

# Dento-Skeletal Mandibular Reconstruction

(Reconstruction Dento-Squelettique Mandibulaire)

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**Abstract**  
**How can an ancient human mandible with, often, incomplete or distorted morphology be restored?**  
**How can a mandibular dental arch be restored prosthetically ?**

The **objective** of this research is to provide assistance both for anthropologists and forensic scientists in the area of dento-skeletal mandibular reconstruction and for odontologists in terms of prosthetics. Solutions can be proposed from metric and angular measures by using geometric links connecting mandibular morphology and occlusal organization.

The **material** (DICOM data) comprises two collections from the Natural History Museum of Vienna (Austria): Wiesbach (211 half-mandibles – 150 years old) and Hainburg (58 half-mandibles – 4000 years old).

The **method** (AVIZO® software) is based on the measurement of three points of the same half-mandible, in a sagittal view: canine, distal buccal cusp of the second molar, and condylar head.

The **results** of the study provide, on average, a curve of Spee with a radius of  $79 \pm 8$  mm for Wiesbach and  $81 \pm 7$  mm for Hainburg, and a Balkwill angle with a measure of  $22 \pm 2$  degrees for Wiesbach and  $20 \pm 2$  degrees for Hainburg.

Combining these results allows us to consider reconstructions despite the absence of one of these three components: mandibular condyle, posterior teeth or anterior teeth.

## Introduction

A mandible can present an absence of :



