A

The Science of Craniofacial Sleep Medicine

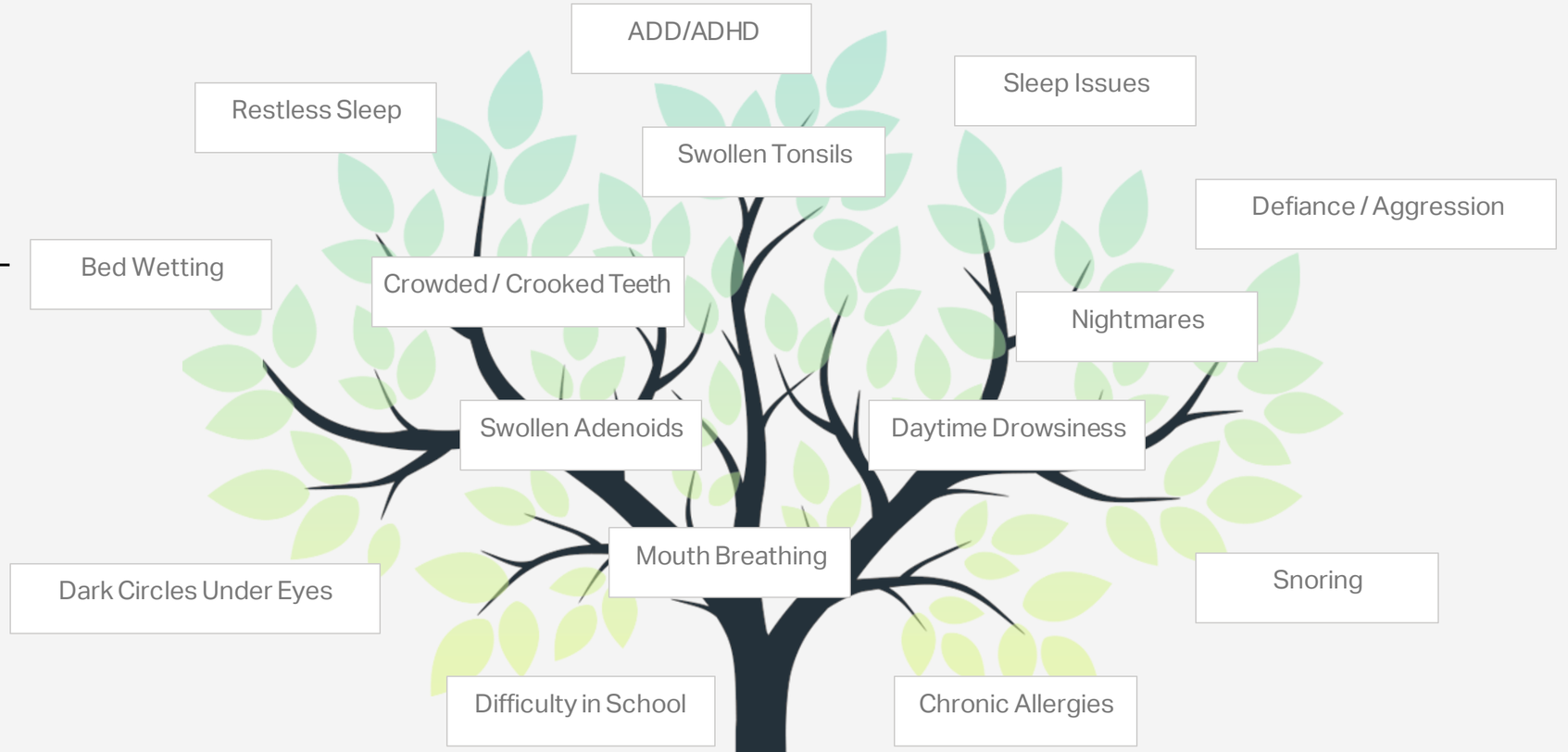
Dr. Jon Caulfield

Epic Dentistry

Littleton, Colorado

Visible Symptoms

Symptoms we see and experience.



Underlying Cause

What's really happening?

Compromised Airway

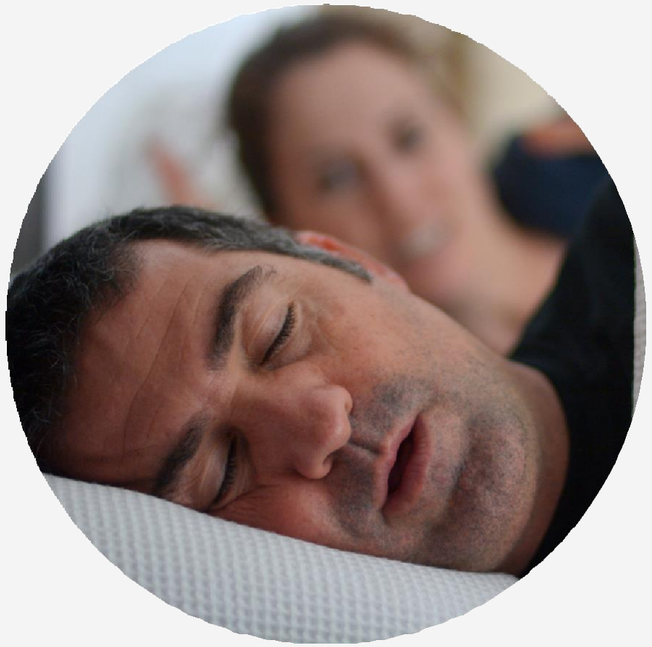
Narrow Dental Arches | Underdeveloped Upper and Lower Jaws

Possible Root Cause

How did we get this way?

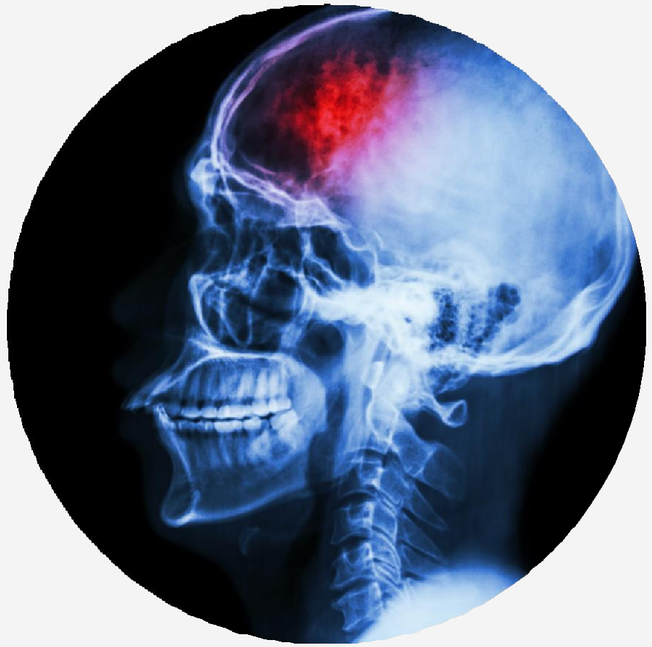
Soft Diet	Weak Tongue	Processed Foods
Weak Orofacial Muscles	Low Tongue Position	Tongue Thrust

Why Aren't Patients Concerned?



- Many are unaware they snore or stop breathing…..because when they are sleeping they aren't credible witnesses.
- And even if they know they snore, they don't think snoring is serious
- They attribute being tired all day to just needing another run through the Starbucks Drive-Thru
- Getting up 3 times a night to use the bathroom is "part of getting older"
- This is their **NORMAL**

What is the price patients pay if we don't enlighten them?



- High Blood Pressure in 40-60% OSA cases
- Brain Fog
- Cardiovascular Disease
- Stroke - 2X risk in heavy snorer vs. non-snorer. 8X risk in heavy snorers with obesity + sleep apnea
- Sudden death
- Diabetes
- Obesity

- GERD: acid reflux
- Lower immunity
- Depression and anxiety
- Memory loss
- Accelerated aging
- Chronic pain and fatigue
- Daytime sleepiness + accidents
- Morning headaches
- Cancer (Prostate, Breast and Colon/Rectal)

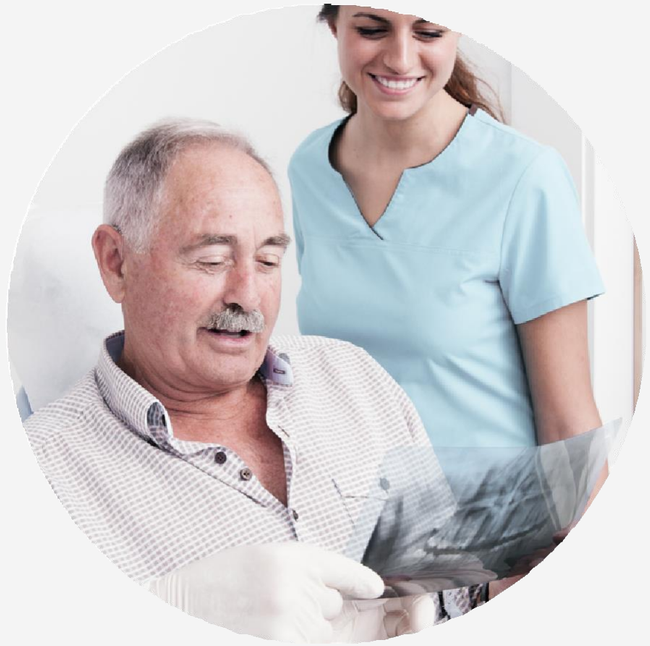
In 98% of patients with OSAS, the condition is due to abnormal anatomical features of the soft tissues and/or the structures of the maxillomandibular skeleton that cause a disproportionate anatomy of the airway.*

