Unit A: Diagnostic Procedures

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Orthodontic Seminar

- Part 1. Malocclusion: what is it and why should we treat it?
- Part 2. The etiology of malocclusion

Part 1. Malocclusion: what is it and why should we treat it?

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Be sure that you are able to:

1. Describe ideal occlusion in terms of the relationship of the teeth to the line of occlusion.
2. Describe ideal occlusion in terms of the occlusal relationship of the teeth in all three planes of space (transverse, antero-posterior and vertical).
3. List the dental characteristics on which the Angle classification is based.
4. Discuss the advantages of the Angle system for classification.
5. Describe the functional, health and psychosocial reasons for orthodontic treatment, and place them in perspective in terms of their relative importance.
6. Describe realistic goals for orthodontic treatment, and indicate the way they have changed as modern dentistry developed.
7. Discuss how need for orthodontic treatment compares with demand in the US at present and how demand is likely to change in the near future.

Describe ideal occlusion in terms of the relationship of the teeth to the line of occlusion.

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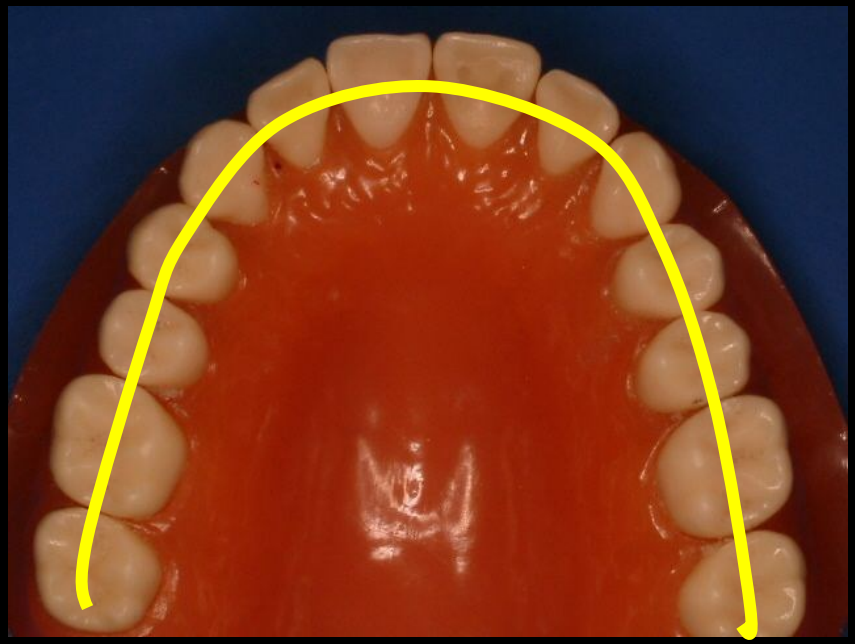
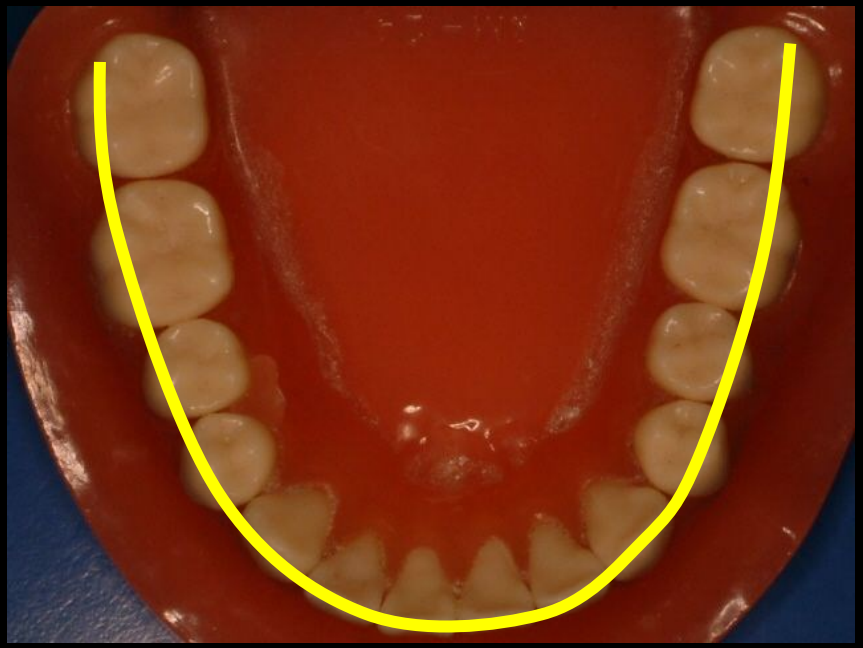
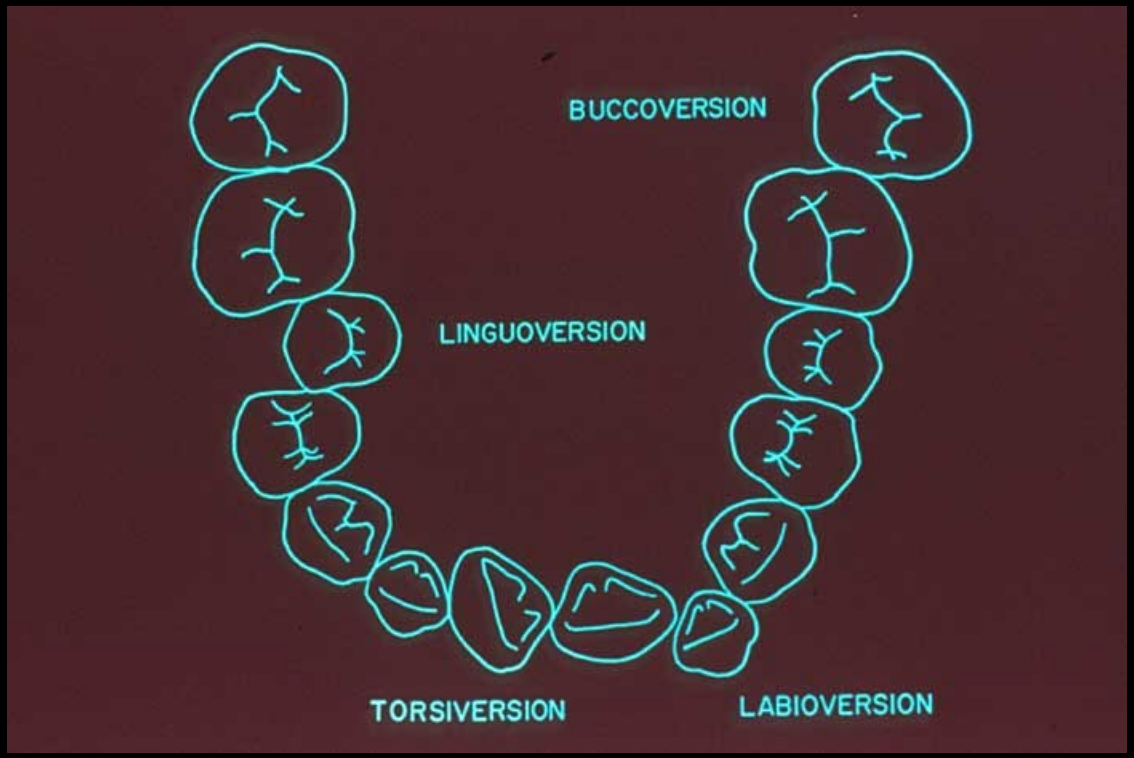
Upper line of occlusion



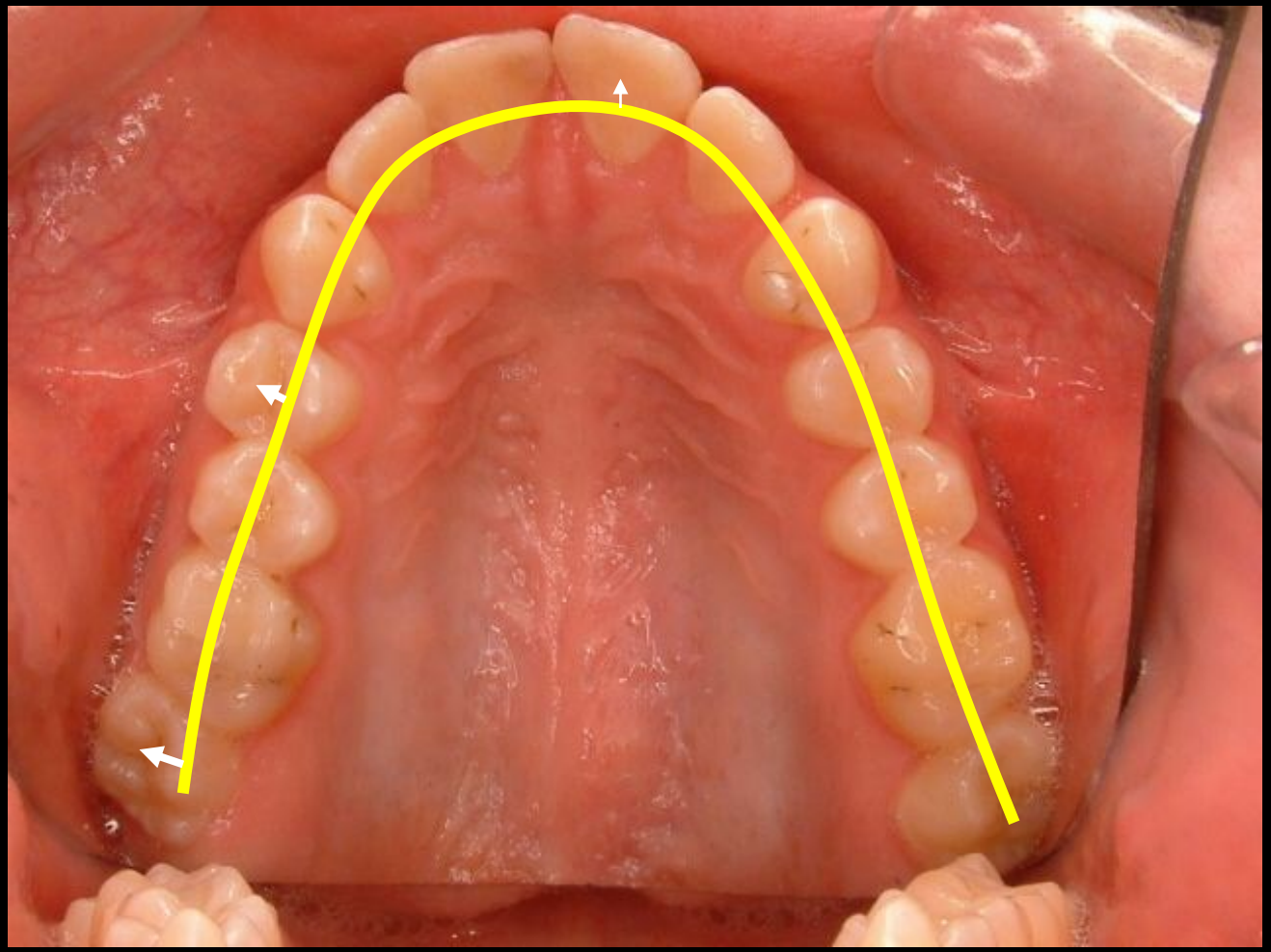
Lower line of occlusion



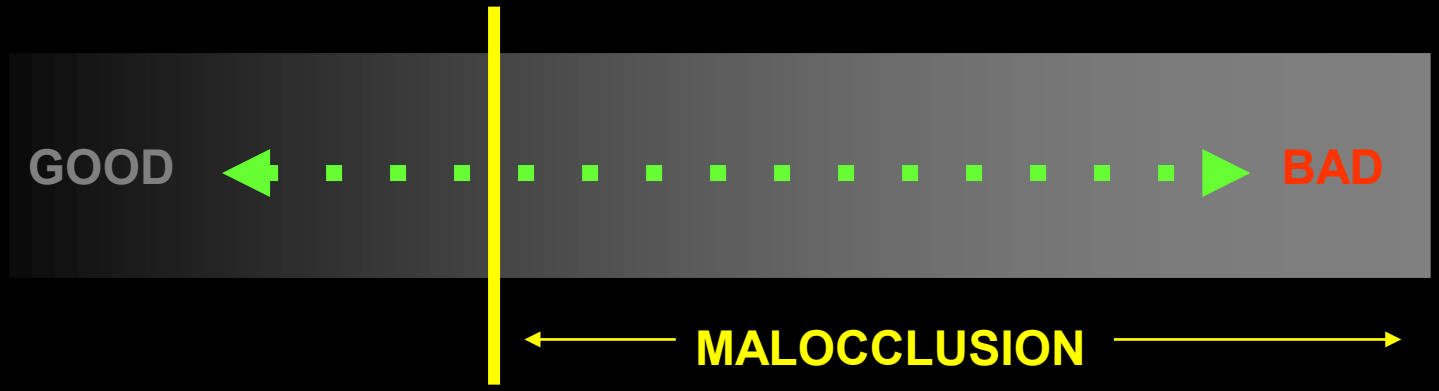
Angle described deviations from the line of occlusion

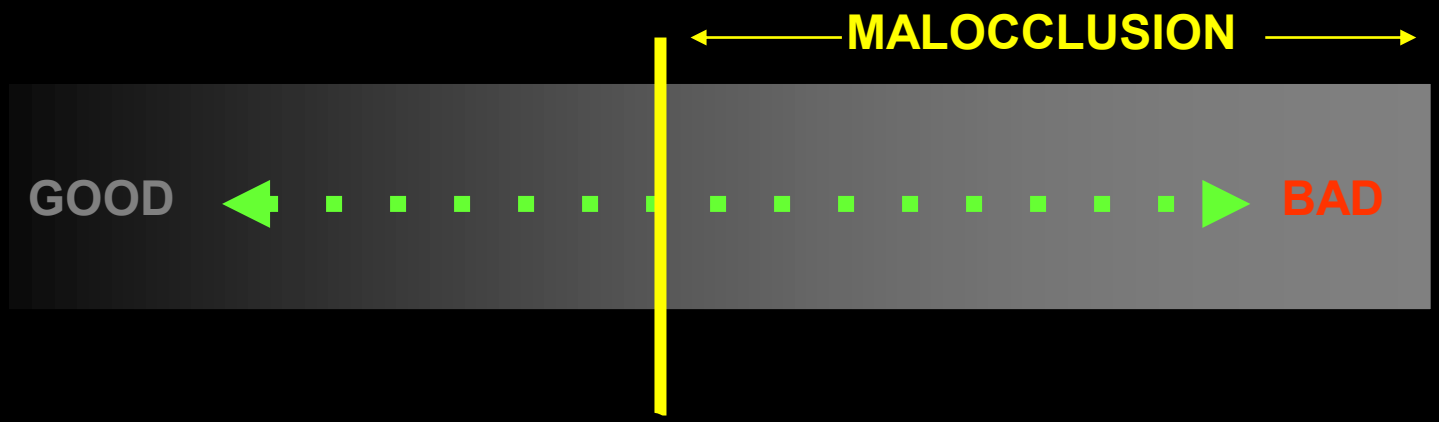


Normal?