CONDYLE



ANTERIOR TEETH

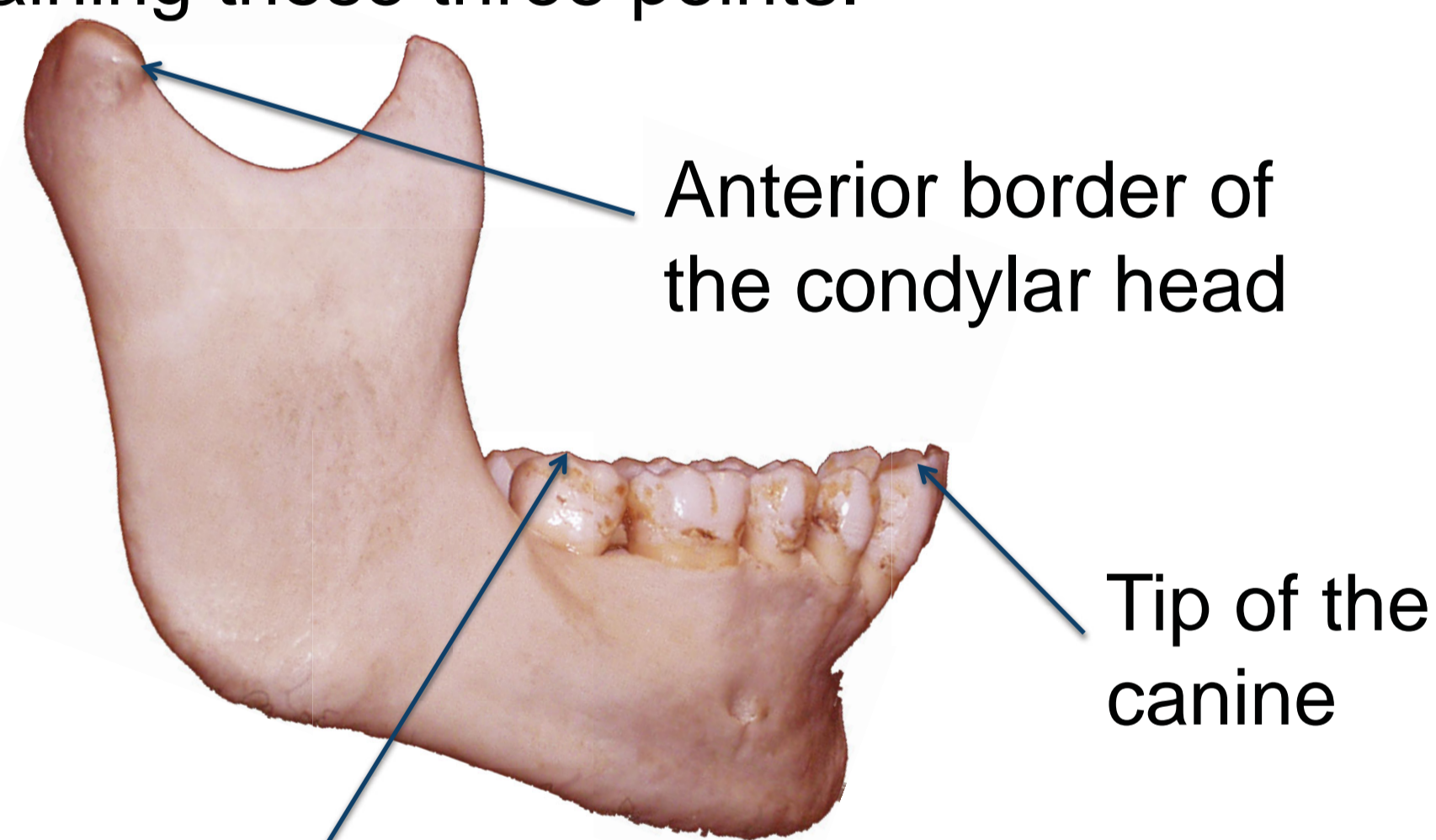


POSTERIOR TEETH

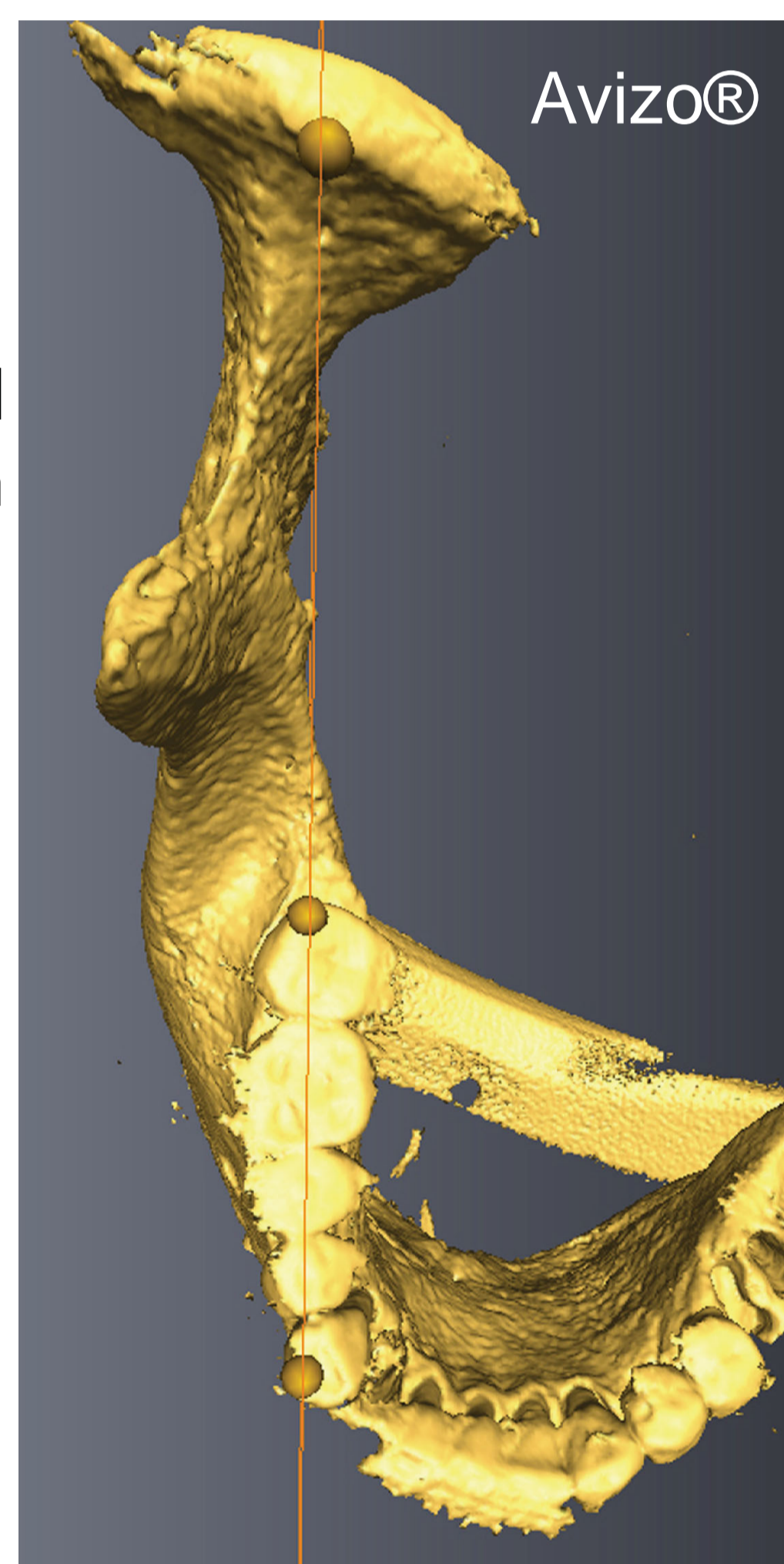
## Material :

- Wiesbach (211 half-mandibles -150 years old)
- Hainburg (58 half-mandibles - 4000 years old)

Two different populations (DICOM data) studied in a strictly perpendicular view to the plan containing these three points.



