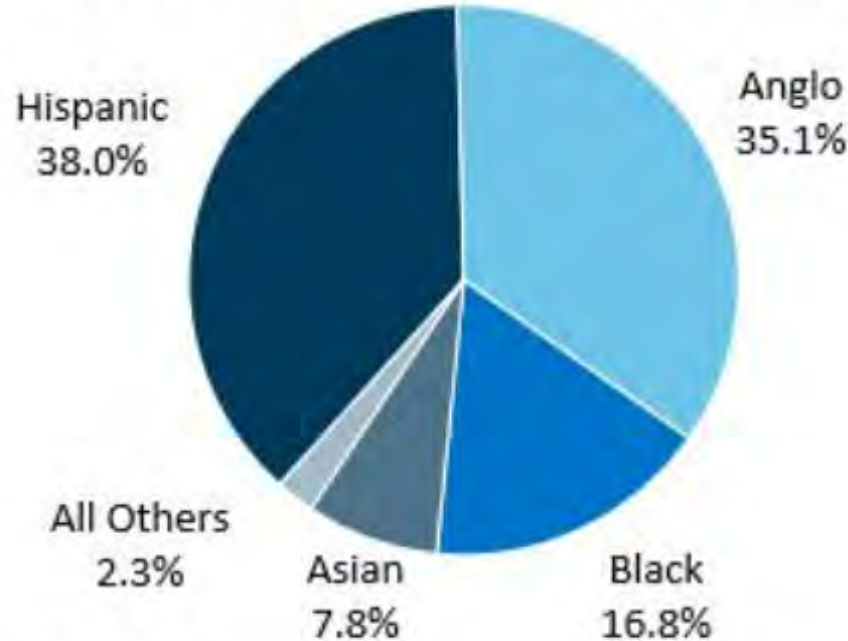
American Racial Demographic Landscape

| | 2008 | 2050 |
|------------------------|------|------|
| Non-Hispanic/ White | 68% | 46% |
| Hispanic | 15% | 30% |
| African American | 12% | 15% |
| Asian American | 5% | 9% |

United States Census Bureau

Houston Demographics

Metro Houston, Racial/Ethnic Composition



Source: U.S. Census Bureau

Ethnic Sensitive Considerations in Facial Rejuvenation

Why are these demographic statistics significant?



Ethnic Sensitive Considerations in Facial Rejuvenation

- 2017 Plastic Surgery Statistics
 - 30% of all cosmetic procedures were performed on non-Caucasian patients
 - Represents 33% increase from 2010

Ethnic Sensitive Considerations in Facial Rejuvenation

- 2010-2017 Plastic Surgery Statistics
 - Hispanics
 - 27% increase
 - African American
 - 52% increase
 - Asian American
 - 51% increase

Ethnic Sensitive Considerations in Facial Rejuvenation

- 2017 Plastic Surgery Statistics
 - Hispanics
 - 1.9 million cases
 - 16% increase (compared to 2016)
 - African American
 - 1.6 million cases
 - 17% increase (compared to 2016)
 - Asian American
 - 1.1 million cases
 - No increase (compared to 2016)