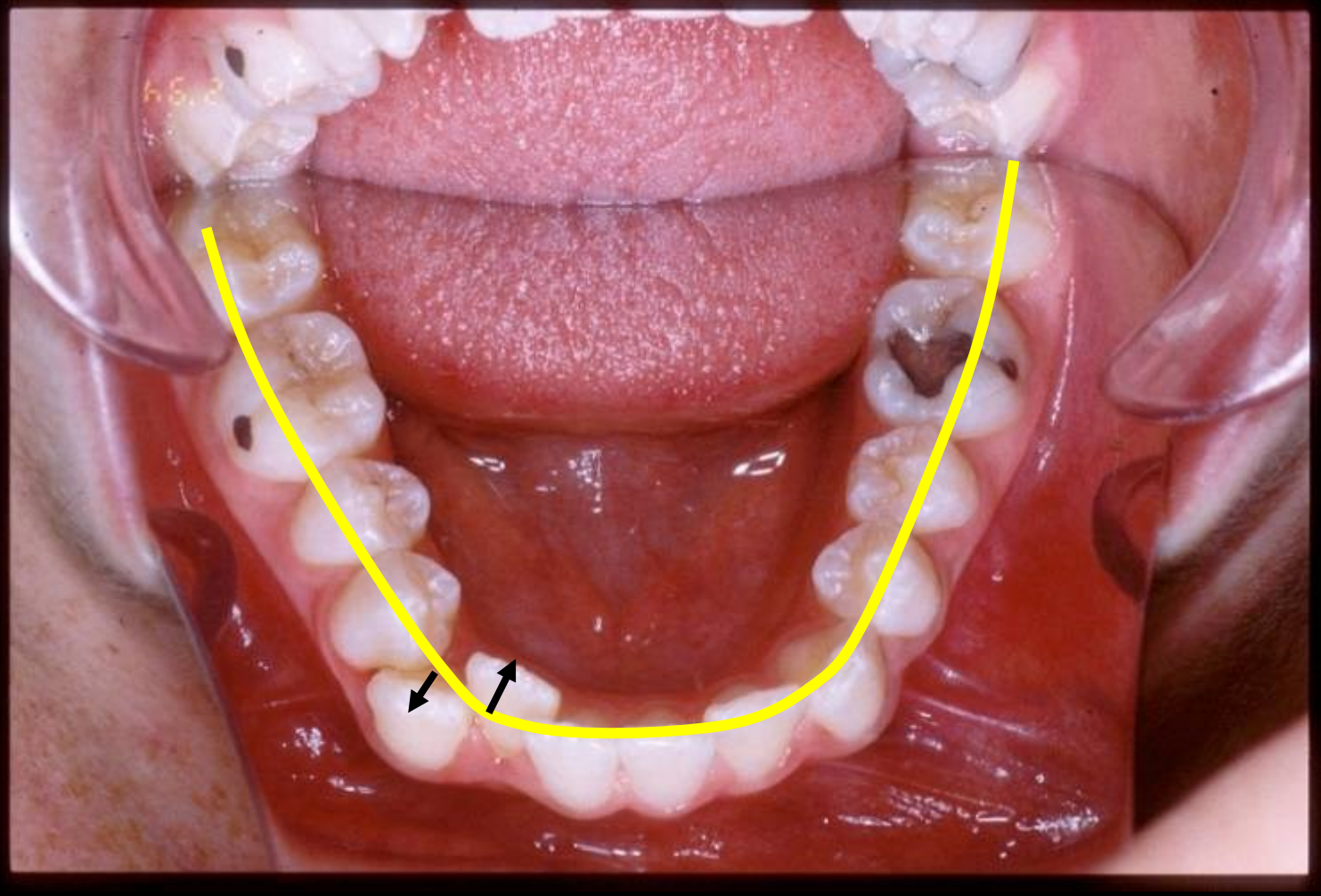


OR
IS IT RANGE WHERE VALUES DICTATE THE CUT-OFF?

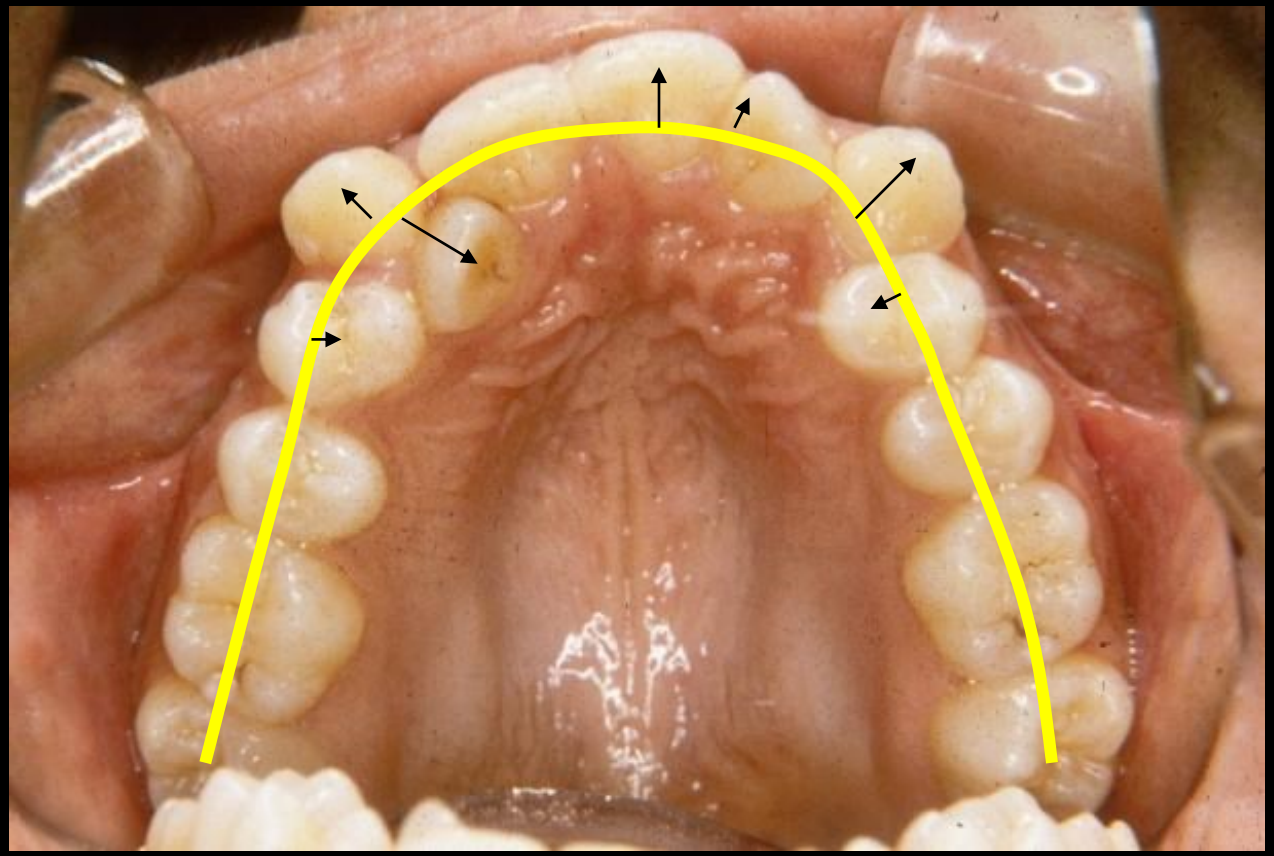




Normal?



Normal?



Describe ideal occlusion in terms of the occlusal relationship of the teeth in all three planes of space (transverse, antero-posterior and vertical).

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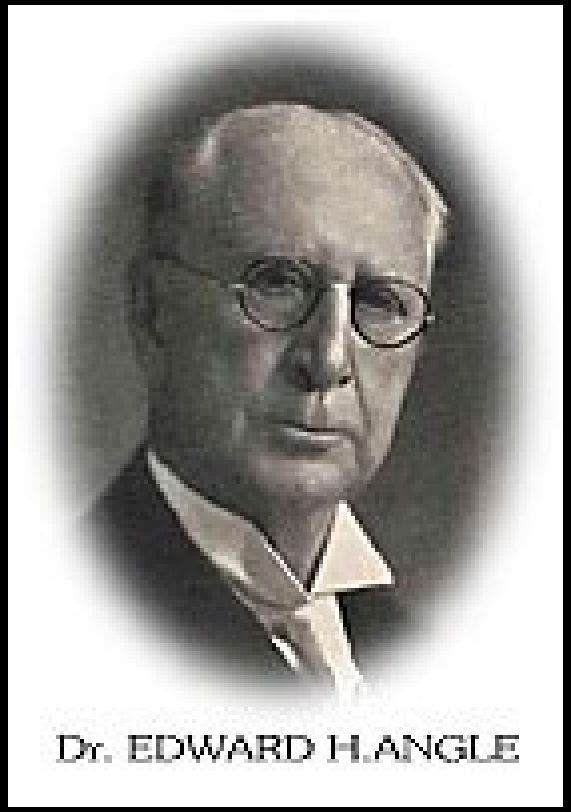
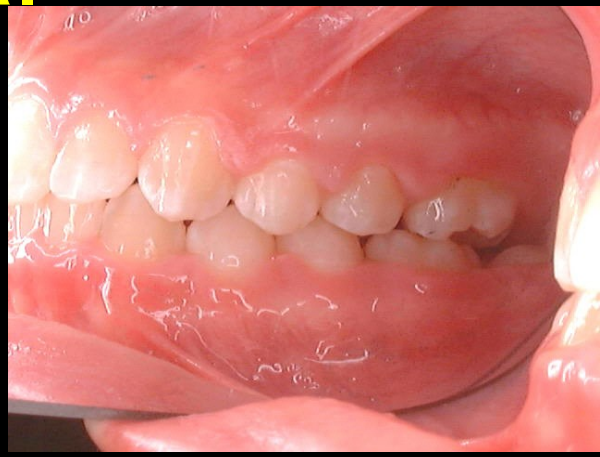
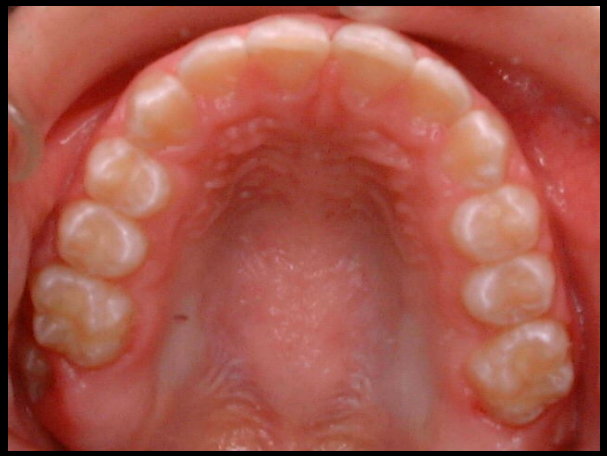
DR. EDWARD H. ANGLE