*ARCH OTOLARYNGOL HEAD NECK SURG/VOL 137 (NO. 10), OCT 2011

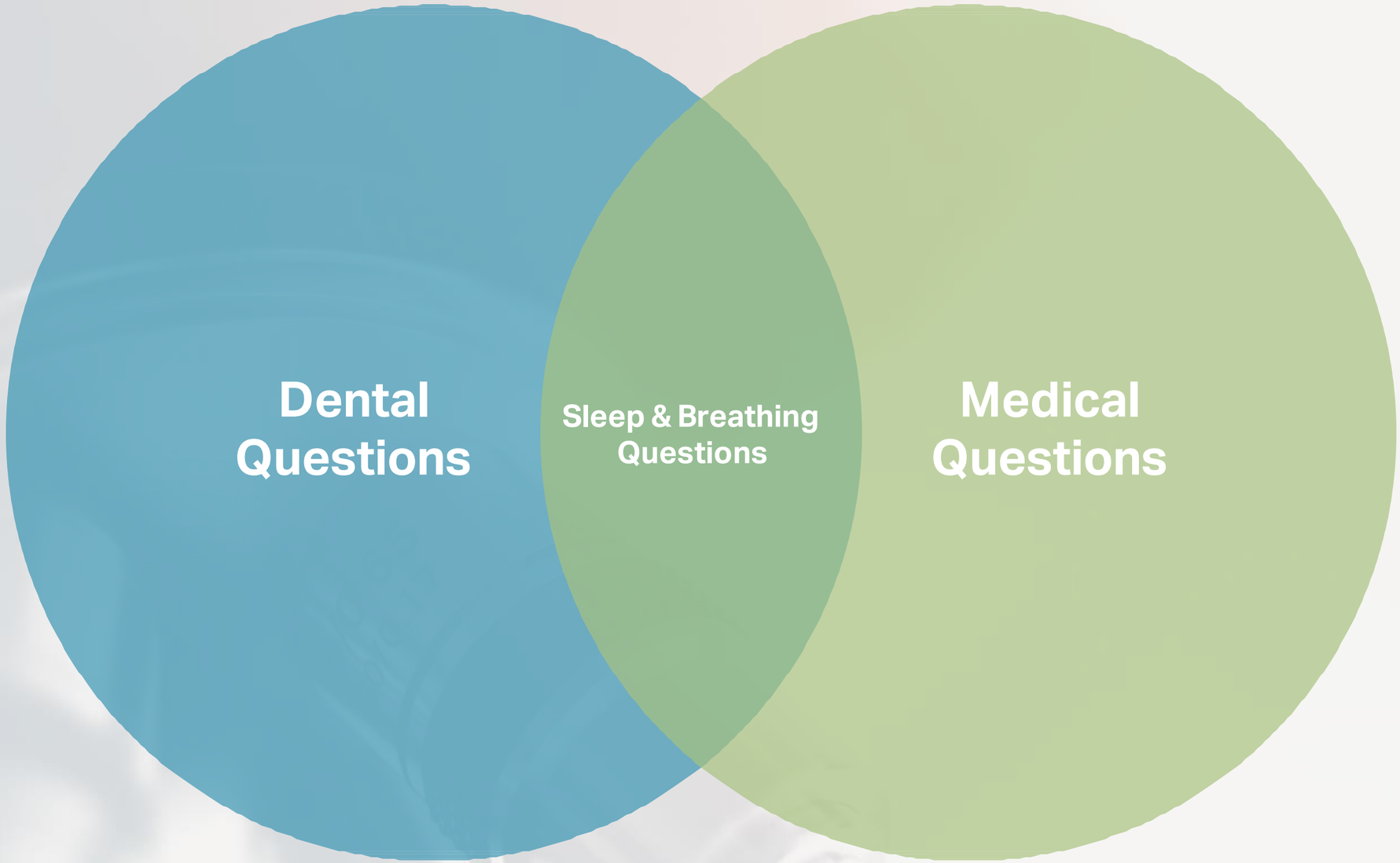
The Essential Role of Dentistry

If dentists don't help with this, who will?

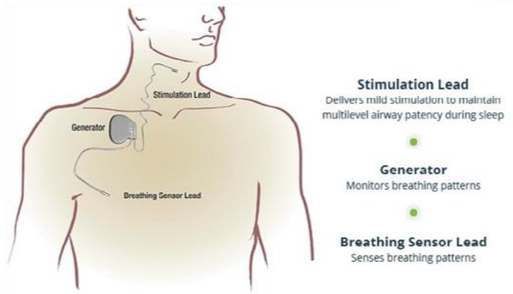
What are you looking for?



- Do you ask patients if they've been diagnosed with sleep apnea?
- Does your patient paperwork include questions that would help you diagnose sleep and breathing issues?
- Do you take CBVT images that measure the volume of the airway?
- Do you take photos of your patients in front of a grid to identify symmetry issues?
- Do you perform a complete dental examination that includes the head and neck?
- Do you know the facial clues, i.e., dry lips, venous pooling, thin upper lip, facial asymmetry, sclera (white) showing between iris and lower eyelid, etc.


Dental Questions
Sleep & Breathing Questions
Medical Questions

Now that we've identified the problem, what are the treatment options?



Stimulation Lead
Delivers mild stimulation to maintain multilevel airway patency during sleep

Generator
Monitors breathing patterns

Breathing Sensor Lead
Senses breathing patterns

1. CPAP is the "gold standard" of care for OSA. It is also rejected by 50 to 75% of patients

2. Mandibular advancement (Herbst, Summoned, Tap) devices offer immediate relief, but many patients see a worsening of their sleep apnea over time and may end up with TMD and an anterior open bite

3. Stimulation Lead Implant – Involves invasive surgery

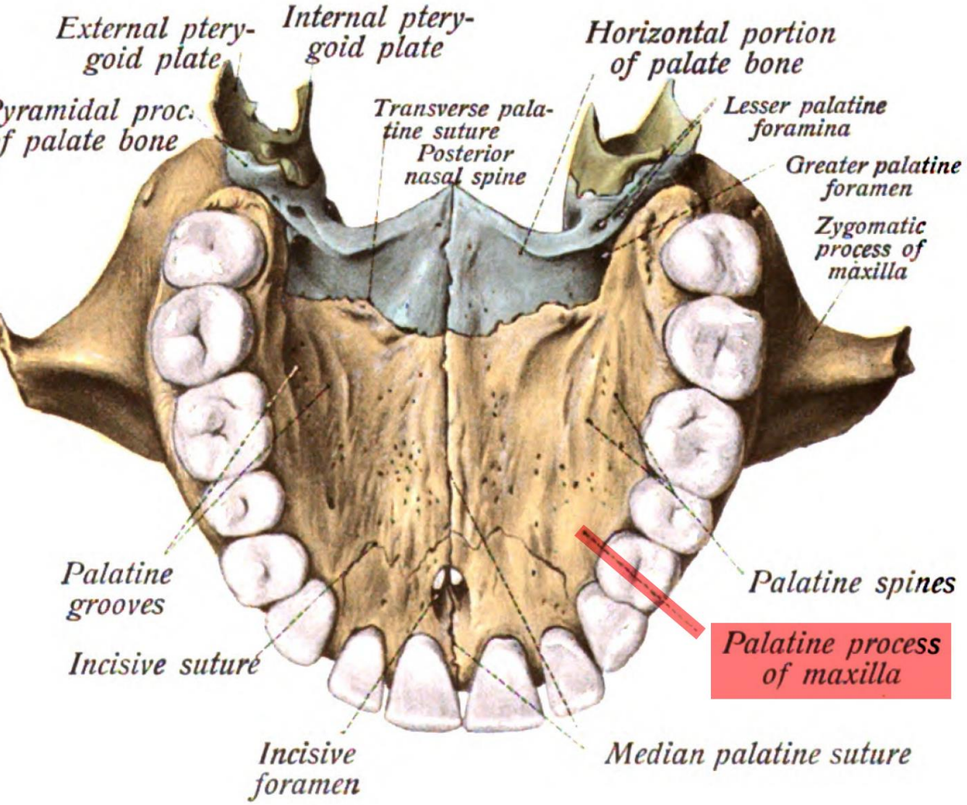
4. Multidisciplinary treatment protocols can treat mild to moderate OSA + chronic pain + TMJ + improve facial appearance

What Oral Appliance Therapy Addresses

Non-surgical upper airway improvement and remodeling with oral appliance treatment.
Improve mid-facial development, volumetric nasal airway and function, sinus drainage and flow, intraoral tongue space and airway function for better breathing and sleeping.
Allow the body to achieve its genetic potential and change the phenotype expressed in patient's current condition.
We overcome the compromised function that leads to OSA, TMD, malocclusion, SDB, maxillary vertical excess, cervical and skeletal misalignment, tooth decay, abfraction, recession, tooth wear and erosion, to name a few.

How it Works

Spatial signaling of the body's genetic map and mechanoreceptor signaling of stem cells in body's sutures to create new bone and new functional spaces (like airway) to restore form and function of the mouth and airway.



Craniofacial Growth & Development: The Maxilla

- Maxilla is the upper fixed bone of the jaw formed by the fusion of two maxillary bones
- The two maxillary bones are fused at the intermaxillary suture (mid-palatal) forming the anterior nasal spine
- The maxilla contacts nine (9) bones—two of the cranium (frontal and ethmoid), and seven of the facial bones (nasal, zygomatic, lacrimal, inferior nasal concha, palatine, vomer, and adjacent fused maxilla)
- The maxilla assists in forming the boundaries of three cavities
  - The roof of the mouth
  - The floor and lateral wall of the nasal cavity
  - The wall of the orbit

Craniofacial Growth & Development

- The anterior/posterior and transverse dimension of the maxilla IS what makes the airway
- Short anterior/posterior dimension or narrow transverse dimension causes excess soft palatal tissue that drapes down the throat and is the most common cause of obstruction
- The tongue is the 2nd most common cause of obstruction

Craniofacial Growth & Development

- The mandible structures are determined by endochondreal genes that form an endochondreal pattern
- The goal of treatment should be to balance the cranial and mid-facial sutures with the mandibular structures
- The mandible is the connection of the upper and lower jaw as well as the airway via tooth occlusion

Craniofacial Growth & Development

- **Simultaneous correction concept** is the idea of addressing the TMJ relationship, maxillary relationship, dental relationship, mandibular posture, and tongue position all at the same time
- By expanding mid-face structures we are able to expand and remodel the glenoid fossa to better accommodate the condyle and reduce or eliminate sublaxations of the articular discs while allowing more forward and lateral movement of the complex
- The growth and development of the squamo-tympanic and ptero-tympanic fissures in the fossa allows the condyle to move more forward in a wider, more optimal fossa

Sutural Homeostasis

- Midfacial structures and the calvaria (14 bones of the skull) which house the orbit of the eyes, nasal and oral cavities, as well as the sinuses are mostly intramembranous bones that respond to functional stimuli
- The circum-maxillary sutures remain in homeostasis and will respond to signal transduction with stem cells in the osteogenic periosteum of the suture undergoing changes to form new bone as the maxilla and accompanying bone are signaled by the appliance
- If sutures are stretched wider than 0.25mm, osteogenic activity ensues to maintain the 0.25mm width
- If sutures are compressed to less than 0.25mm, osteoclastic activity will resorb bone away until 0.25mm width is achieved
- **THIS IS SUTURAL HOMEOSTASIS**

The Power of Sutural Homeostasis

- Opening and stretching sutures slightly allows natural mechanisms to remodel and redevelop bone at an ideal rate while maintaining the normal sutural width, and producing health, stable bone
- Whereas, rapid expansion of the vascular osteogenic membrane in the mid-palatal suture can produce bleeding, scarring, poor-quality bone with a predominance of collagenous tissue—this reduces vascularity and can allow bone to relapse in the future
- The rate of expansion (0.25mm per week) maintains vascularity and bone function while permitting gene and environmental interactions to modify undifferentiated stem cells to form mesenchymal cells in the sutures and periodontia that is stimulated by the appliance protocol
- The sutures and periodontia are maintained through sutural homeostasis so the environment and genetic components interact favorably to maintain and/or improve function