Ethnic Sensitive Considerations in Facial Plastic Surgery

- Two main areas of discussion
 - Aesthetic Nasal Surgery
 - Facial Rejuvenation

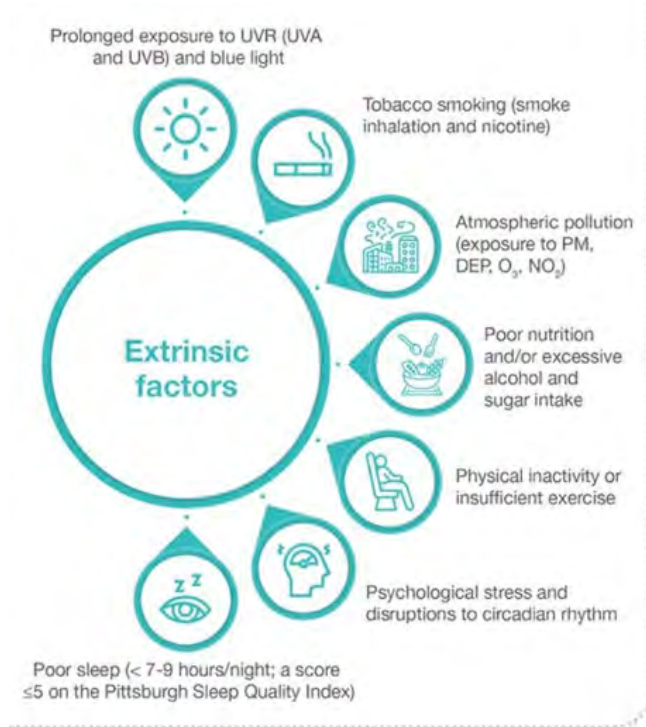
Facial Aging



Rembrandt

Facial Aging

- Extrinsic
 - Sun exposure
 - UVA and UVB
 - Smoking
 - Radiation
 - Chemical toxins
 - Diet and Nutrition



Facial Aging

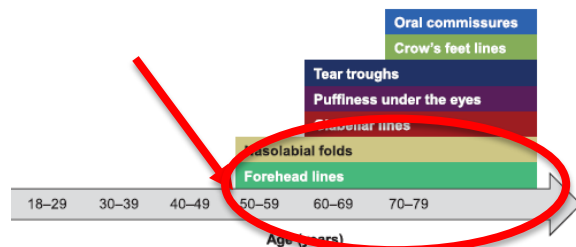
- Intrinsic
 - Genetics
 - Diseases and disorders
 - Endocrine
 - Autoimmune
 - Skeletal support
 - Fat atrophy
 - Redistribution of the soft tissue
- Gravity induced



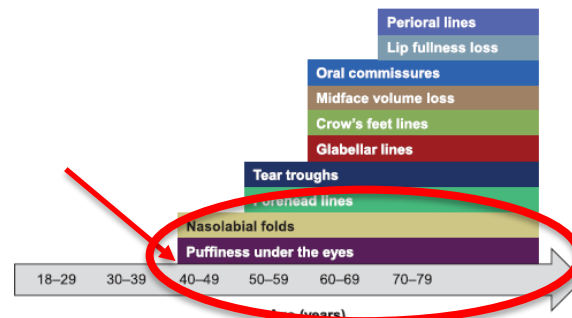
Ethnic Sensitive Considerations in Facial Rejuvenation

Cross Cultural Facial Aging

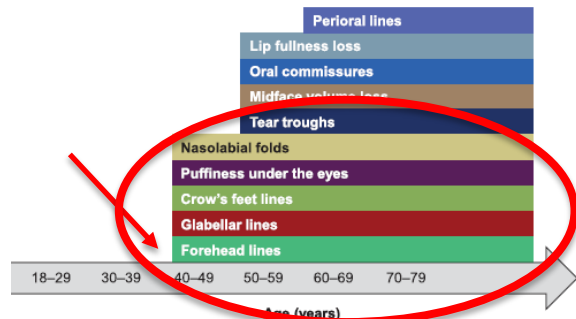
(A)
Black



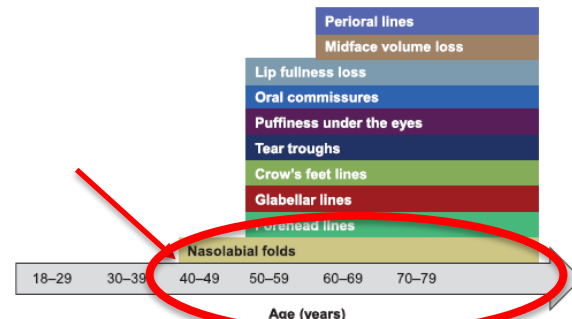
(B)
Asian



(C)
Caucasian

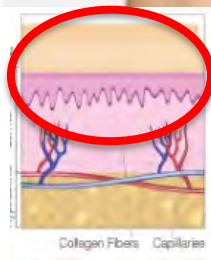


(D)
Hispanic



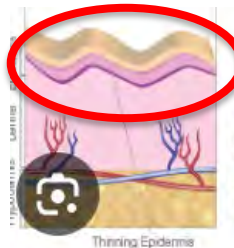
Ethnic Sensitive Considerations in Facial Rejuvenation

Representation of Facial Aging



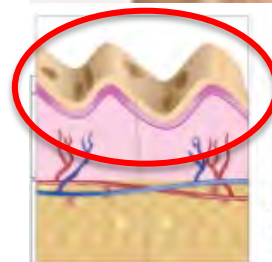
20s

Environmental damage and constant exposure to damaging UV rays begin to take their toll on skin. Free radicals attack the skin's structural integrity. Cell renewal and turnover rates begin to decline.