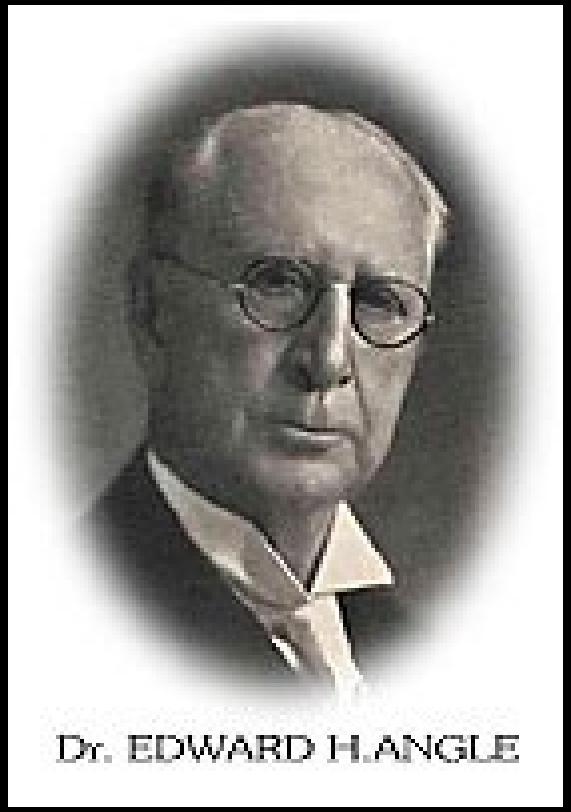
Class 1 Normal

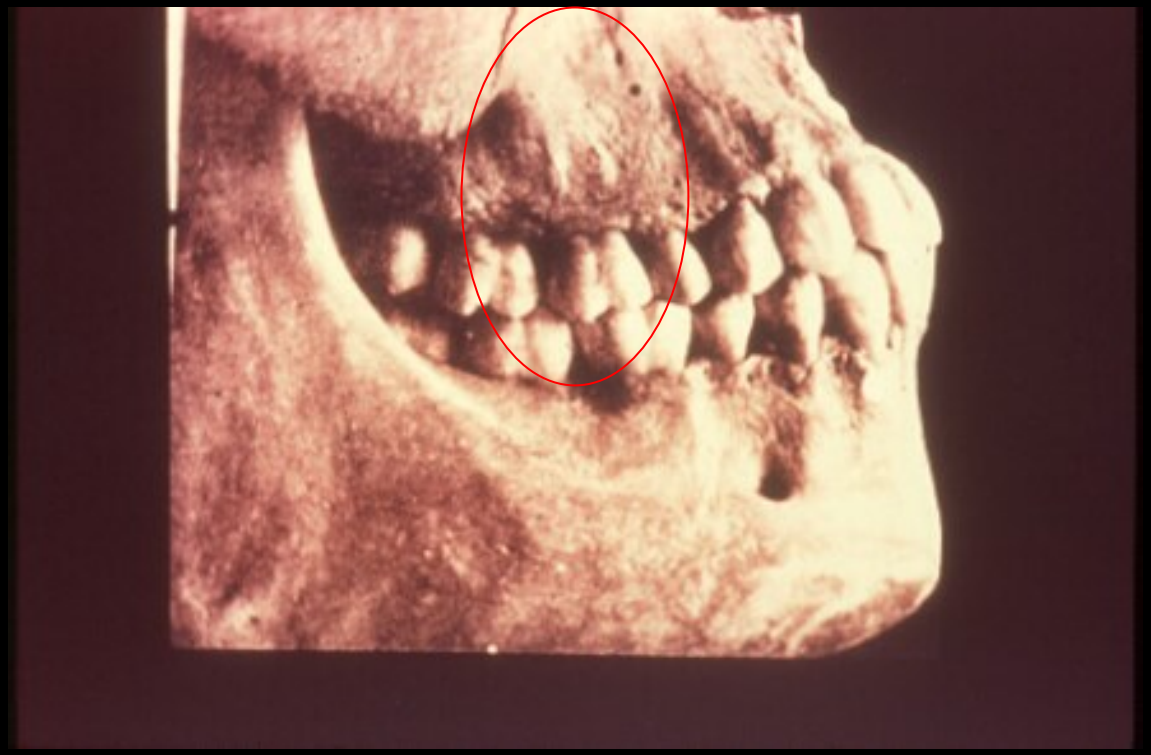




- List the dental characteristics on which the Angle classification is based.

DR. EDWARD H. ANGLE

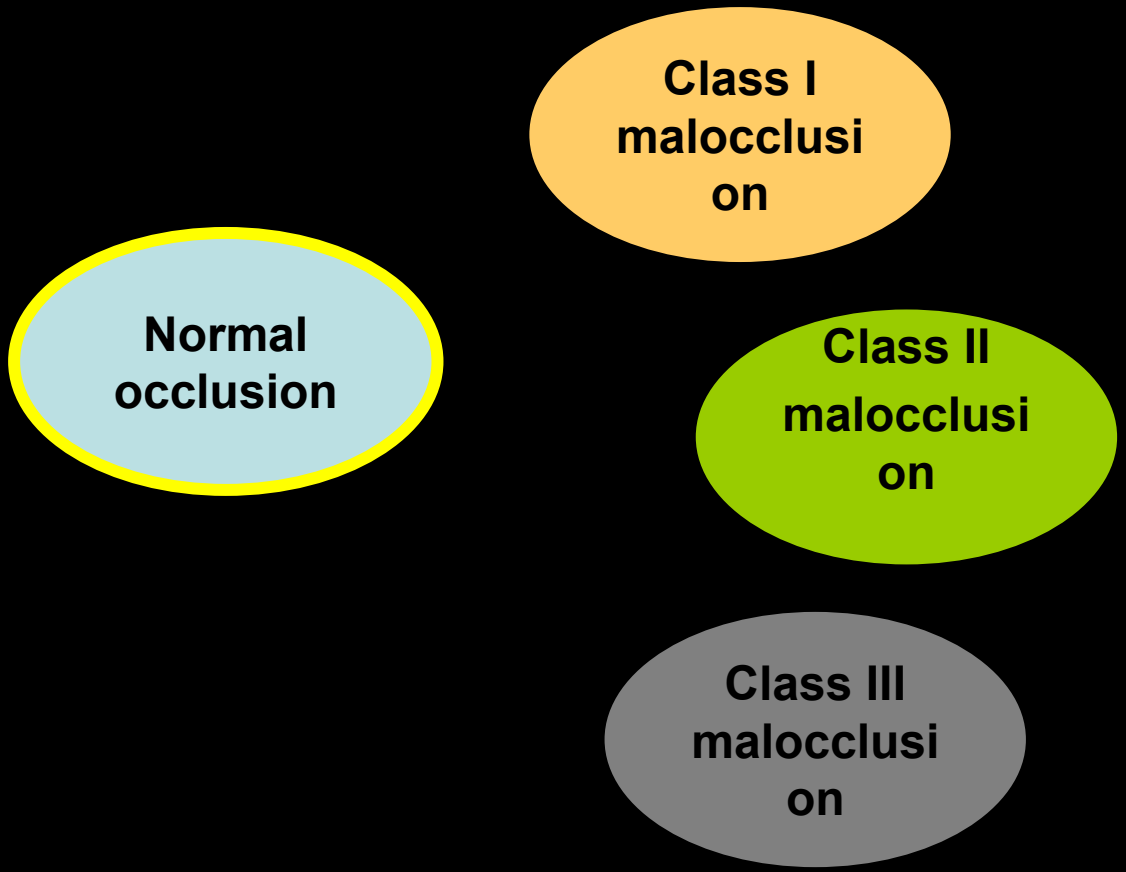




Zygomatic arch

Angle classified the occlusal relationships of the teeth. His classification had four parts.

-



- Discuss the advantages of the Angle system for classification.

- Describe the functional, health and psychosocial reasons for orthodontic treatment, and place them in perspective in terms of their relative importance.

Why do orthodontics?

1. **Reduce psychosocial handicap**

2. **Improve oral function**

3. **Adjunct to disease control**
   - **not to treat disease**

- Describe realistic goals for orthodontic treatment, and indicate the way they have changed as modern dentistry developed.

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Angle vs Soft Tissue Paradigm: A New Way of Looking at Treatment Goals

Angle paradigm	Soft tissue paradigm
Primary goal of treatment:	
ideal dental occlusion	ideal soft tissue proportions and adaptation

Angle vs Soft Tissue Paradigm: A New Way of Looking at Treatment Goals

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Secondary goal of treatment:	
jaw relationships	functional occlusion

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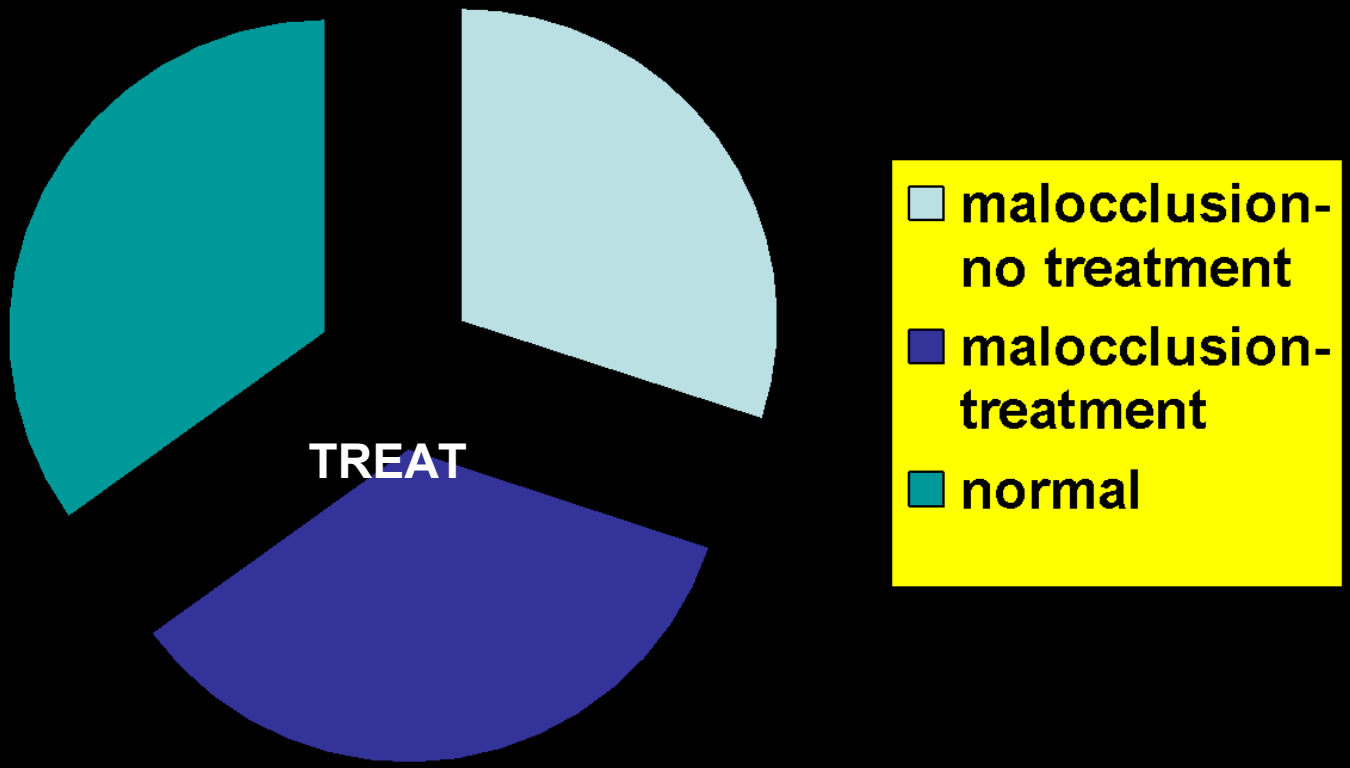
Angle paradigm	Soft tissue paradigm
Primary goal of treatment:	
dental occlusion	soft tissue proportions and adaptation
Secondary goal of treatment:	
jaw relationships	functional occlusion
Hard vs soft tissue relationship:	
ideal skeletal/dental produces ideal soft tissue	ideal soft tissue defines ideal skeletal/dental