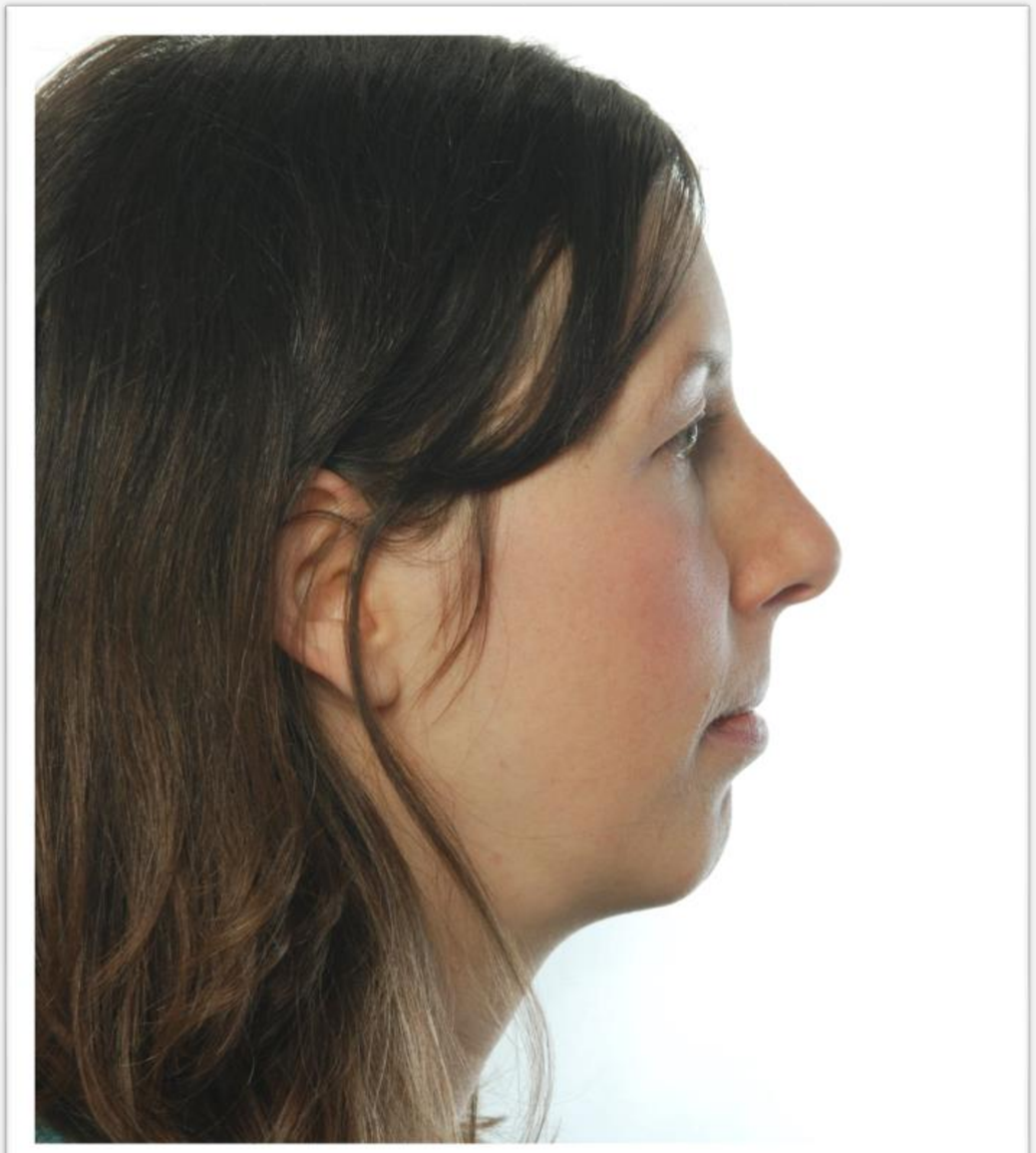
Adult Case Review

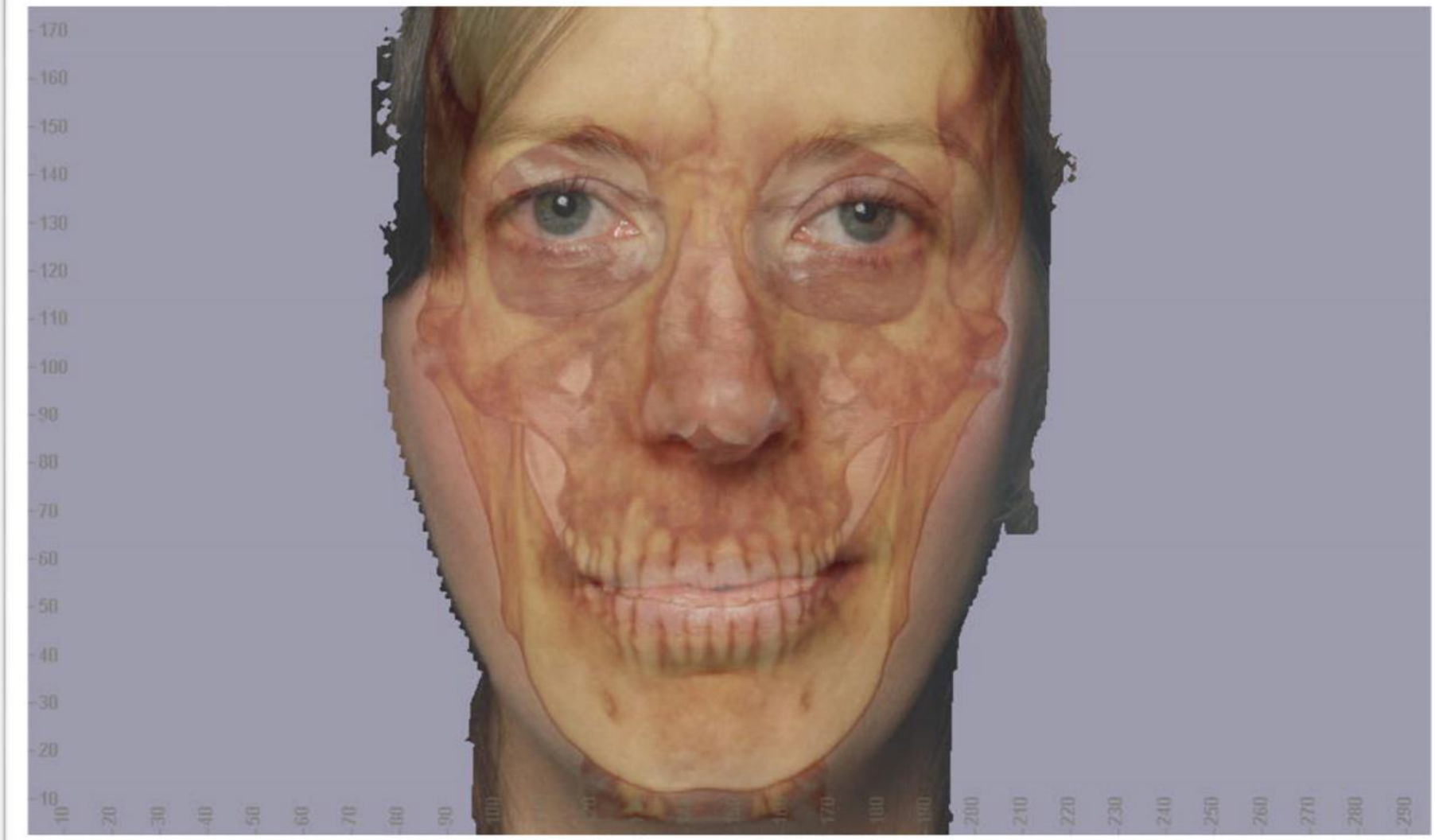
CASE STUDY: CHRISTIE

Patient of Dr. Jon Caulfield

- Disruptive sleep
- Popping in jaw
- Frequent headaches


Lateral Portrait
Frontal Portrait
Frontal Potrait (Smile)
ddi
imaging · center
ddi Imaging Center
8 West Dry Creek Circle
Suite 201
Littleton, CO 80120
Ph: (303) 797-8306
Fx: (303) 798-6286
www.ddiCenter.com
Name: CHRISTIE DRAHNAK Sex: Female
Date: 4/16/2012 Age: 34 y 1 m ID: 5-10468
Ref by: JON CAULFIELD
Maxillary Occlusal
Mandibular Occlusal