40s

By our 40s, the skin is thinner, barrier lipids are not as pronounced and dehydration can be an issue. More prominent signs of skin aging may also appear, such as dark spots and significant dullness.

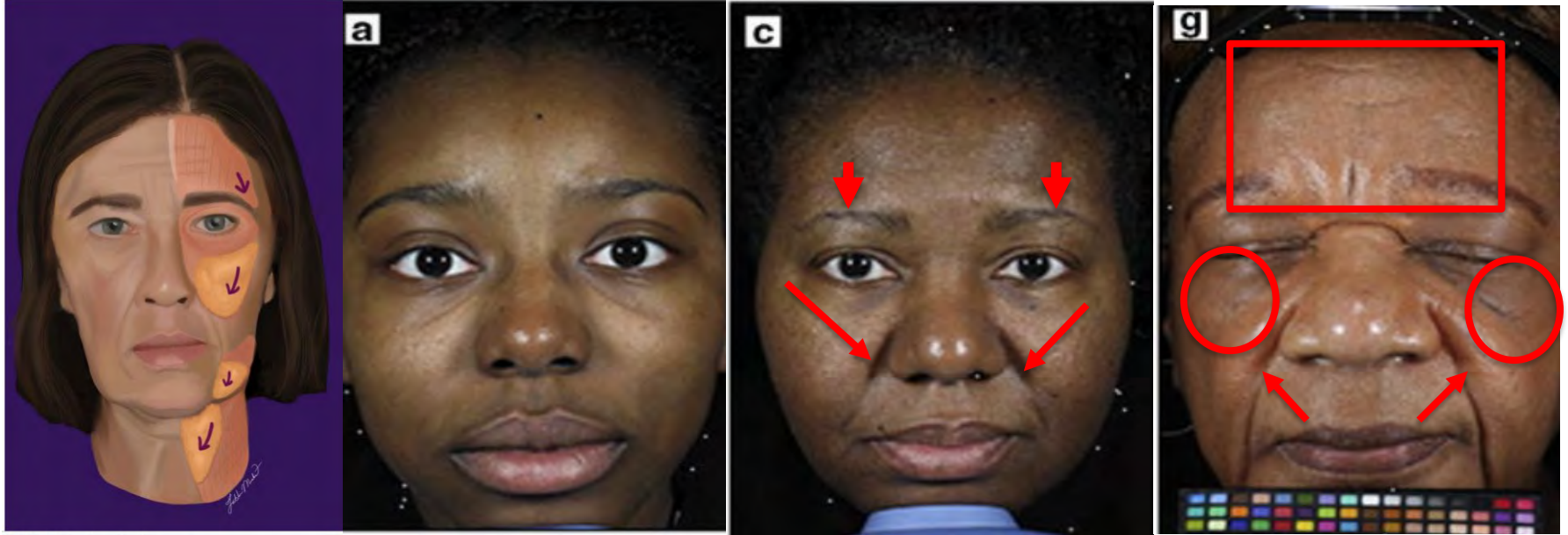


50s+

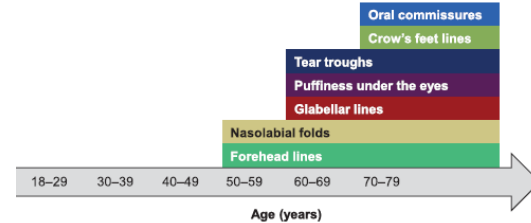
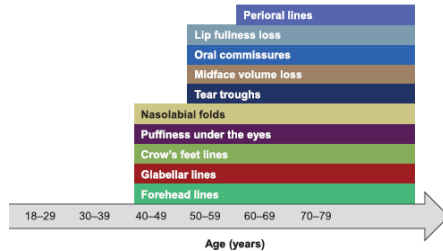
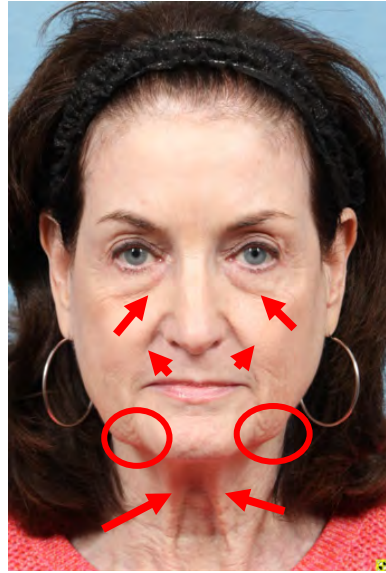
The protective barrier lipid layer lessens, leading to less efficiency in retaining moisture and more potential for sensitivity and dehydration. Skin shows wrinkles, fine lines and pigmentation.

Ethnic Sensitive Considerations in Facial Rejuvenation

Facial Aging



Ethnic Sensitive Considerations in Facial Rejuvenation



Ethnic Sensitive Considerations in Facial Rejuvenation

Treatment Options

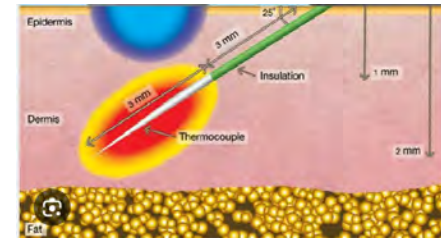
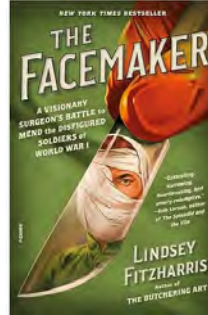
- Extrinsic Aging
 - Sunscreen
 - Broad spectrum (UVA/UVB)
 - SPF 40 or above
 - Avoid tanning beds
 - Skin care
 - Diet and Nutrition
 - Resurfacing
 - Lasers
 - Chemical peel