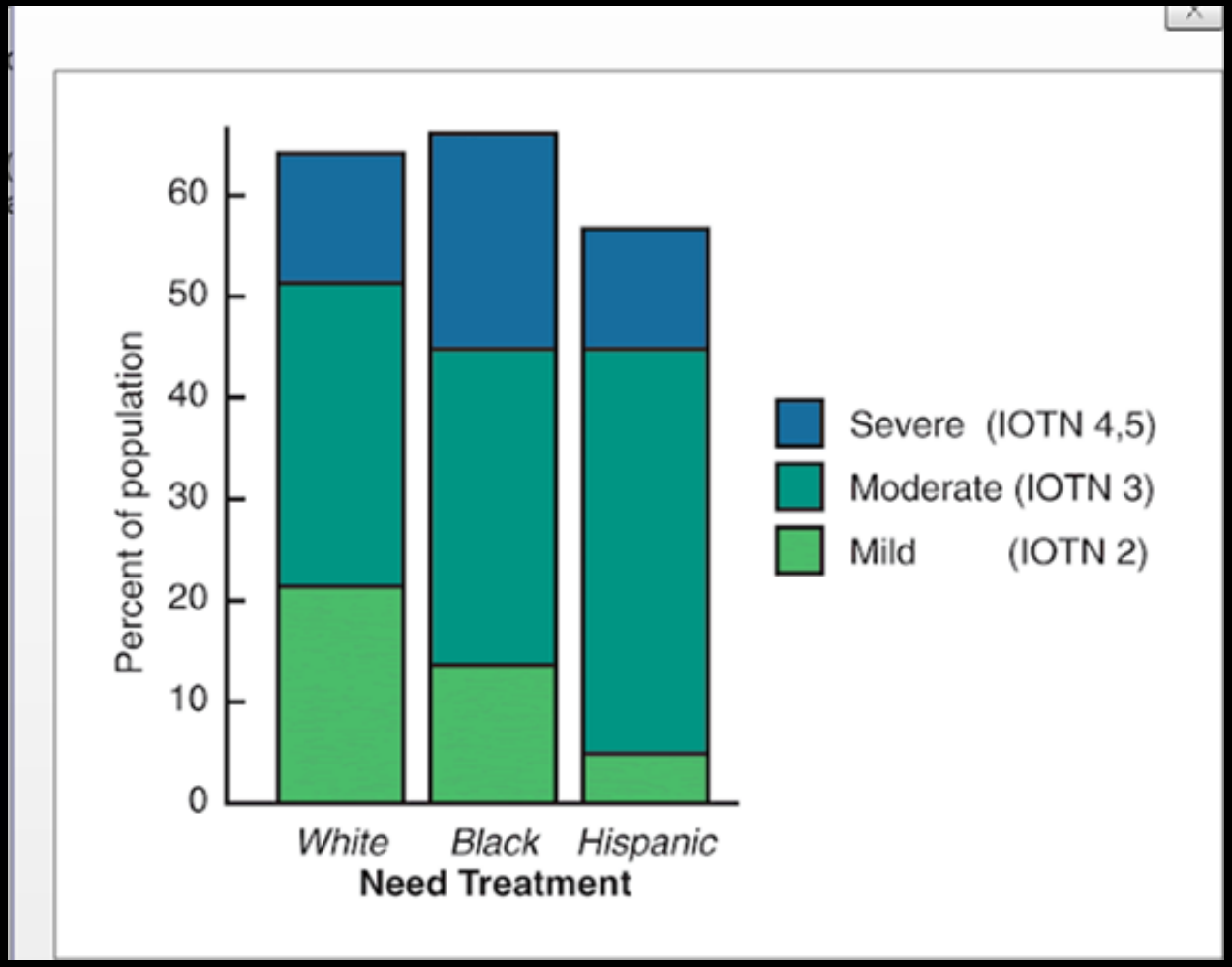
Angle vs Soft Tissue Paradigm: A New Way of Looking at Treatment Goals

Angle paradigm	Soft tissue paradigm
Diagnostic emphasis:	
dental casts, cephalometric x-rays	clinical examination of soft tissues
Treatment approach:	
obtain ideal dental and skeletal relationships, and the soft tissues will be OK	determine ideal soft tissue relationships, and then place the jaws and teeth as needed to obtain them

- Discuss how need for orthodontic treatment compares with demand in the US at present and how demand is likely to change in the near future.

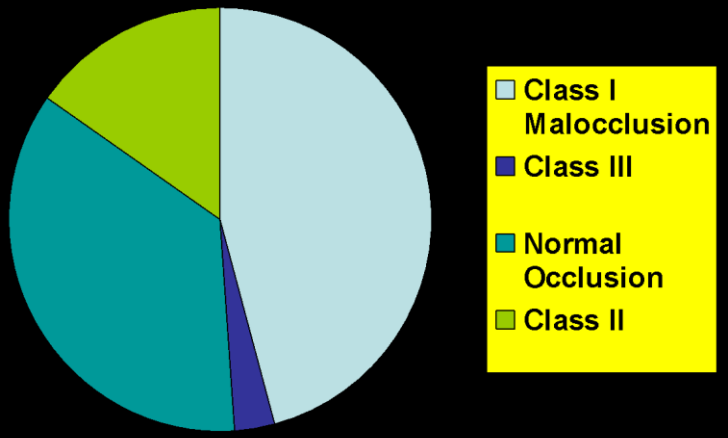
TREATMENT


TREAT
malocclusion-no treatment
malocclusion-treatment
normal


Percent of population
60
50
40
30
20
10
0
White
Black
Hispanic
Need Treatment
Severe (IOTN 4,5)
Moderate (IOTN 3)
Mild (IOTN 2)

Who seeks orthodontic treatment?

- 65% have malocclusion
- Dentists feel that 55% need treatment
- Patients feel that 35% need treatment



Do lay people not recognize problems OR do they place different values on the benefits of treatment?

In fact lay people can discriminate between good and bad teeth. It is simply that they place different value on the treatment to address the problem.

But who gets treatment?

Range 5-40%

many factors influence this decision

socioeconomic?

Increasing adult demands

- Job advancement
- Need to “trade up”

Would benefit from treatment

- Dentists 55%
- Lay people 35%
- Would accept-no cost 50%

Treatment

- 55% Need treatment
- 50% Accept treatment at no cost
- 5% Wouldn’t accept treatment
  - » Even if it was free

Summary

- Malocclusion is defined as a deviation of the line of occlusion or it may be a deviation in the way the teeth relate
- Malocclusion is more prevalent than normal occlusion
- Most malocclusion is dental crowding-but 15% have a skeletal problem

Part 2. The etiology of malocclusion

- Describe known causes of malocclusion in terms of major categories, and put the known causes in perspective relative to the total number of patients with malocclusion.
- Indicate the two types of malocclusion most likely to be due to inherited jaw proportions, and describe the evidence to support your categorization.
- Indicate the mechanism by which trauma to the mandible can affect its future growth.
- Identify the magnitude of force needed to cause movement of a tooth, and relate this to the observed threshold for tooth movement.
- Identify the duration of force needed to cause movement of a tooth, and relate this to the impact of habits like thumb sucking on the dentition.
- Describe the maturation of oral function from infancy to adult life, with particular emphasis on the pattern of swallow.
- Discuss myofunctional therapy for tongue thrusting as a potential therapy for anterior open bite in children, with emphasis on its underlying assumptions and their validity.
- Describe the possible role of nasal obstruction in the etiology of malocclusion, and indicate the probable mechanism by which it would have an effect.

- Describe known causes of malocclusion in terms of major categories, and put the known causes in perspective relative to the total number of patients with malocclusion.

- Hereditary factors
- Interference with normal development
- Trauma
- Disturbance with normal function

CAUSES OF MALOCCLUSION

1. Facial form and congenital anomalies

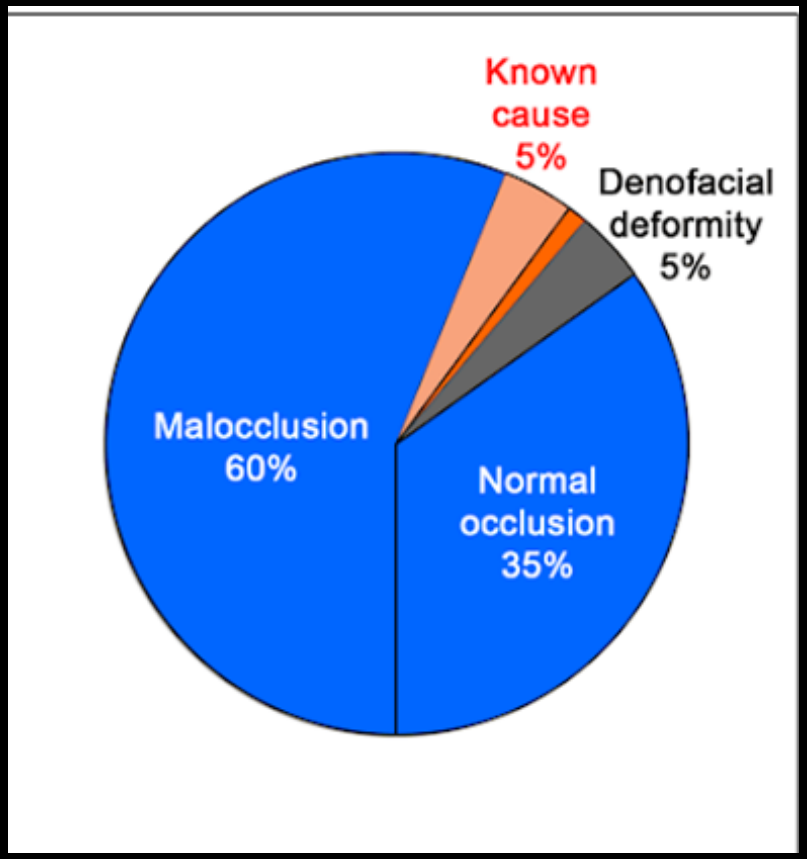
2. Postnatal Growth Disturbances

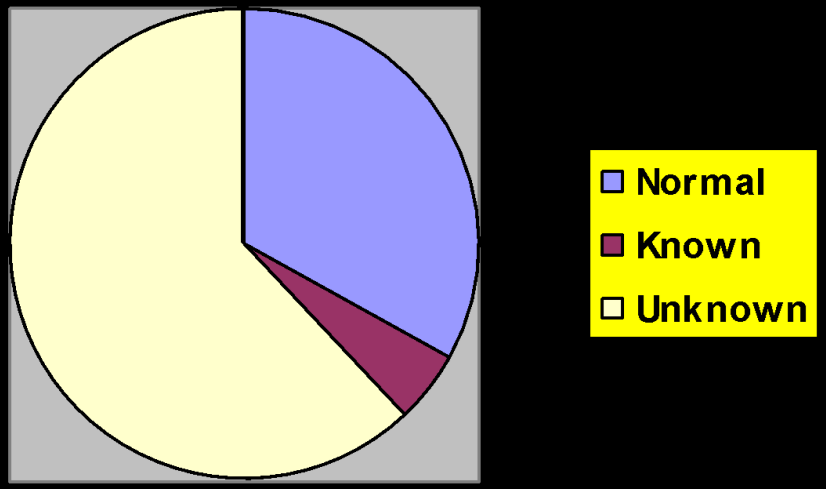
3. Inherited Facial Disproportions

4. Environmental Causes

AETIOLOGY OF MALOCCLUSION

- 5% KNOWN – THE REST-UNKNOWN



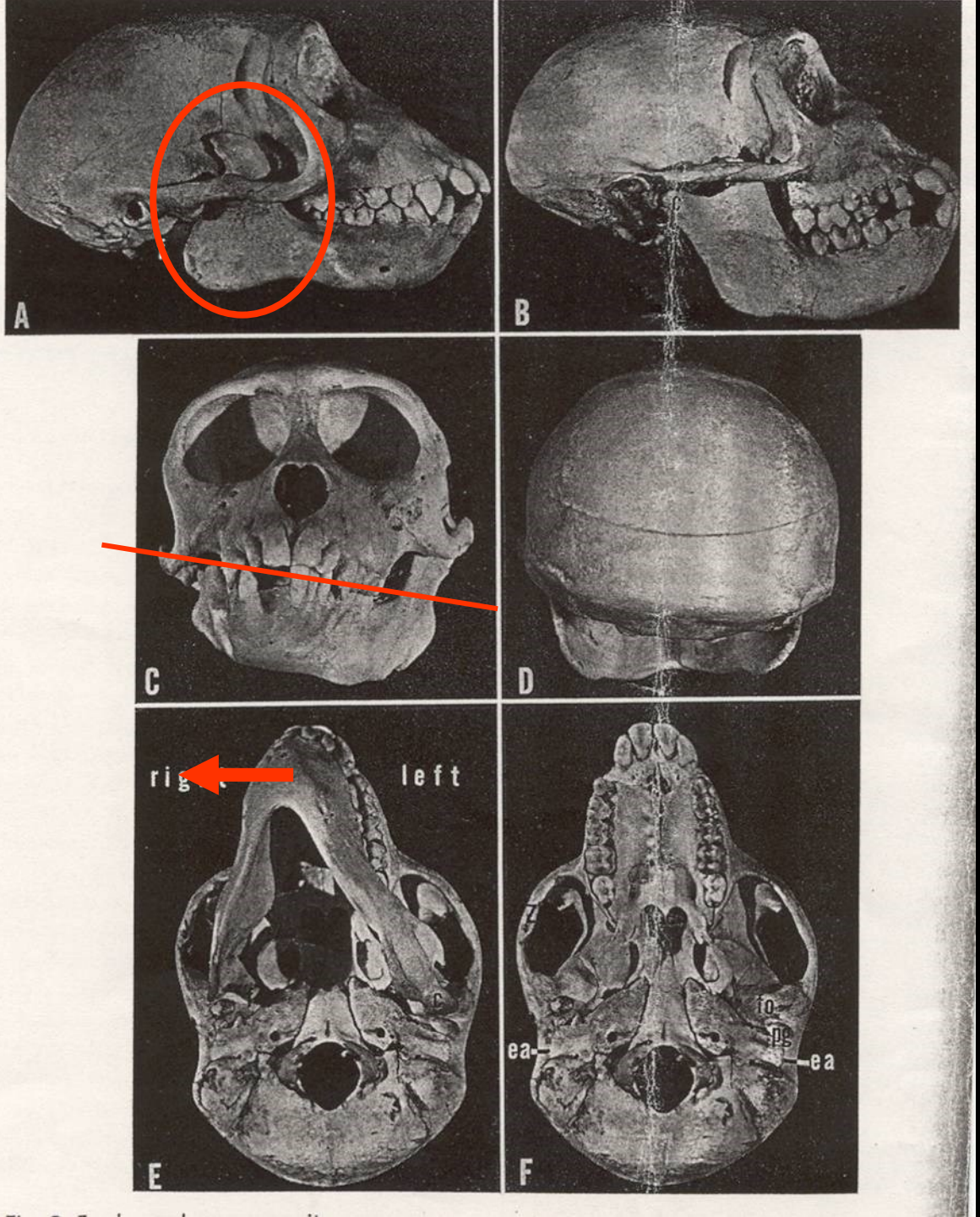


- Indicate the two types of malocclusion most likely to be due to inherited jaw proportions, and describe the evidence to support your categorization.