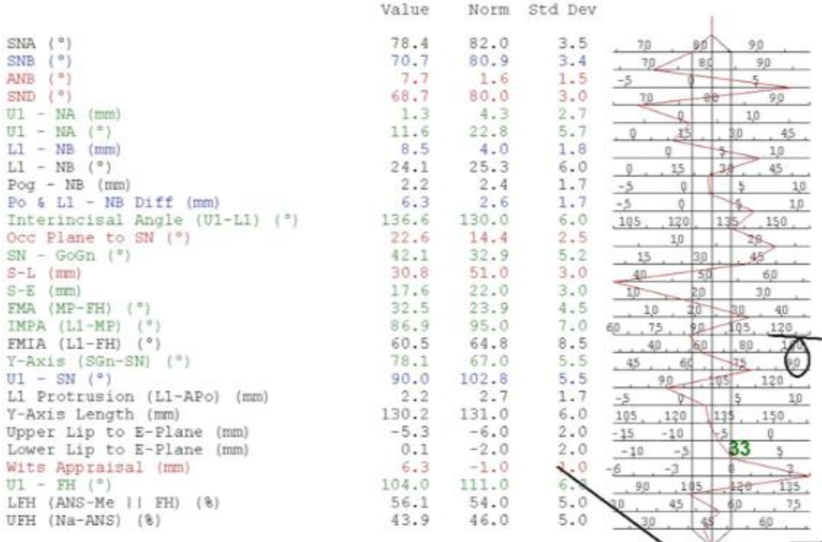


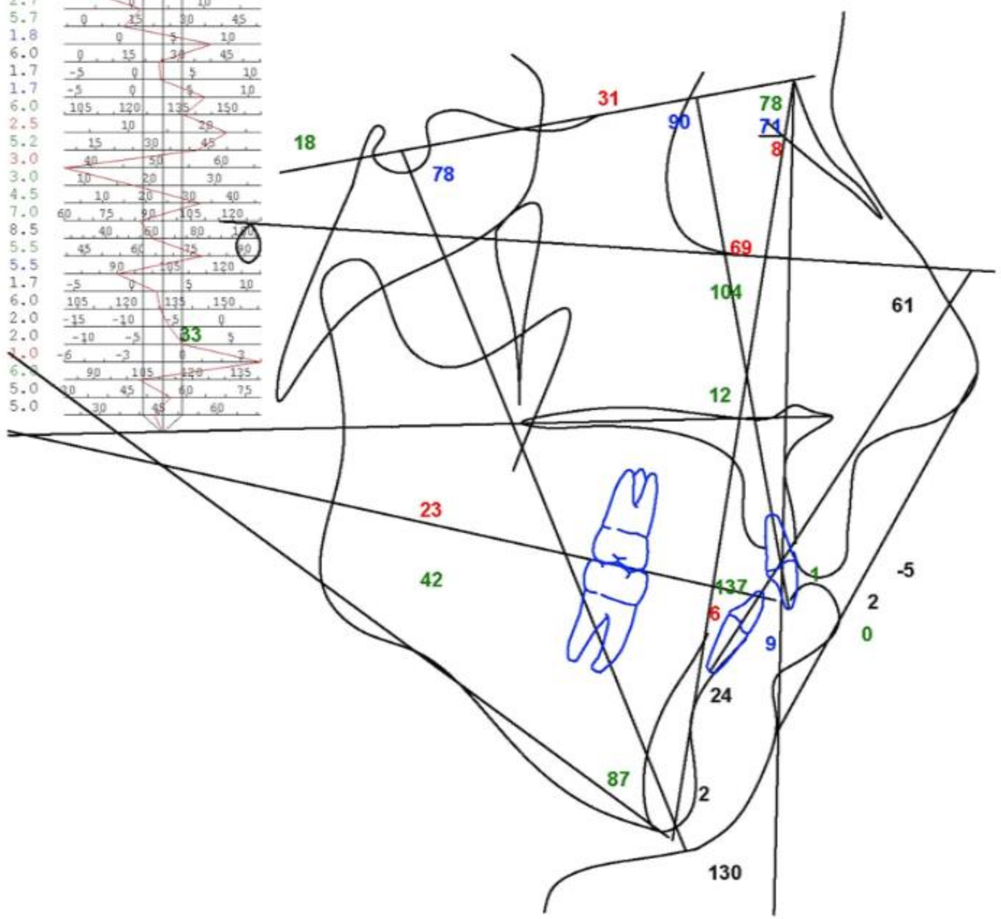



Sagittal Slice
45.8 mm

16/2012 Initial Analysis: [Steiner/Tweed/Wits] Norm:Other

	Value	Norm	Std Dev
SNA (°)	78.4	82.0	3.5
SNB (°)	70.7	80.9	3.4
ANB (°)	7.7	1.6	1.5
SND (°)	68.7	80.0	3.0
U1 - NA (mm)	1.3	4.3	2.7
U1 - NA (°)	11.6	22.8	5.7
L1 - NB (mm)	8.5	4.0	1.8
L1 - NB (°)	24.1	25.3	6.0
Pog - NB (mm)	2.2	2.4	1.7
Po & L1 - NB Diff (mm)	6.3	2.6	1.7
Interincisal Angle (U1-L1) (°)	136.6	130.0	6.0
Occ Plane to SN (°)	22.6	14.4	2.5
SN - GoGn (°)	42.1	32.9	5.2
S-L (mm)	30.8	51.0	3.0
S-E (mm)	17.6	22.0	3.0
FMA (MP-FH) (°)	32.5	23.9	4.5
IMPA (L1-MP) (°)	86.9	95.0	7.0
FMIA (L1-FH) (°)	60.5	64.8	8.5
Y-Axis (SGn-SN) (°)	78.1	67.0	5.5
U1 - SN (°)	90.0	102.8	5.5
L1 Protrusion (L1-APo) (mm)	2.2	2.7	1.7
Y-Axis Length (mm)	130.2	131.0	6.0
Upper Lip to E-Plane (mm)	-5.3	-6.0	2.0
Lower Lip to E-Plane (mm)	0.1	-2.0	2.0
Wits Appraisal (mm)	6.3	-1.0	2.0
U1 - FH (°)	104.0	111.0	6.0
LFH (ANS-Me || FH) (%)	56.1	54.0	5.0
UFH (Na-ANS) (%)	43.9	46.0	5.0





CHRISTIE: Mid-Treatment

CHRISTIE - JAN 2013

Hi Everyone!

Just wanted to post another 4 month update. I can breathe better than ever now! My profile continues to improve! I am so happy!!! The dentist also let me know no metal braces!!!....just some invisalign! yay!!!

My dentist and his staff are awesome! Here is their link if you would like more information too!

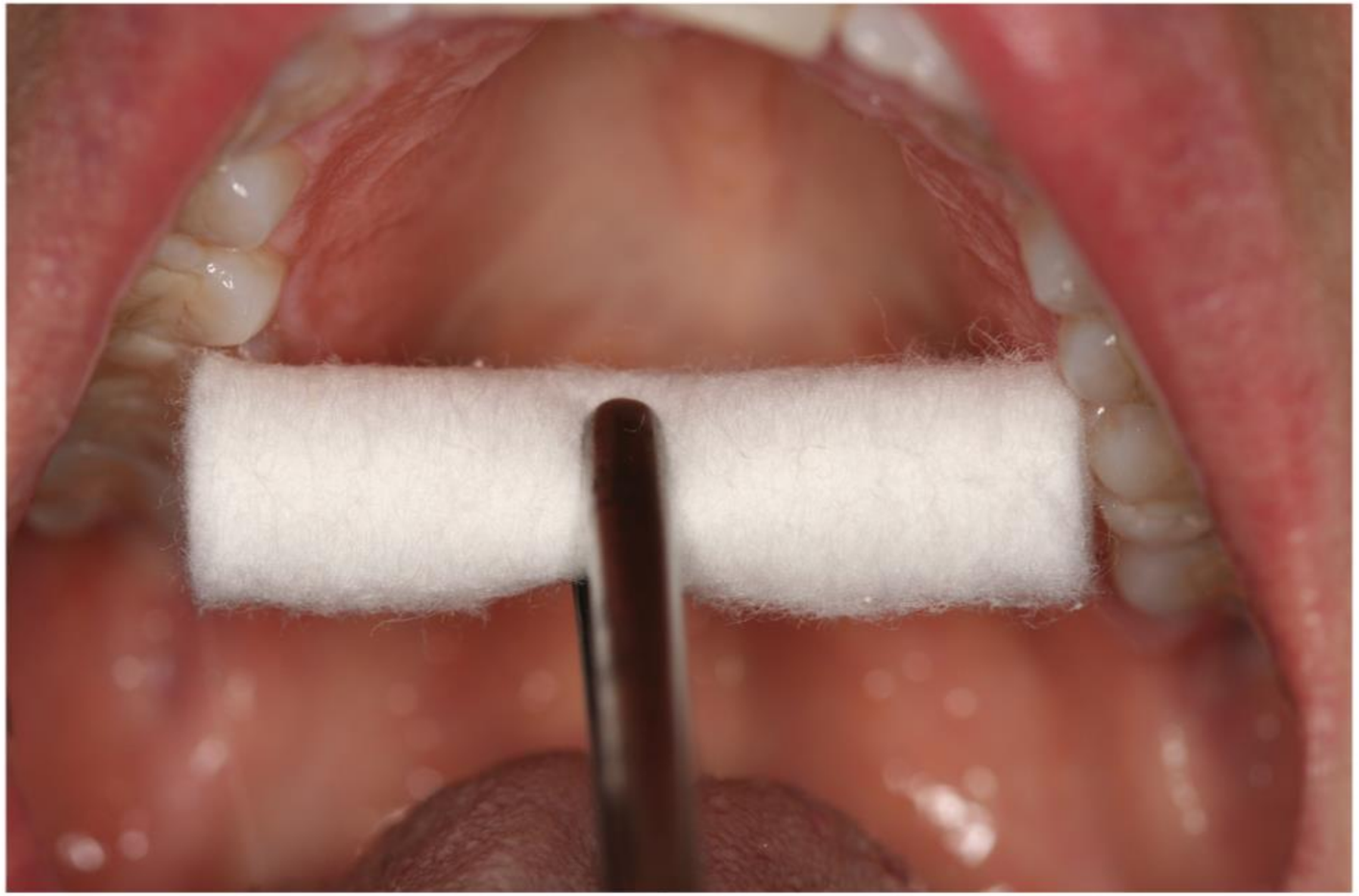
Dr. Jon W. Caulfield, D.D.S.
http://www.dentistinlittletonco.com

Posted by Christie at 2:00 PM 6 comments:

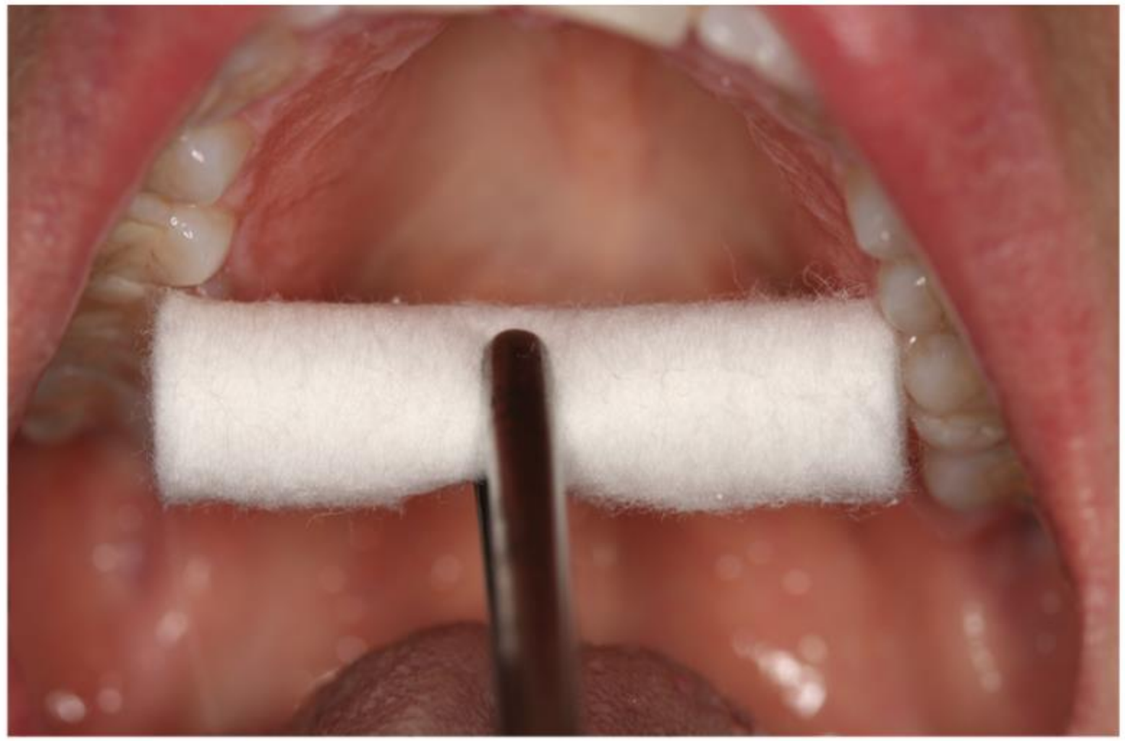
CHRISTIE - 9 MO

CHRISTIE - 9 MO

CHRISTIE - 9 MO



CHRISTIE - 9 MO

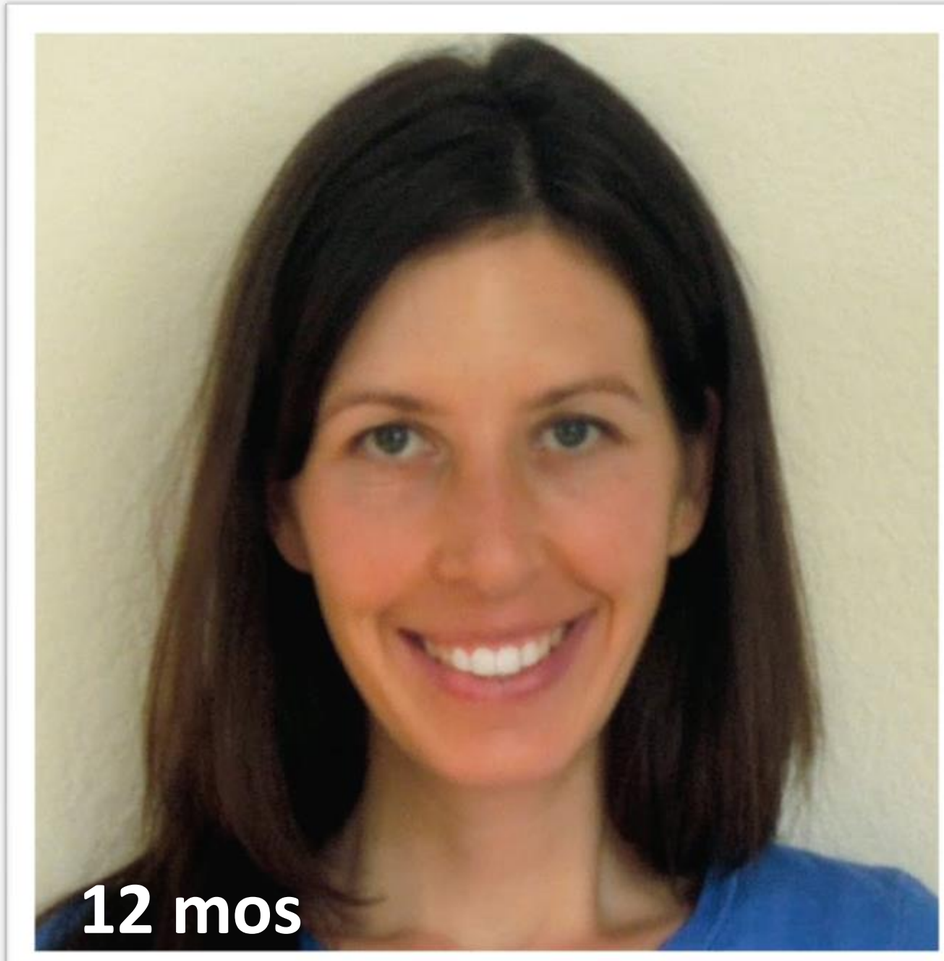


CHRISTIE - 9 MO

Vivos DNA (Daytime Nightime Appliance): FDA REGISTERED as a Class 1 appliance for palatal expansion