 - Chemo denervation
 - Botox



Ethnic Sensitive Considerations in Facial Rejuvenation

Treatment Options

- Intrinsic Aging
 - Surgical intervention
 - Face lifting procedures
 - Fat, muscle and skin repositioning
 - Volumization with fillers
 - Temporary
 - Permanent
 - Fat
 - Skin tightening procedures
 - Energy delivery micro needling devices
 - Morpheus, Profound



Ethnic Sensitive Considerations in Facial Rejuvenation



Customized Treatment Strategy

- Extrinsic
 - Skin Care
 - Hydro facial
 - Micro needling
 - Botox
- Intrinsic
 - Deep Plane Facelift
 - Muscle tightening in the neck
 - Liposuction to the jaw line
 - Hyaluronic acid filler to the midface and lips

Ethnic Sensitive Considerations in Facial Rejuvenation



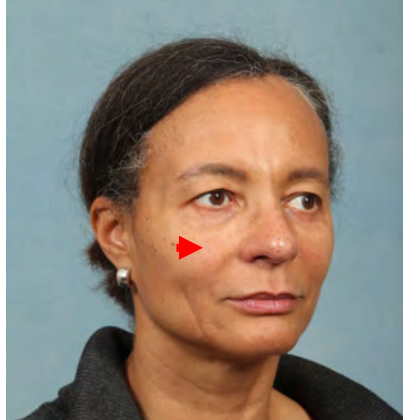
Ethnic Sensitive Considerations in Facial Rejuvenation



Customized Treatment Strategy

- Extrinsic
 - Skin Care
 - Skin brightening regimen
 - Botox
 - Botox browlift
- Intrinsic
 - Hyaluronic acid filler
 - Midface
 - Lower eyelids
 - Nasolabial folds
 - Lips
 - NO surgery