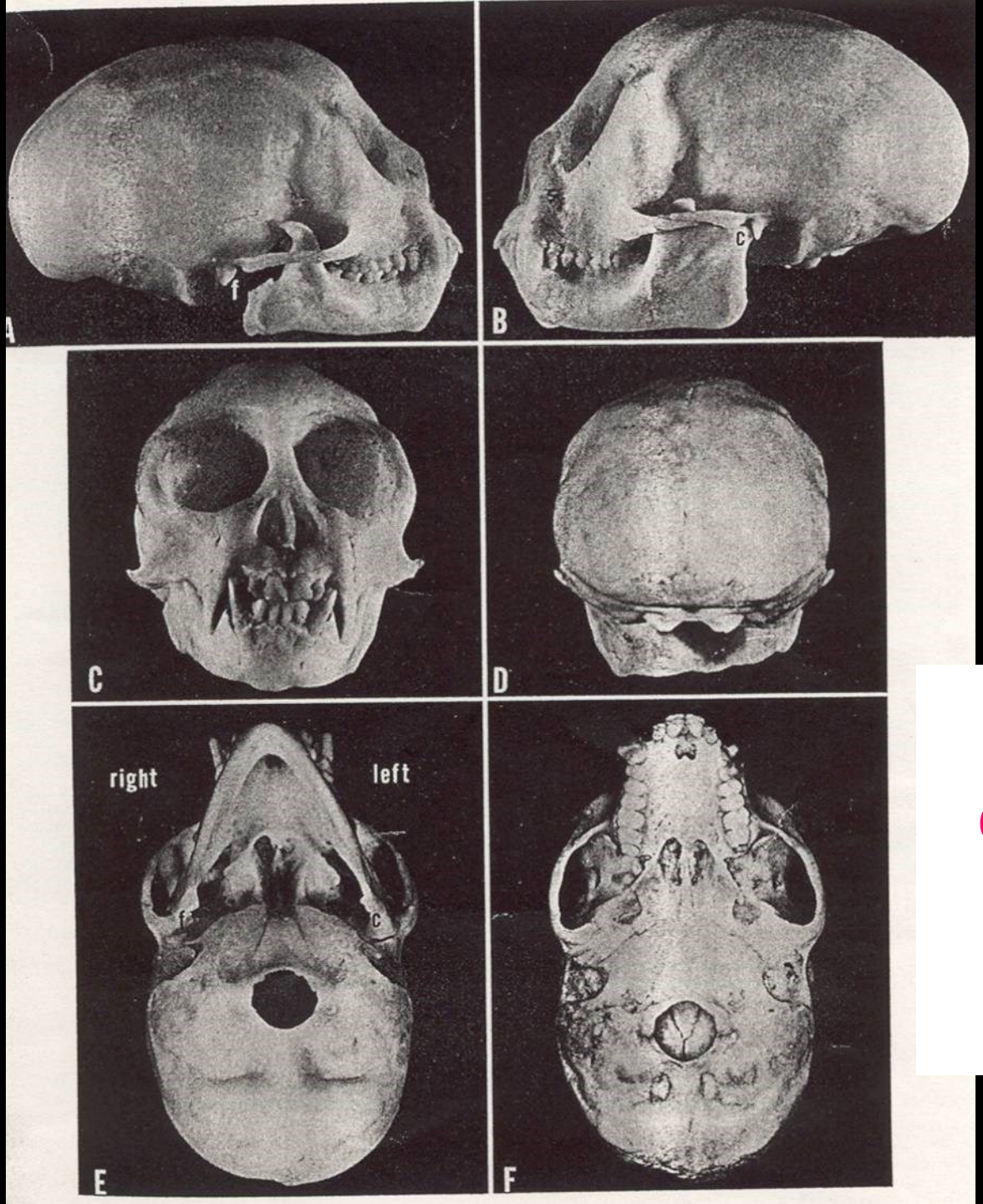
Inherited Facial Disproportions

Twin studies, family studies and dog studies

- Indicate the mechanism by which trauma to the mandible can affect its future growth.

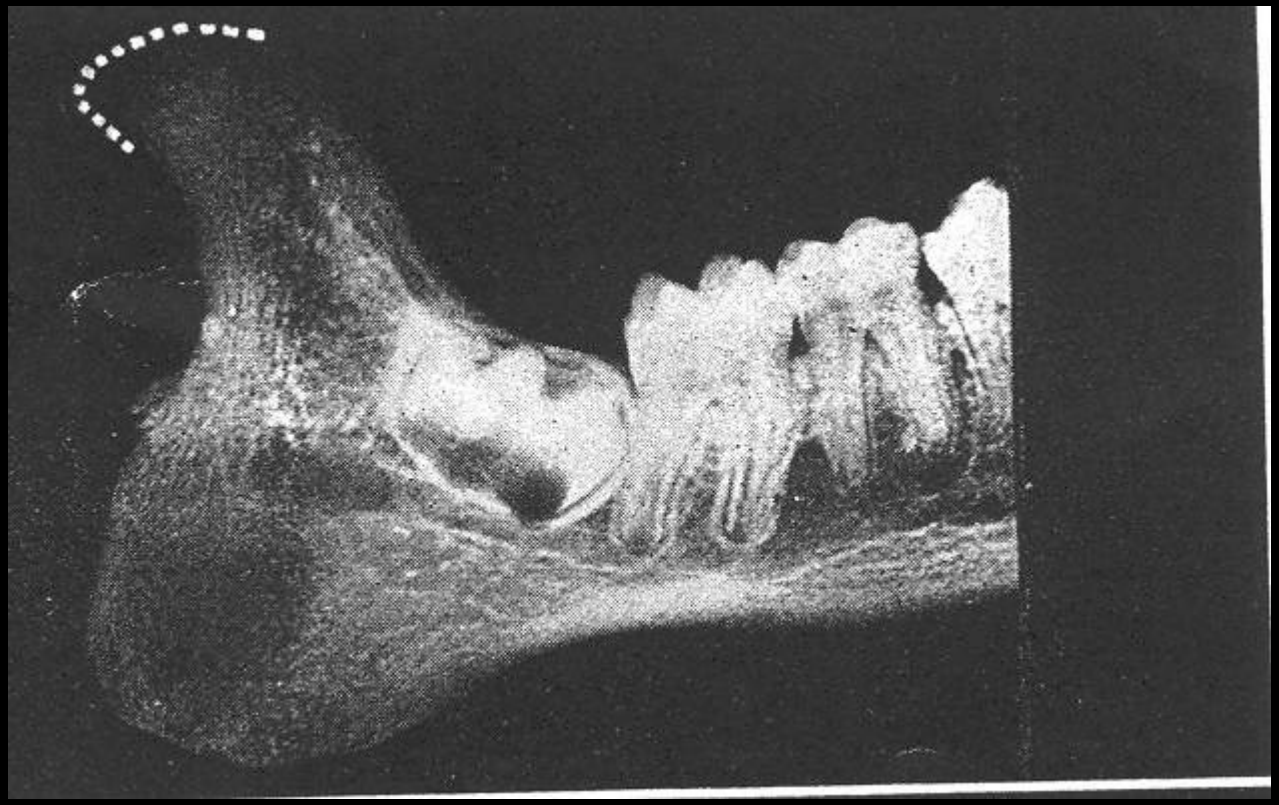

A
B
C
D
right
left
E
F
ea
io
pg
ea

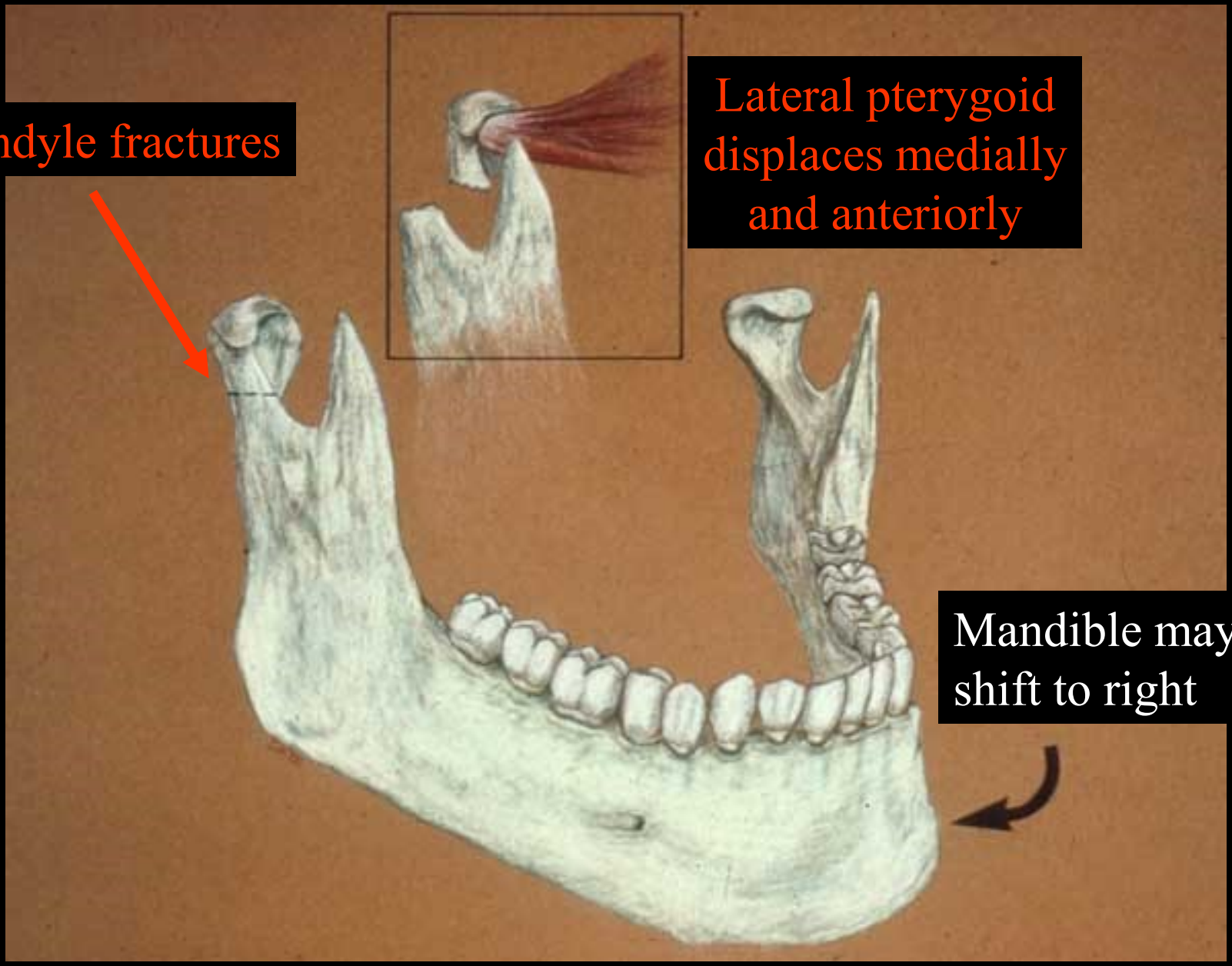
Adult Monkey



Collapses on condylectomy side

Sarnat




Condyle fractures
Lateral pterygoid displaces medially and anteriorly
Mandible may shift to right

EFFECT OF FRACTURE OF MANDIBULAR CONDYLE IN CHILDREN

- **75% - Condyle regenerates**
  - No growth deficit
- **25% - Partial regeneration**
  - Growth deficit occurs