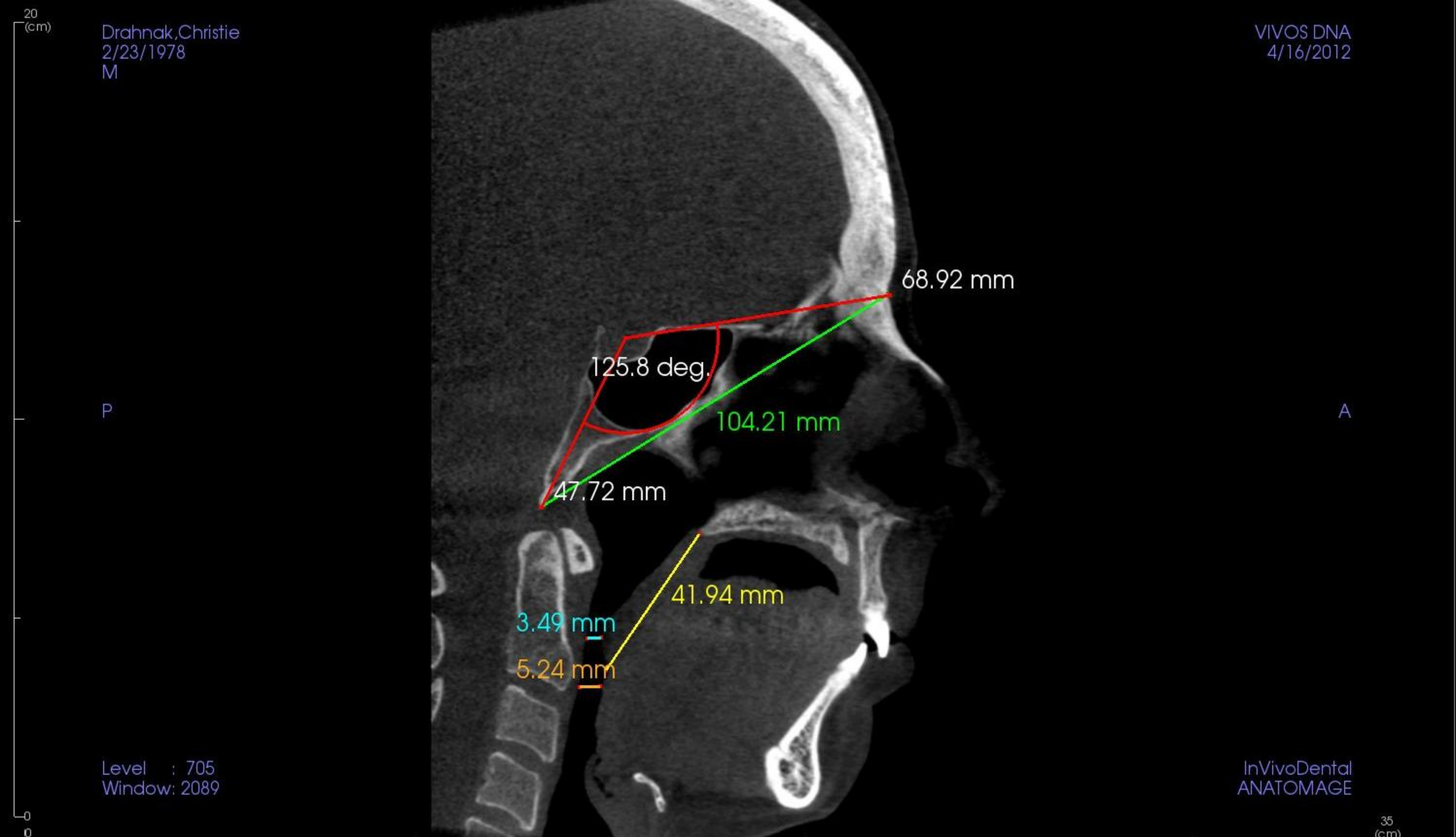
CHRISTIE – After Treatment

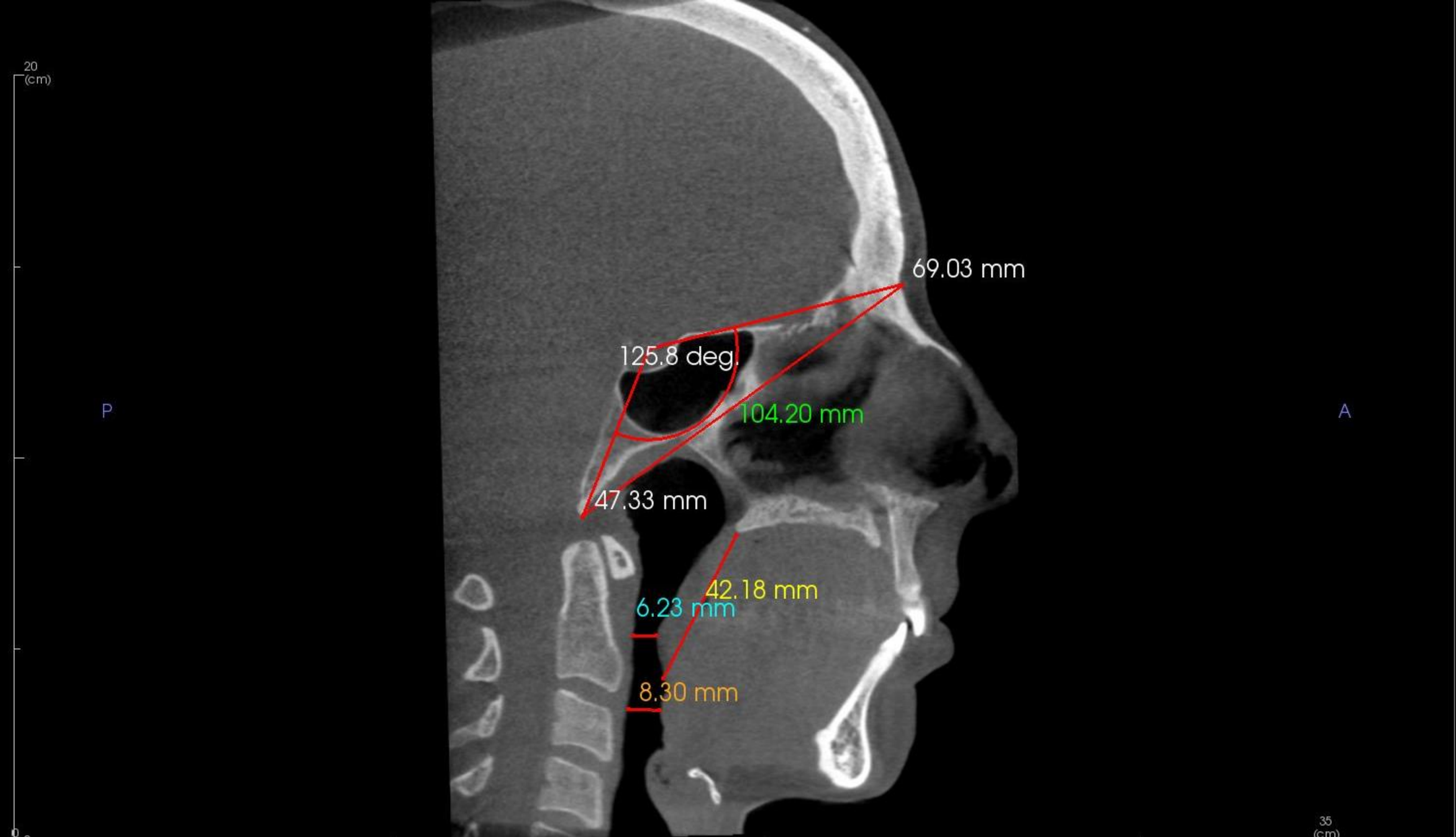
Before & After



CHRISTIE – after treatment

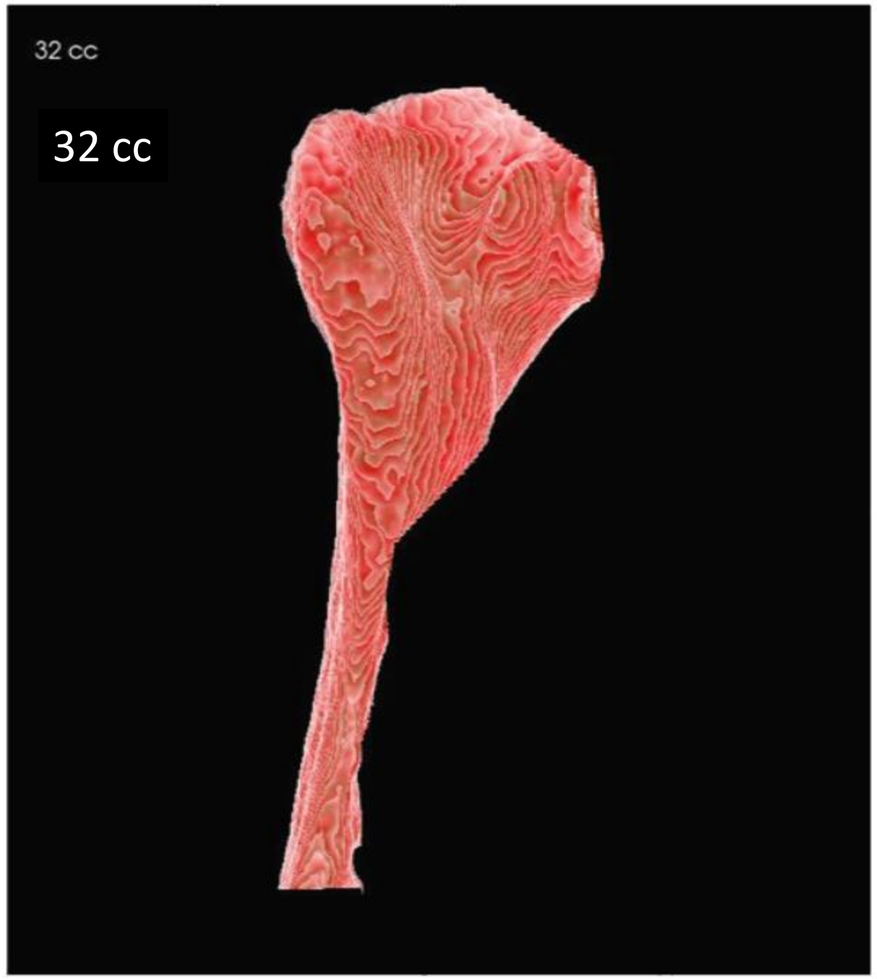
Before & After

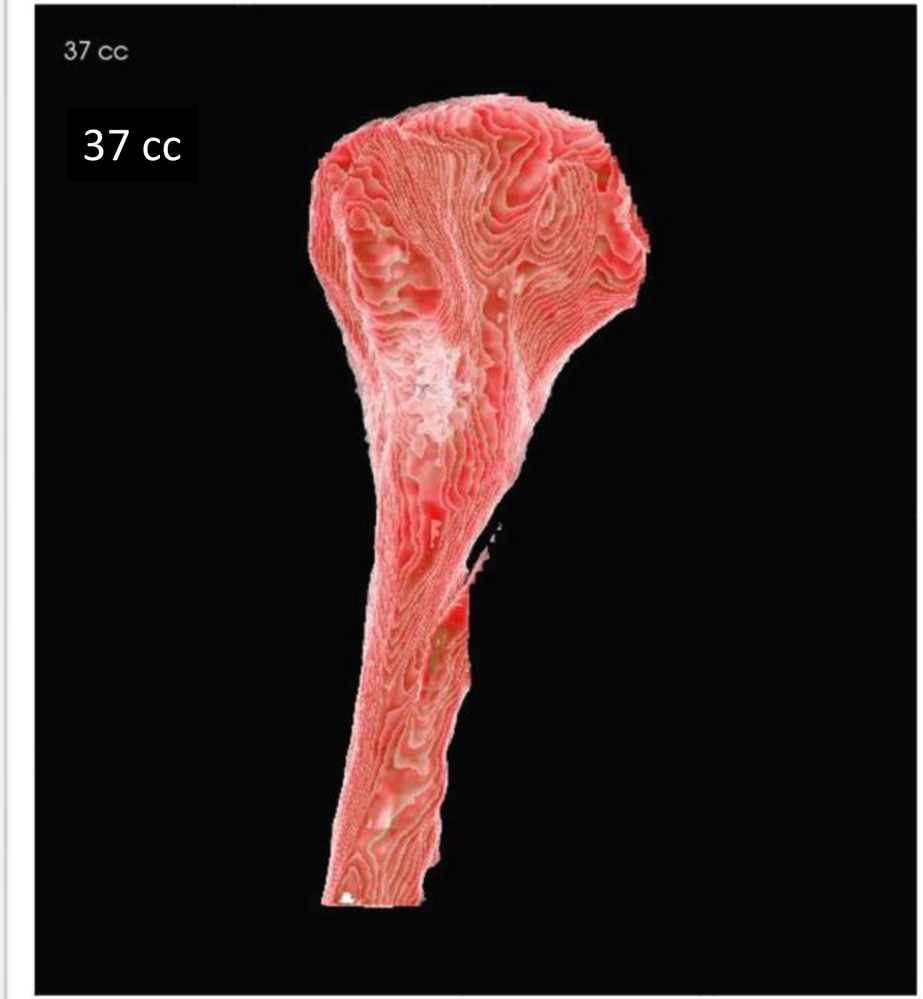

20
(cm)
Drahnak,Christie
2/23/1978
M
VIVOS DNA
4/16/2012
68.92 mm
125.8 deg.
104.21 mm
47.72 mm
41.94 mm
3.49 mm
5.24 mm
P
A
Level : 705
Window: 2089
InVivoDental
ANATOMAGE
0
0
35
(cm)


20
(cm)
P
A
69.03 mm
125.8 deg.
104.20 mm
47.33 mm
42.18 mm
6.23 mm
8.30 mm
35
(cm)