Ethnic Sensitive Considerations in Facial Rejuvenation



Ethnic Sensitive Considerations in Facial Rejuvenation

- Summary

- Change in our cultural landscape
- Increase in patients of ethnic decent seeking cosmetic surgery
- It's important to recognize that the aging process differs based upon skin types
- Recognize that antiaging interventions vary based on skin types
- There is no one size fits all approach in facial rejuvenation
- Approaches to facial rejuvenation should be customized with considerations of race and culture



Houston Methodist team travels to Ukraine to treat many hurt in war

By Evan MacDonald

STAFF WRITER

Houston Methodist surgeons and health care workers felt they had a good sense of what they'd see in Ukraine before they traveled there last month to treat soldiers and civilians in-

jured in the war with Russia.

The team, part of a group of 13 health care workers from the U.S. and Canada, spent more than six months preparing to treat injuries from gunshots and high-velocity blasts. But it felt different once they arrived and met those patients in per-

son, said Dr. Anthony Brissett, the director of facial plastic and reconstructive surgery at Houston Methodist.

"You can't help but have this affect you emotionally in some way," Brissett said. "A lot of these people are young men and
Ukraine continues on A11



Dr. Anthony Brissett, second from right, performs surgery in Ukraine, where he was part of a medical mission to treat soldiers and civilians.

Courtesy Houston Methodist

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Photos courtesy Houston Methodist

Dr. Joshua Kain, center, of Houston Methodist, speaks to health care workers in Ukraine. Kain and Dr. Anthony Brissett, left in white, were part of a team treating gunshots and high-velocity blasts.

Houston Methodist Update

Marc L. Boom

December 7, 2023

Leapfrog Hospital Safety Grade Trend

| | Past Scores | | | | | | | | | | | | | | | | | | | | | | |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| | Spring 2012 | Fall 2012 | Spring 2013 | Fall 2013 | Spring 2014 | Fall 2014 | Spring 2015 | Fall 2015 | Spring 2016 | Fall 2016 | Spring 2017 | Fall 2017 | Spring 2018 | Fall 2018 | Spring 2019 | Fall 2019 | Spring 2020 | Fall 2020 | Spring 2021 | Fall 2021 | Spring 2022 | Fall 2022 | Spring 2023 |
| HMH | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| HMB | B | A | A | A | A | A | A | A | A | A | B | B | A | A | A | A | A | A | A | A | A | A | A |
| HMCL | B | B | A | A | C | C | C | C | C | C | B | A | B | A | A | A | A | A | A | A | A | A | A |
| HMSL | B | B | B | B | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| HMTW | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | A | A | A | A | A | A | A | A |
| HMWB | B | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| HMW | NS | NS | A | B | B | A | A | A | B | B | B | A | A | A | A | A | A | A | A | A | A | A | A |

Fall
2023



Awards and Accolades

Houston Methodist featured on *Newsweek's*
“The Best Hospital in Every State” list



Awards and Accolades

Houston Methodist Ranked Among Top Five Large Health Systems in the Nation by Fortune and PINC AI.



| | |
|---|-----------------------------|
| 1 | Mayo Clinic |
| 2 | HCA Continental Division |
| 3 | Intermountain Health |
| 4 | Houston Methodist |
| 5 | Baylor Scott & White Health |

Awards and Accolades

Samuel S. Weiss Award

ACG's highest honor for the magnitude of his service to the College



Eamonn M. M. Quigley, MD, MACG

ACG 2023

Awards and Accolades



Awards and Accolades




Susan Coulter honored with the
Byron Welch Award for Lifetime Achievement
in Fundraising from the
Association of Fundraising Professionals

Awards and Accolades




Dorothy Ables received the
Outstanding Volunteer Fundraiser Award from
the Association of Fundraising Professionals

HM's Nursing on PBS "NewsHour"