Ankylosis of mandible

Fusion across Temporomandibular joint

Restricts motion

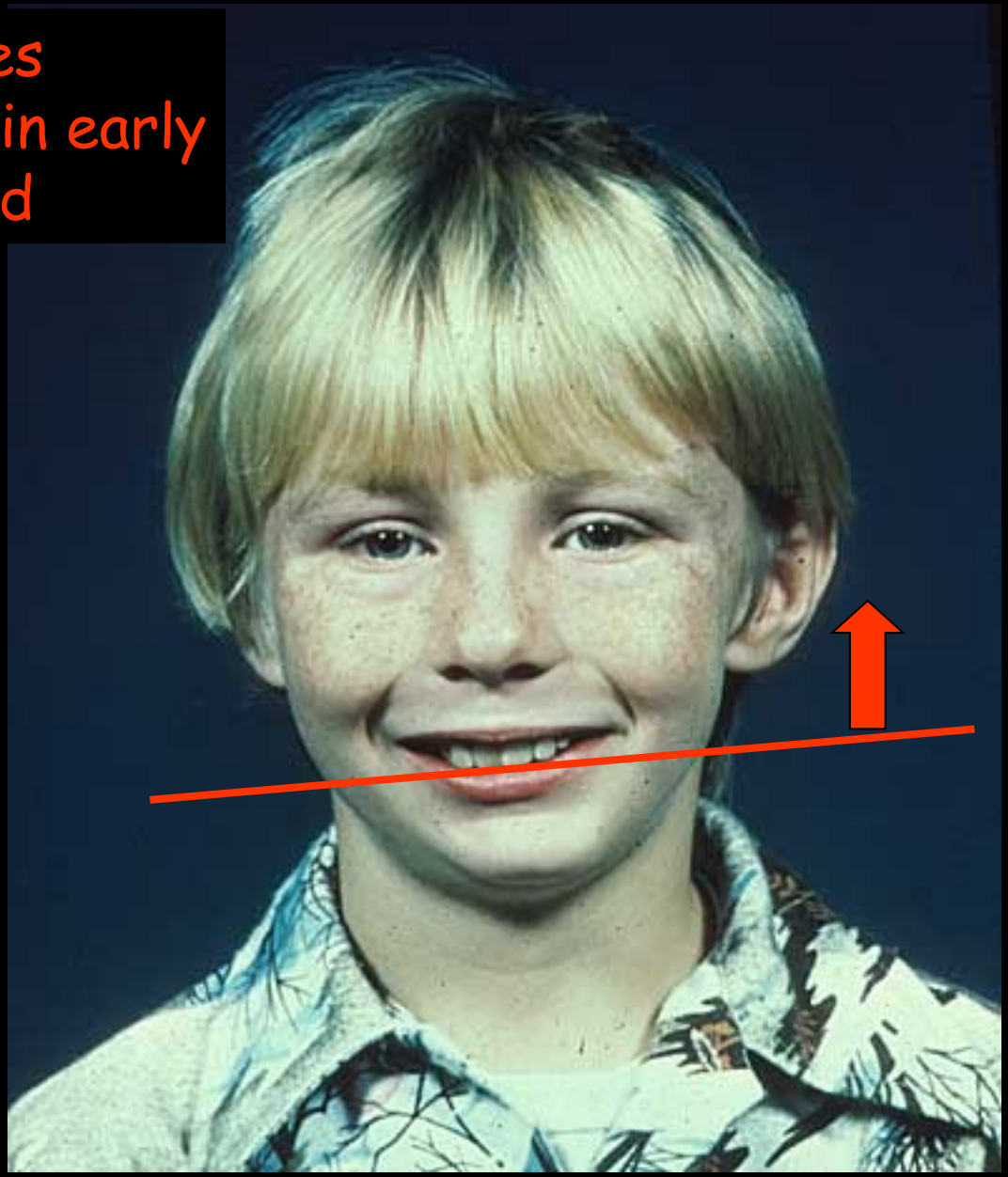
Inhibits growth

In order to grow properly, the mandible must be able to

TRANSLATE

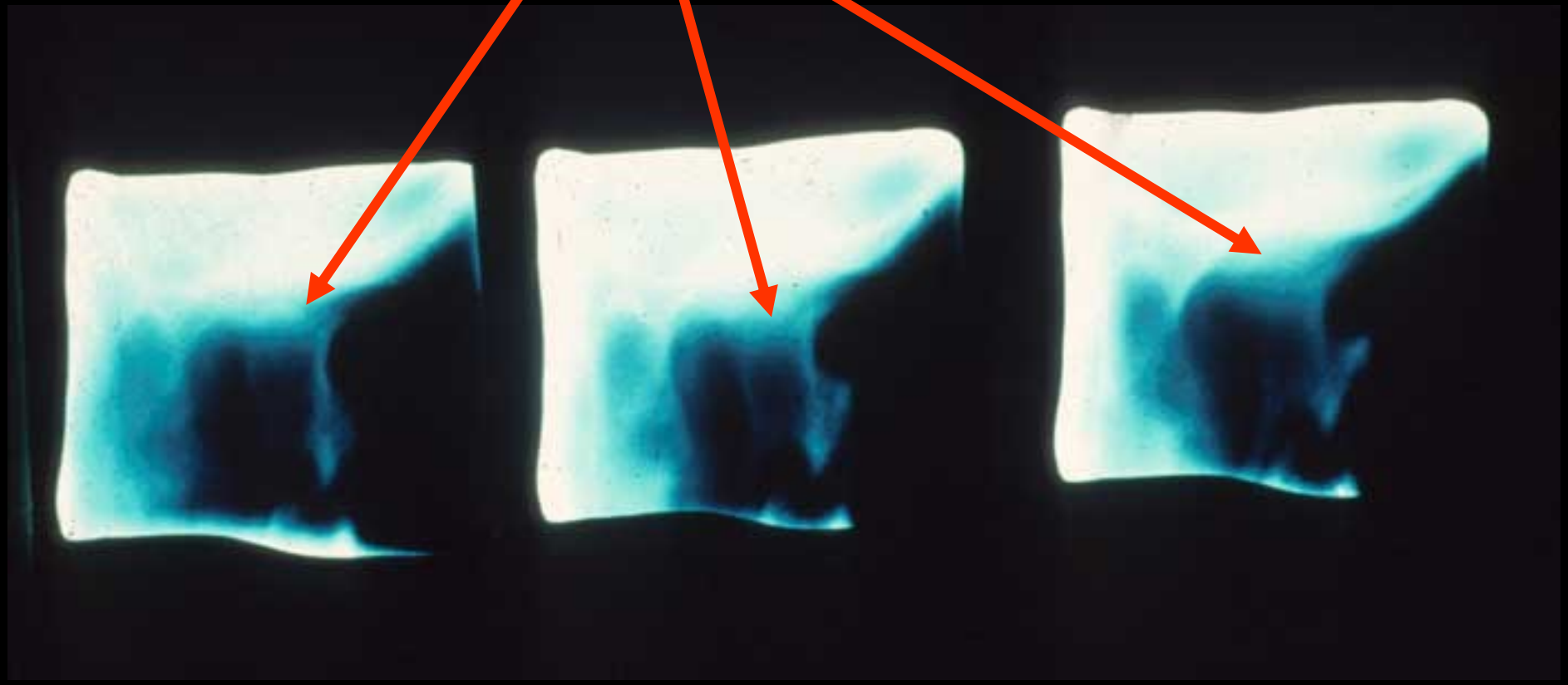
Opening on a hinge is not enough!