32 cc


37 cc


32 cc
32 cc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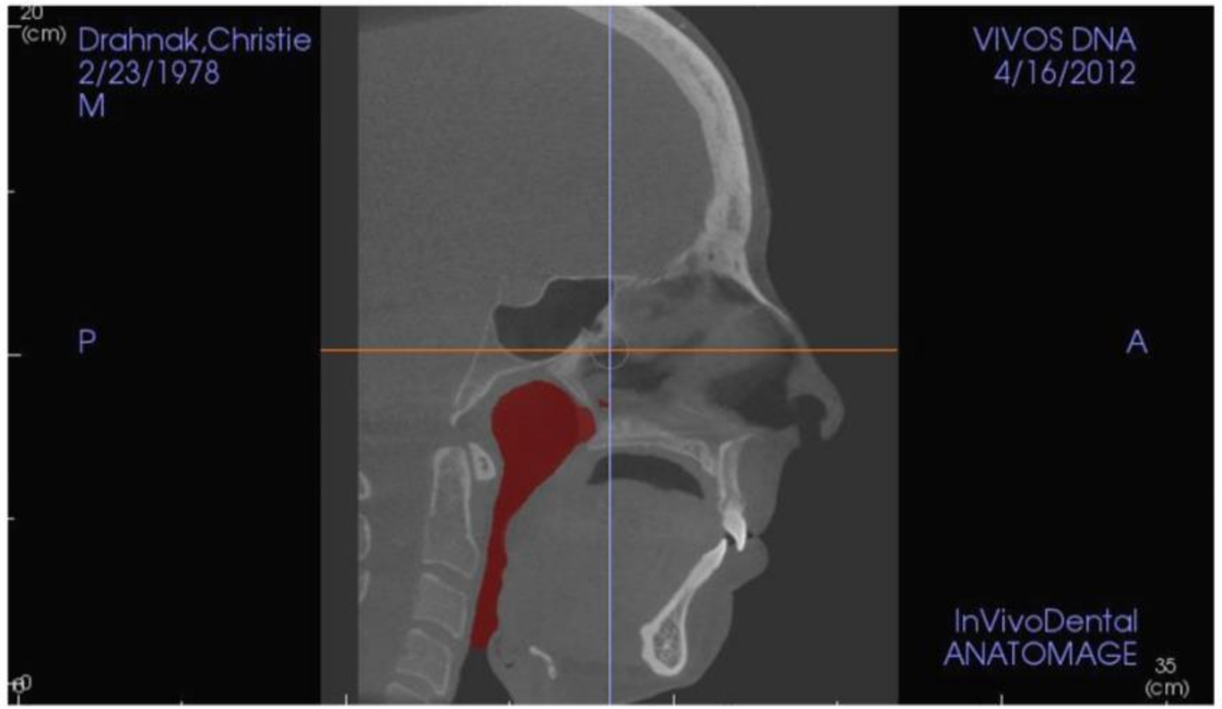
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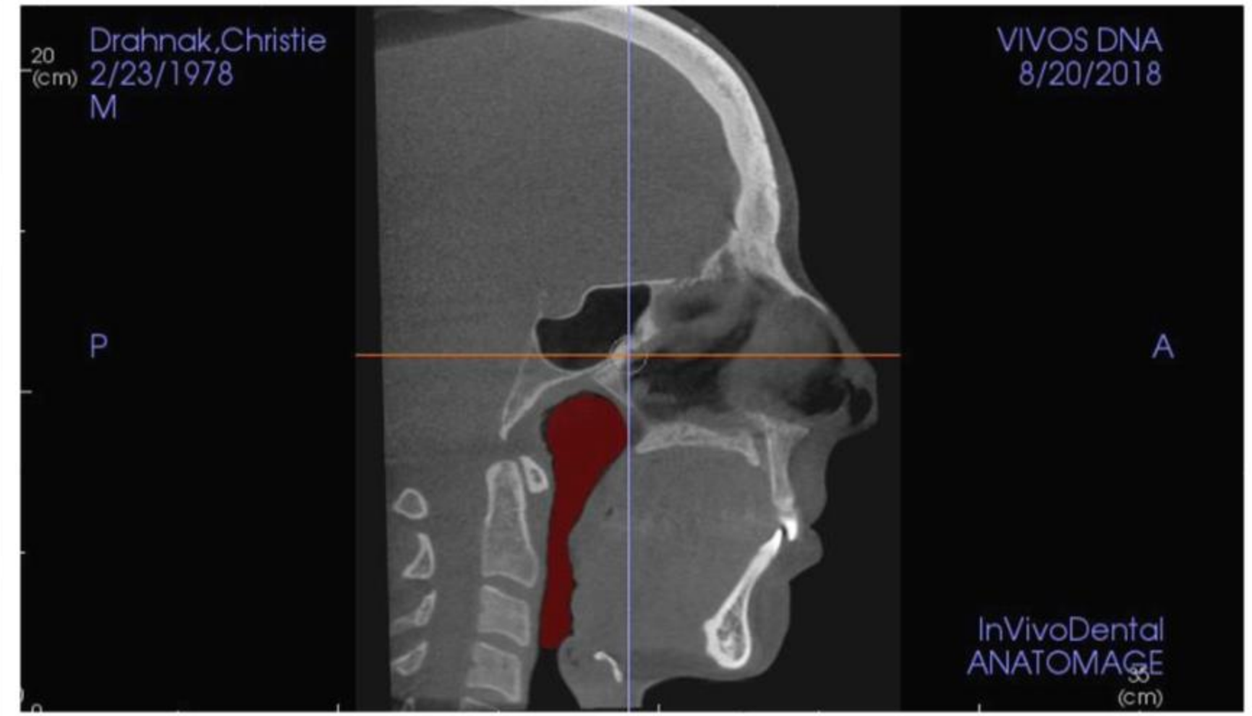
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(cm)
Drahnak,Christie
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VIVOS DNA
8/20/2018
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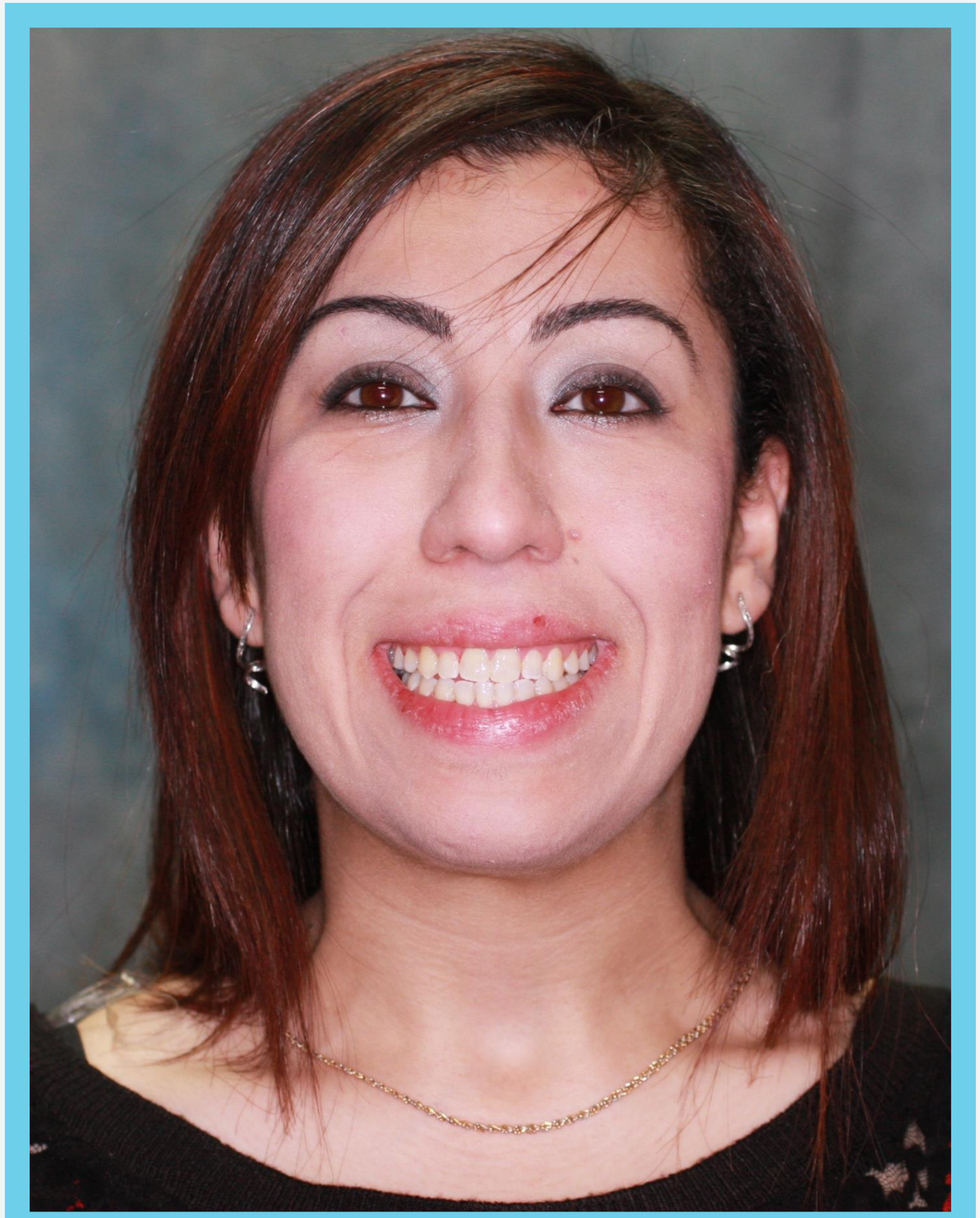
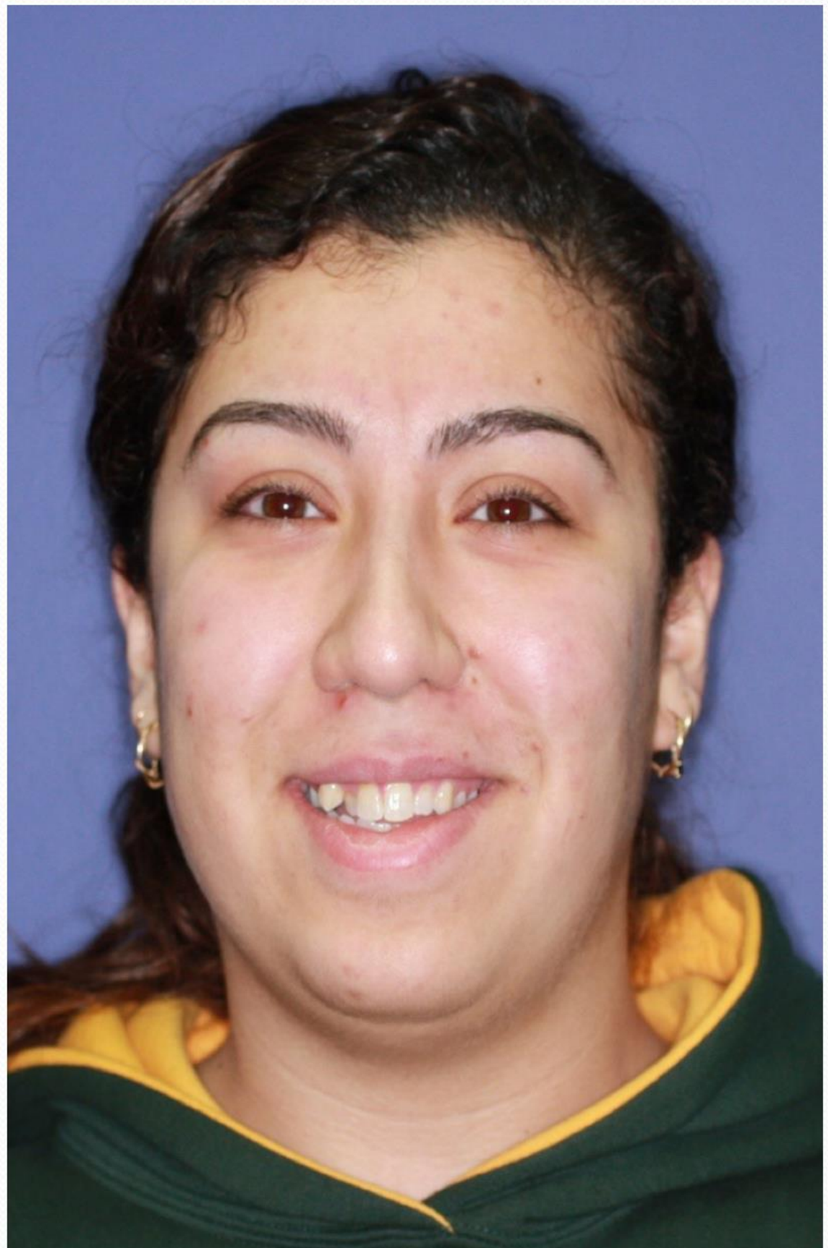