Menu

Full Episodes Podcasts Newsletters Live



PBS NEWS HOUR

#PBSNEWS

1:28 / 8:35

1x CC

How a Houston hospital reversed the trend of nurses leaving the profession

Nov 13, 2023 6:20 PM EST

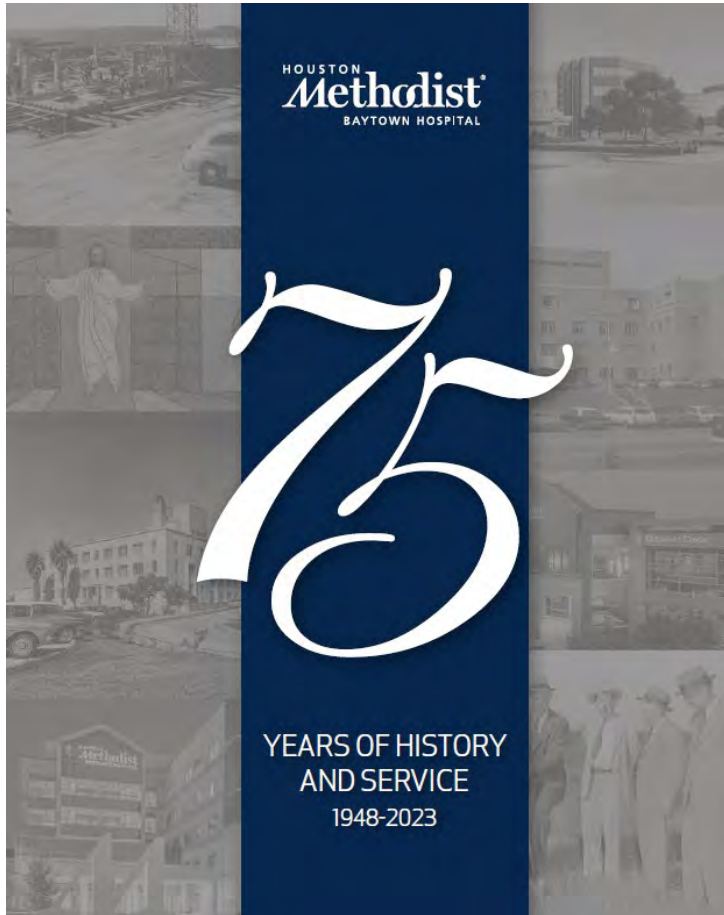
Quality and Safety Awards



2023 Rendezvous Anew

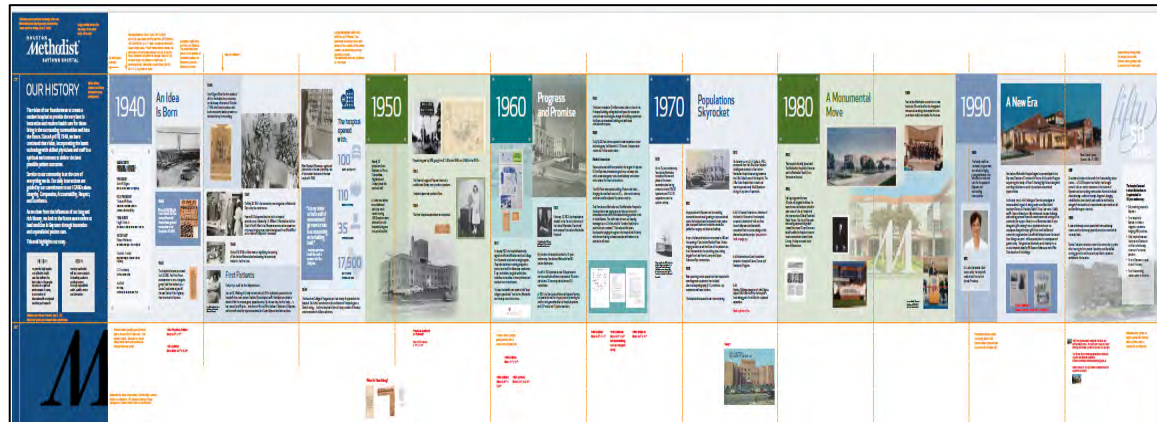


HMB: Celebrating 75 Years of History and Service



75 Years of History and Service book completed; distribution underway

History Wall dedication:
Dec. 14, 2023





THANK YOU FOR ATTENDING OUR **TOWN HALL CONVERSATION**

For more information about facial reconstructive surgery,
please contact Emily Schott at
ekschott@houstonmethodist.org.

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