Tip of the second molar distal buccal cusp



## Method :

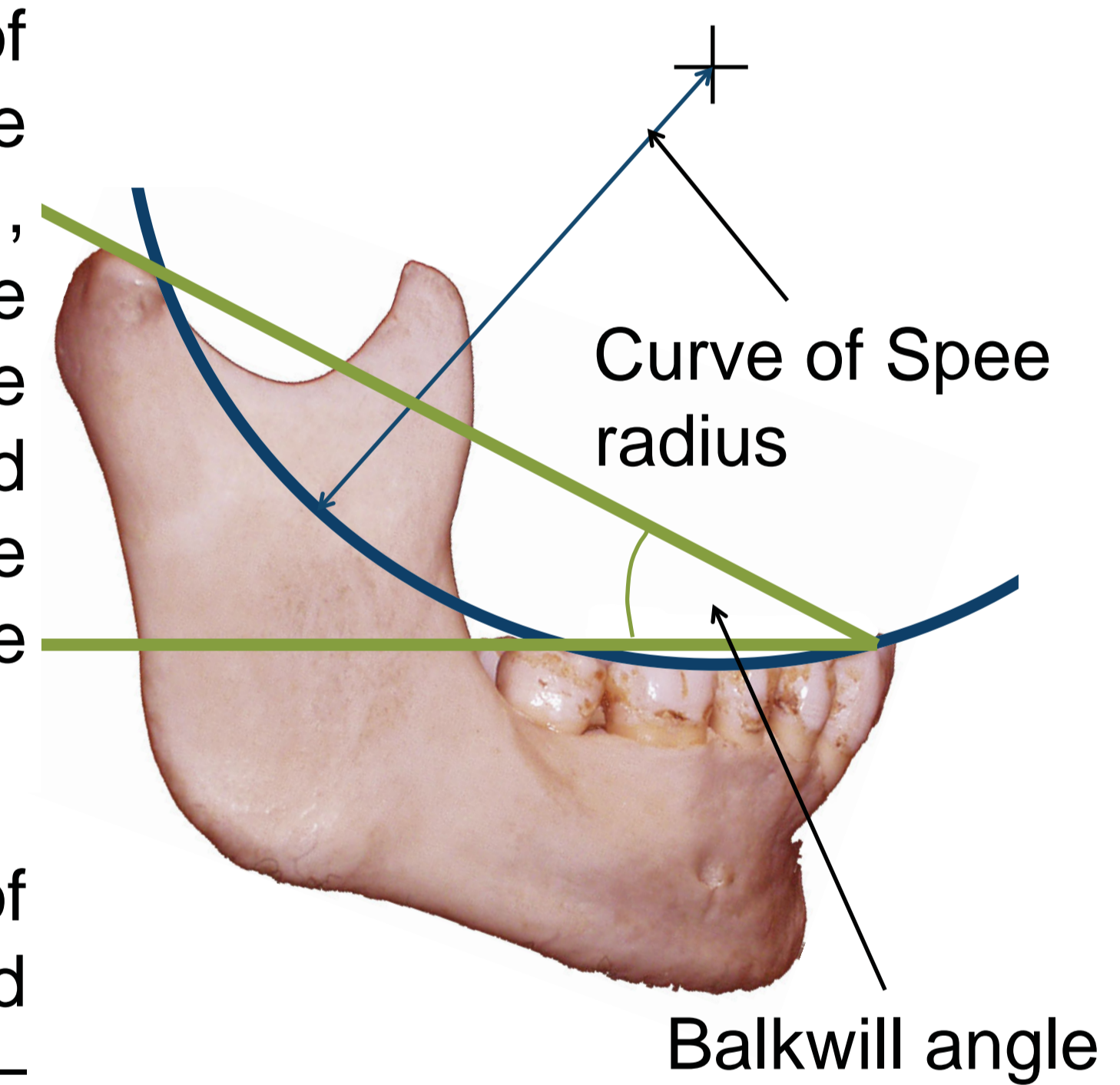
Measures of metric and angular values

### - curve of Spee (mm)

The measurement radius consisted of an anatomic curve established by the occlusal alignment of the teeth, beginning with the cusp tip of the mandibular canine, followed by the buccal cusp tips of the premolar and molar teeth, and ending with the anterior most portion of the mandibular condyle.