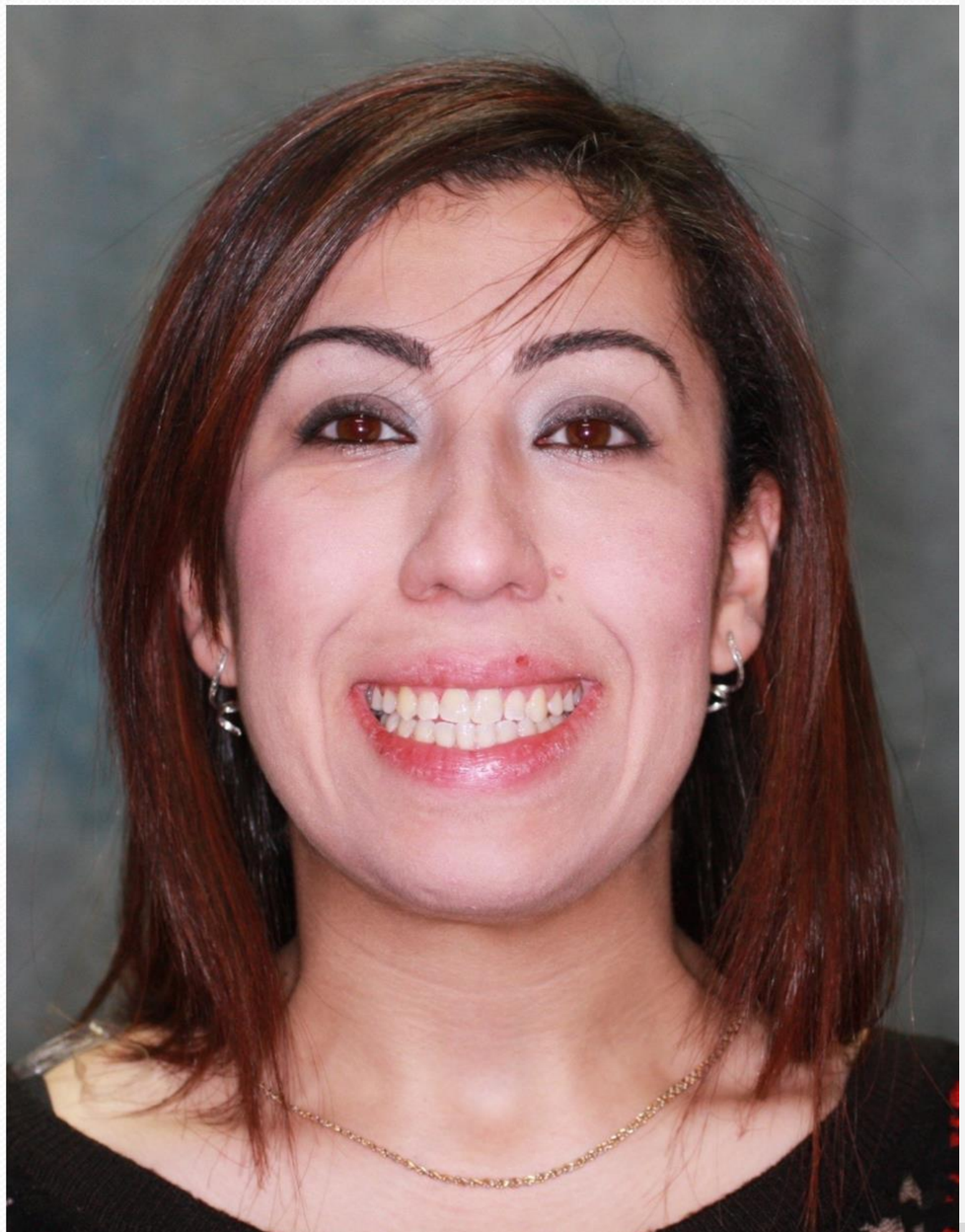
Case Study: Nada

Patient of Dr. Heit

craniofacial pain/crooked teeth

Example of Non-surgical procedure:
Courtesy: Dr Tammarie Heit, DDS





New Diagnosis

- Maxillary deficiency
- MDCB – mandibular discrepancy to the cranial base
- CMD – craniomandibular disorder
- Class 2 malocclusion
- TMJ disc disorder

Protocol

Sleep Study – Pre and Post Sleep Studies Show Validated Results

Treatment

- Schwartz appliance with NMO=didn't eliminate her pain
- DNA helped pain after 3 months of treatment.
- WHY?????

July 20, 2010 - start with DNA


UNIVERSITY OF
ALBERTA

Sept 28, 2010-2 months

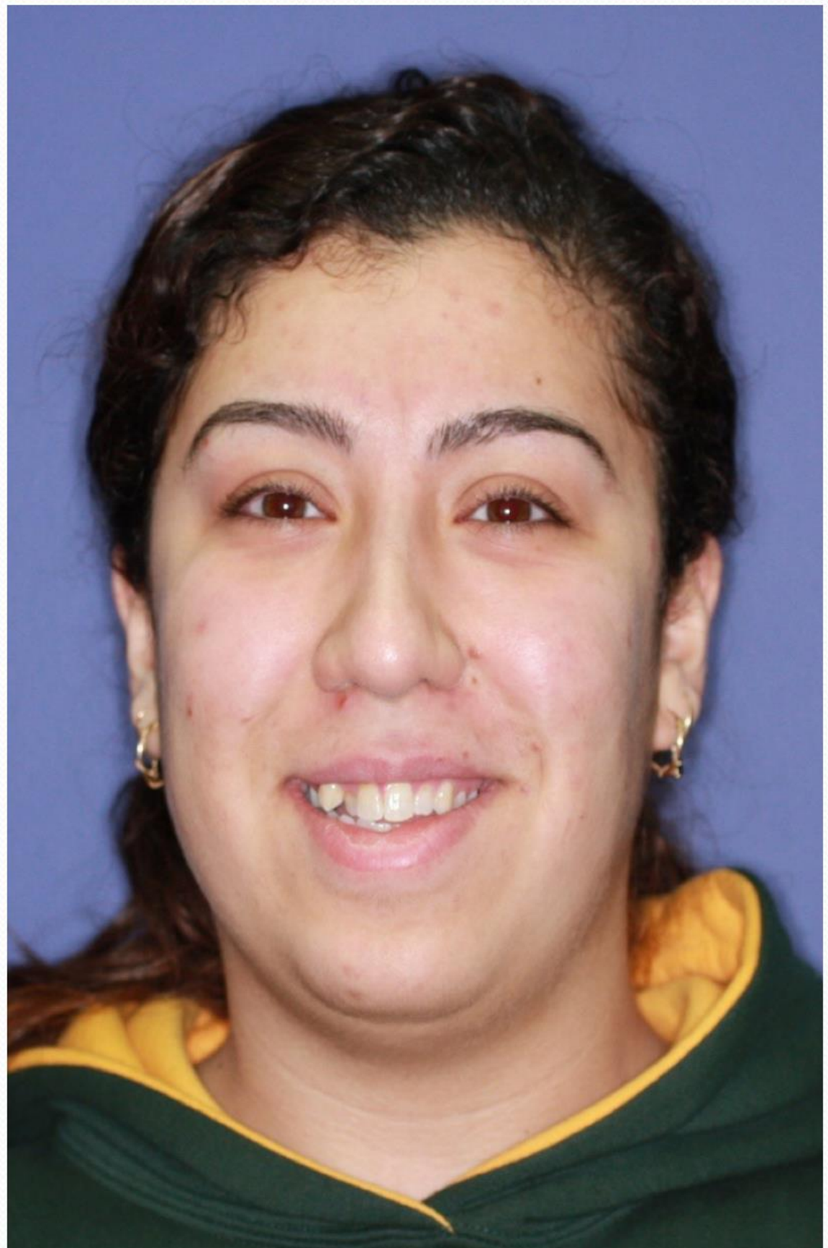
Feb 1, 2011- 7 months

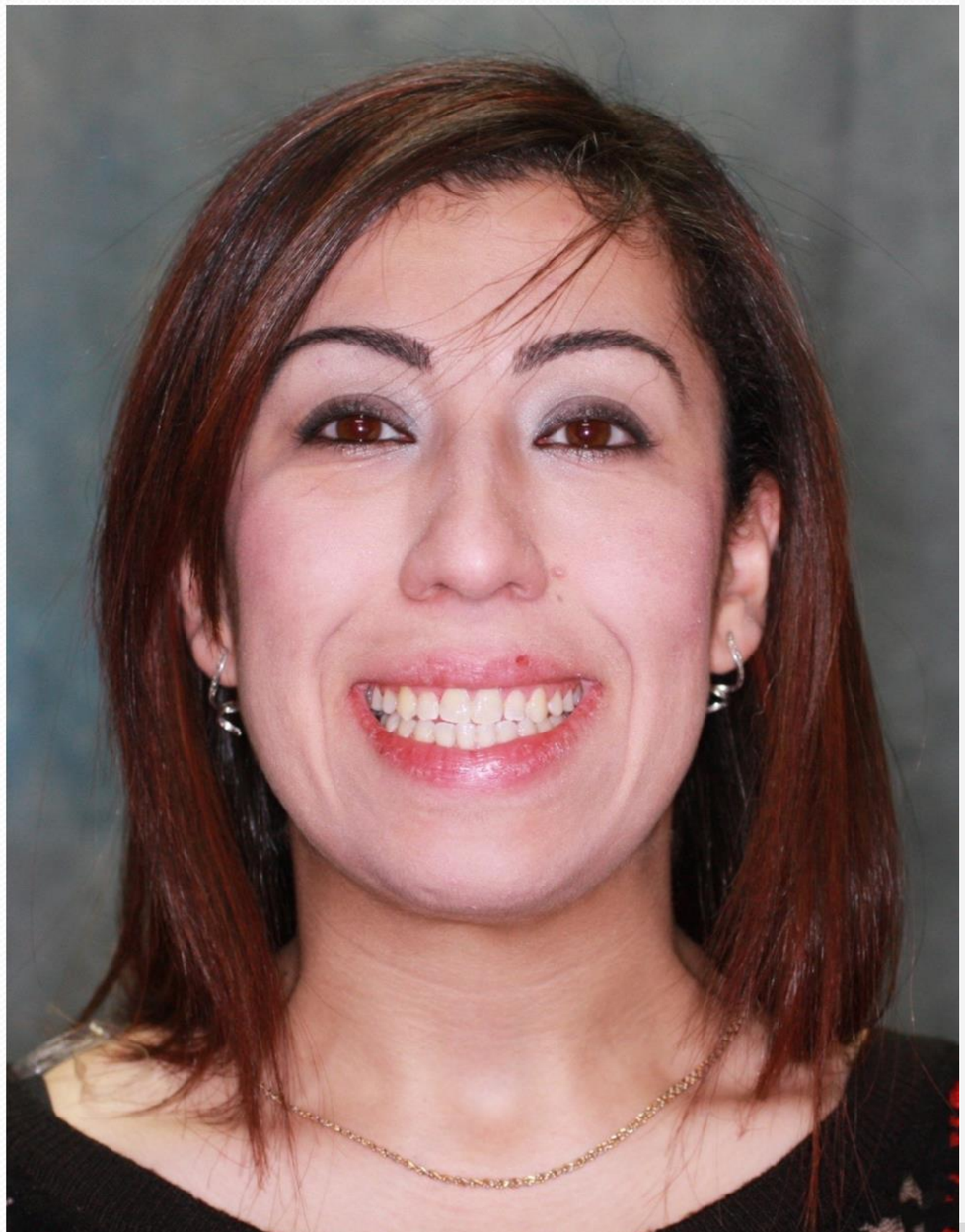
Nov 7, 2011 - 16 months

Full Banding Jan 10, 2019 – 18 months

May 9, 2013-16 months (me)

Example of Non-surgical procedure:
Courtesy: Dr Tammarie Heit, DDS





THANK YOU!

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