Fractures
Condyle in early childhood



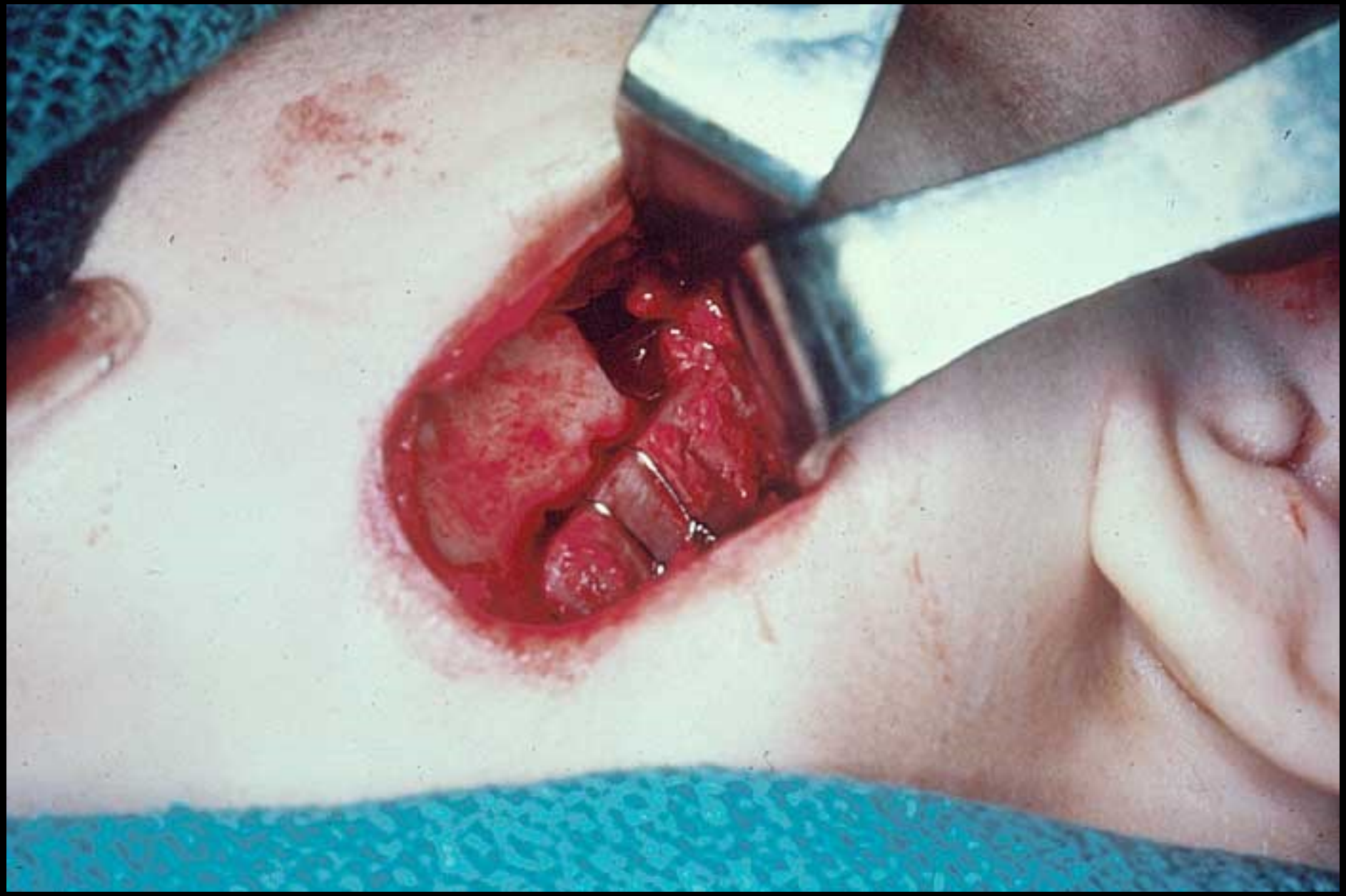
Chin retrusive

Ankylosis- from scarring

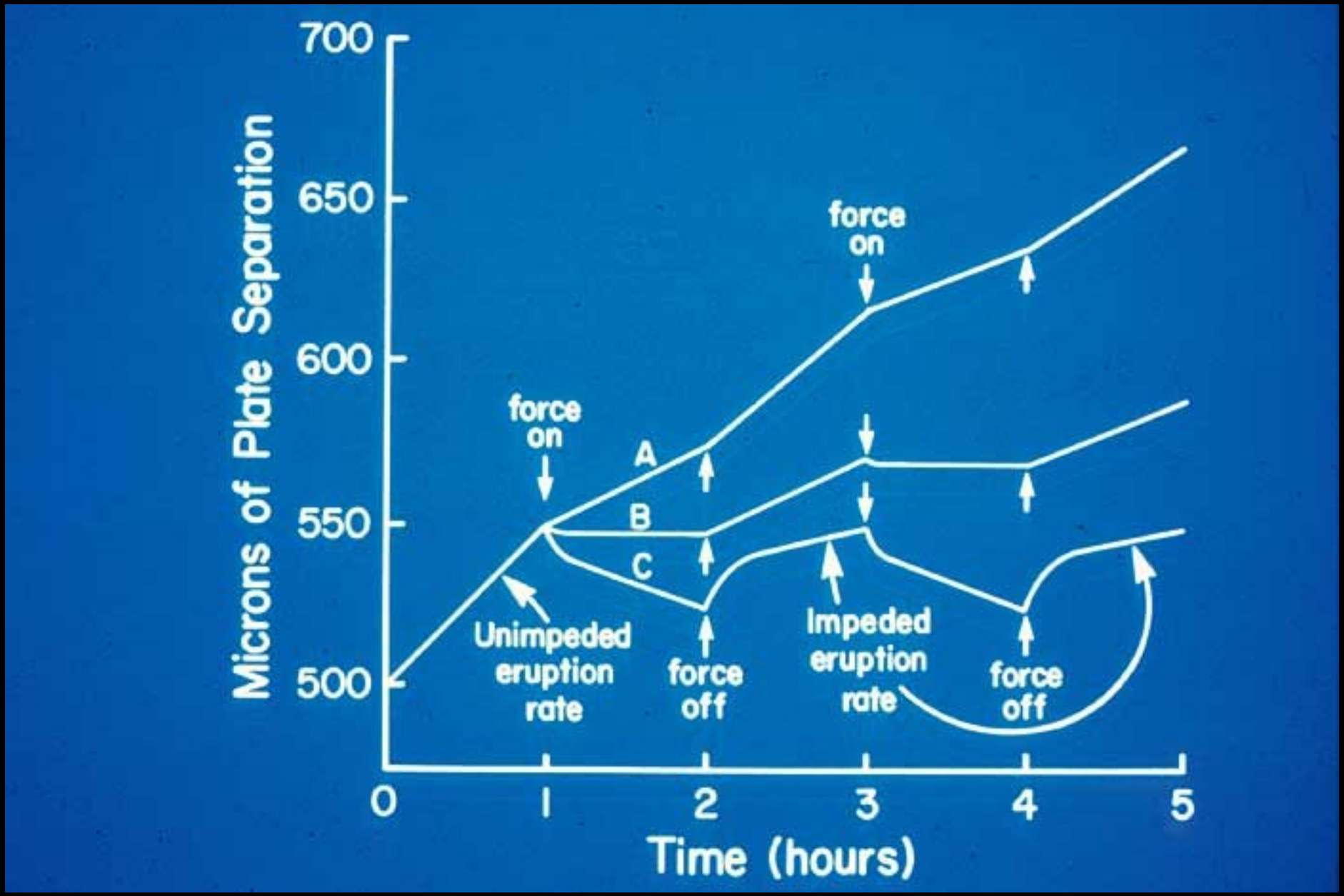



Remove ankylosed joint
4
3
2
1
cm

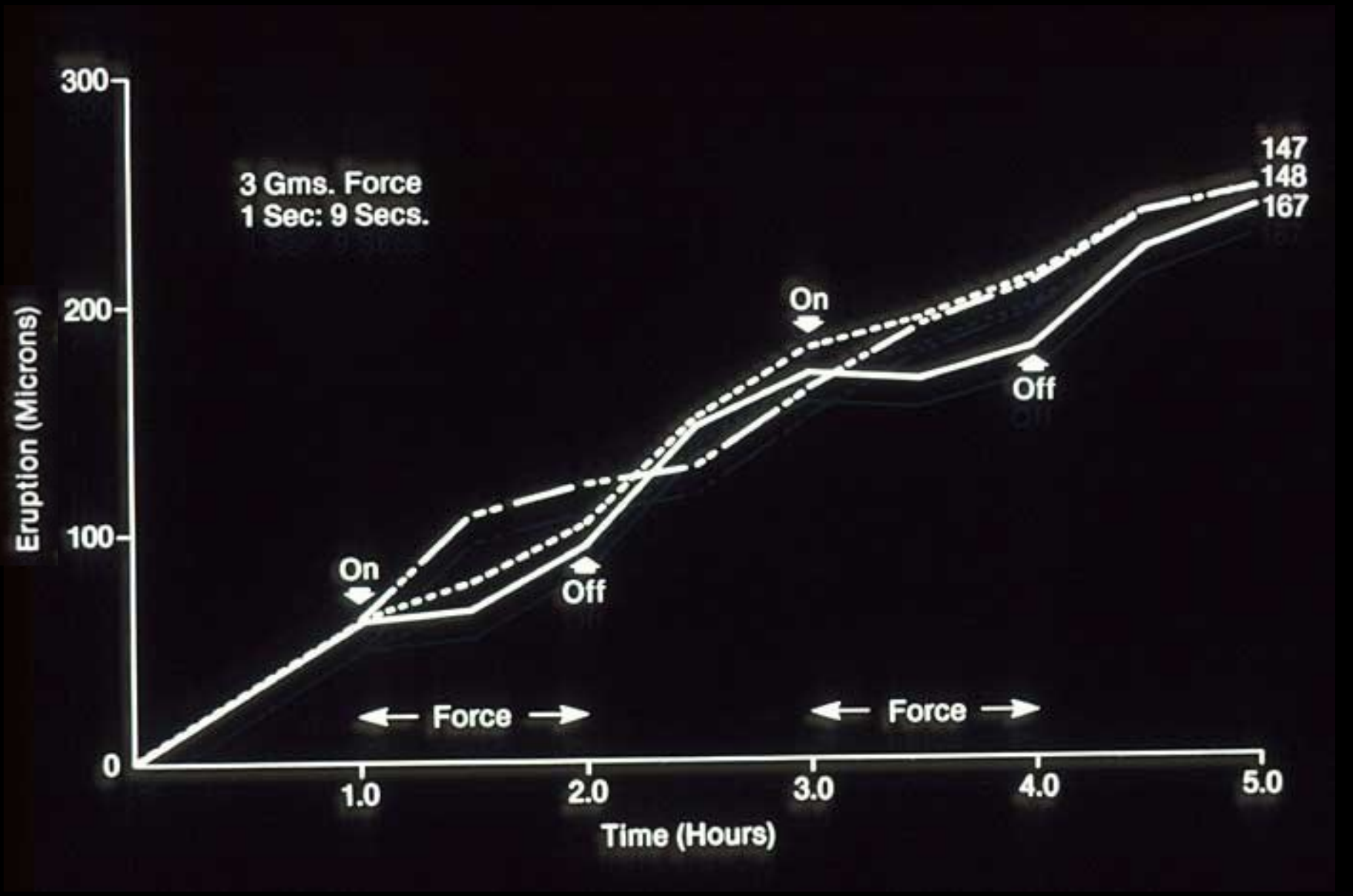
Replace with something which grows at the same rate

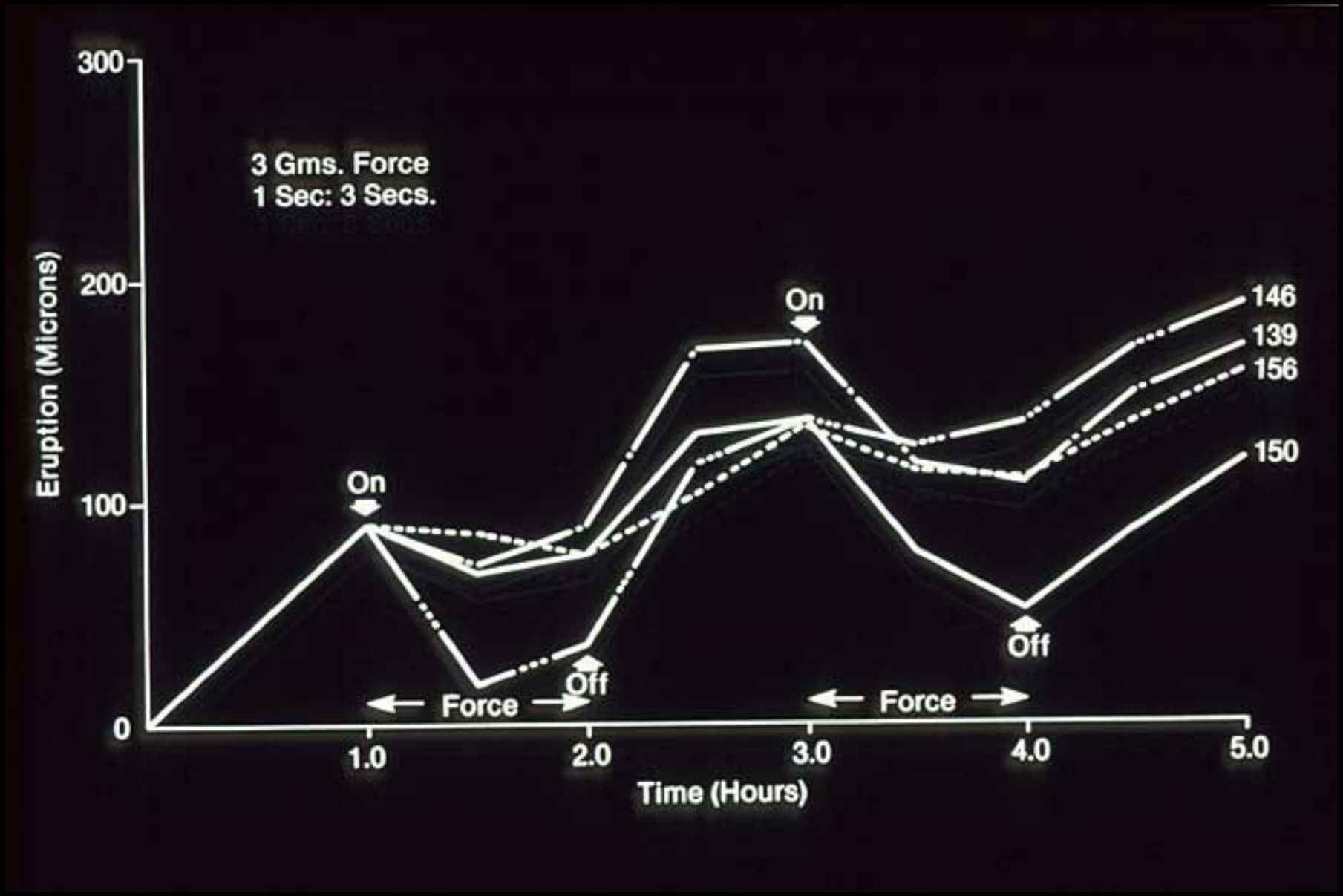


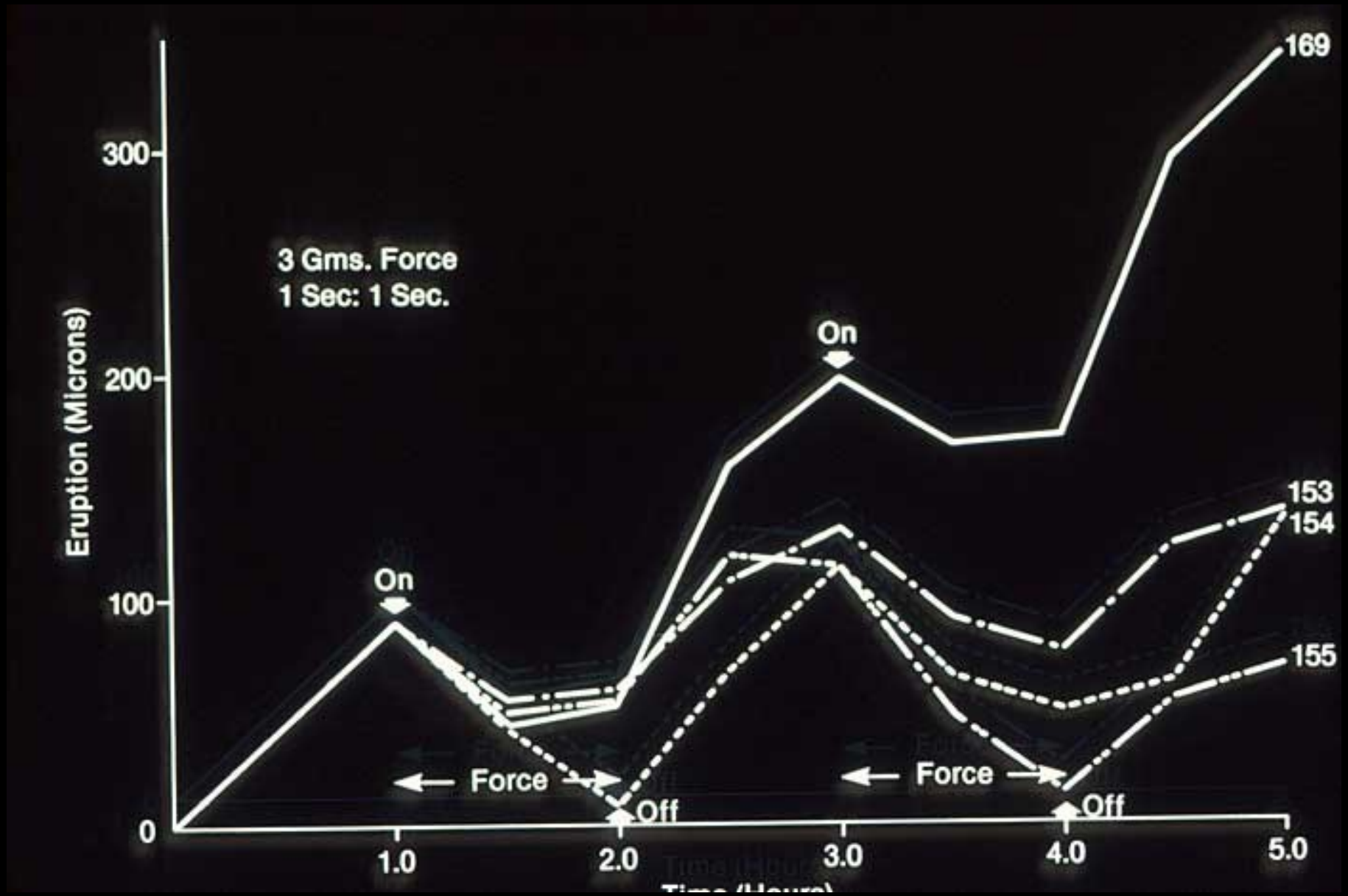
- Identify the magnitude of force needed to cause movement of a tooth, and relate this to the observed threshold for tooth movement.


700
650
600
550
500
Microns of Plate Separation
force on
force on
A
B
C
Unimpeded eruption rate
force off
Impeded eruption rate
force off
0
1
2
3
4
5
Time (hours)

- Identify the duration of force needed to cause movement of a tooth, and relate this to the impact of habits like thumb sucking on the dentition.


300
200
100
0
Eruption (Microns)
3 Gms. Force
1 Sec: 9 Secs.
147
148
167
On
Off
On
Off
Force
Force
1.0
2.0
3.0
4.0
5.0
Time (Hours)

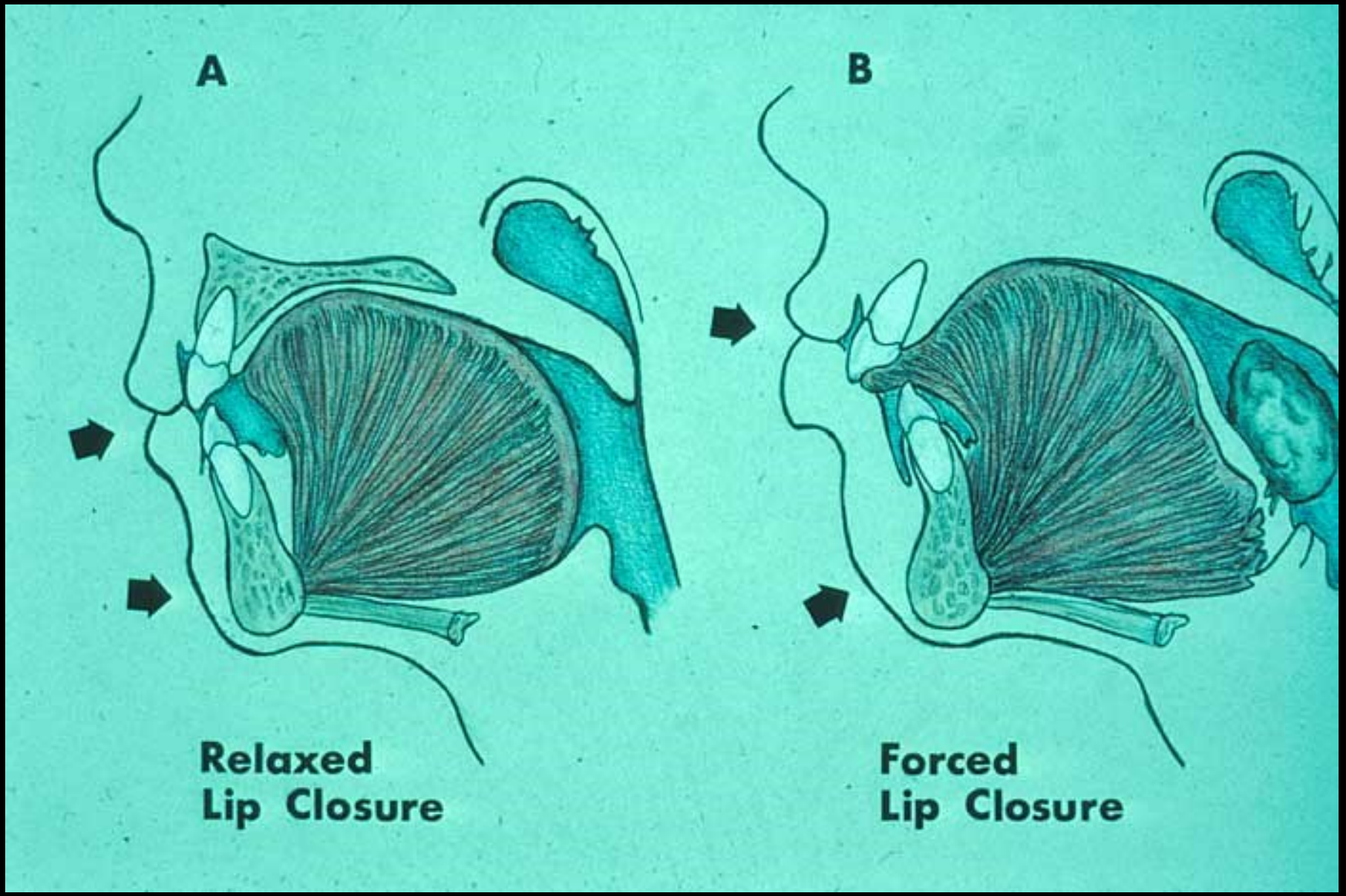

300
200
100
0
Eruption (Microns)
3 Gms. Force
1 Sec: 3 Secs.
On
On
Off
Off
Force
Force
146
139
156
150
1.0
2.0
3.0
4.0
5.0
Time (Hours)


3 Gms. Force
1 Sec: 1 Sec.
Eruption (Microns)
300
200
100
0
On
On
Force
Force
Off
Off
169
153
154
155
1.0
2.0
3.0
4.0
5.0

CONCLUSIONS

- **INTERMITTENT LIGHT FORCE AFFECTS THE ERUPTION OF THE RABBIT INCISOR**
  - **50% TIME: SIMILAR TO CONTINUOUS FORCE**
  - **25% TIME: INTERMEDIATE EFFECT (individual variation)**
  - **10% TIME: LITTLE OR NO EFFECT**

- Describe the maturation of oral function from infancy to adult life, with particular emphasis on the pattern of swallow.


A
B
Relaxed
Lip Closure
Forced
Lip Closure

- Discuss myofunctional therapy for tongue thrusting as a potential therapy for anterior open bite in children, with emphasis on its underlying assumptions and their validity.

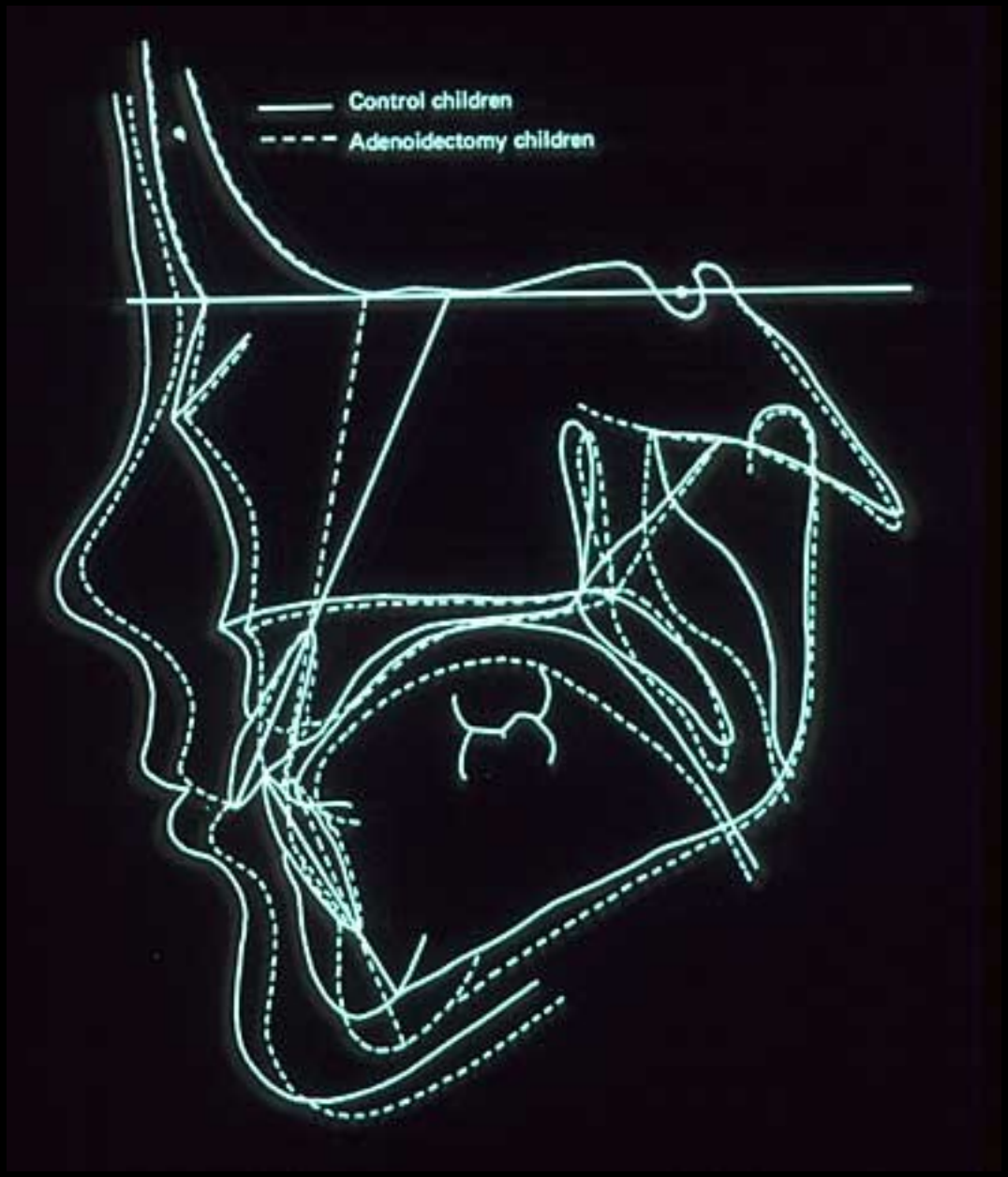
- Describe the possible role of nasal obstruction in the etiology of malocclusion, and indicate the probable mechanism by which it would have an effect.

CONCEPT

MODE OF RESPIRATION MAKES SOME DIFFERENCE AS IT ALTERS POSTURAL RELATIONSHIPS – CHANGE IN RESTING PRESSURES

EVIDENCE

- **LINDER-ARONSON EXPERIMENTS**
- **VIG EXPERIMENTS**


Control children
Adenoidectomy children

CONCLUSION

- **PARTIAL NASAL OBSTRUCTION IN HUMANS TENDS TO INCREASE FACE HEIGHT**

HOW MUCH?

CONCEPT

MODE OF RESIPRATION MAKES SOME DIFFERENCE AS IT ALTERS POSTURAL RELATIONSHIPS – CHANGE IN RESTING PRESSURES

EVIDENCE

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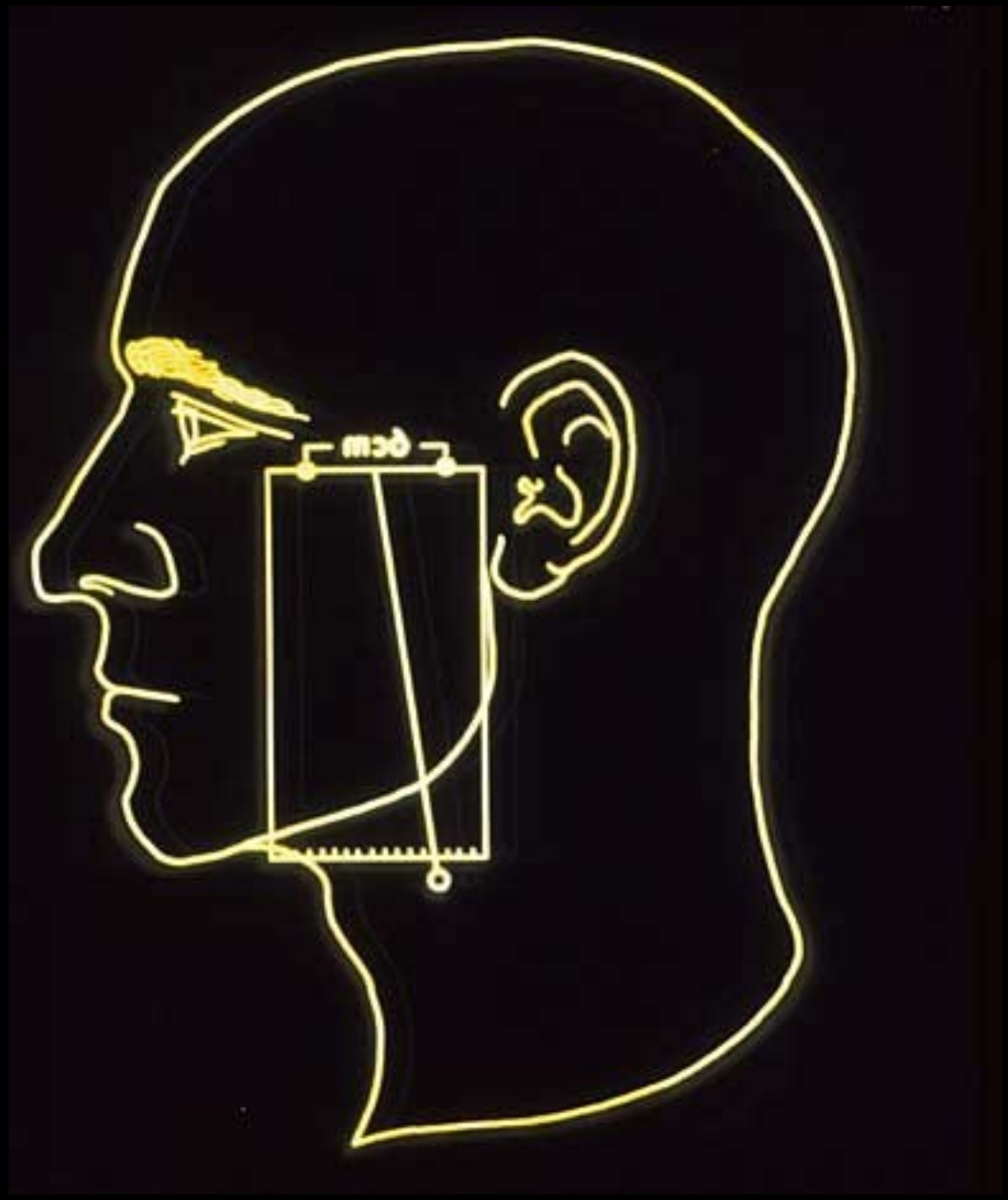
- **VIG EXPERIMENTS**


6cm

CHANGE IN CERVICOCRANIAL ANGLE TO VERTICAL WITH INDUCED ORAL RESPIRATION