### - Balkwill angle (degree)

The measurement angle consisted of the occlusal plane (canine – second molar) and closing radius (canine – condyle).

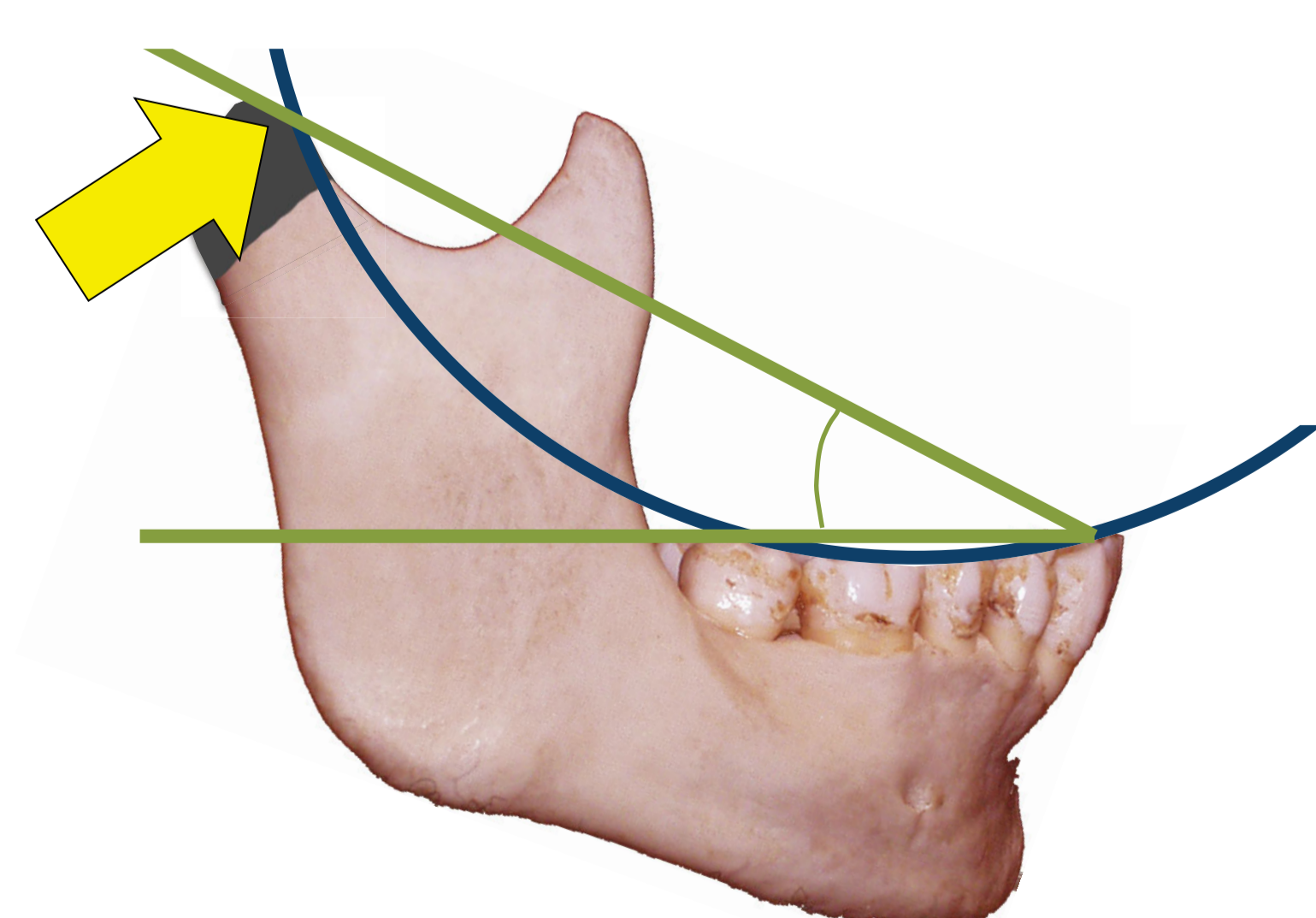


## Results :

		number	average	standard deviation
Curve of Spee	Wiesbach	211	78,84	8,06
	Hainburg	58	80,83	7,18
Balkwill angle	Wiesbach	211	22,36	2,31
	Hainburg	58	20,42	2,54

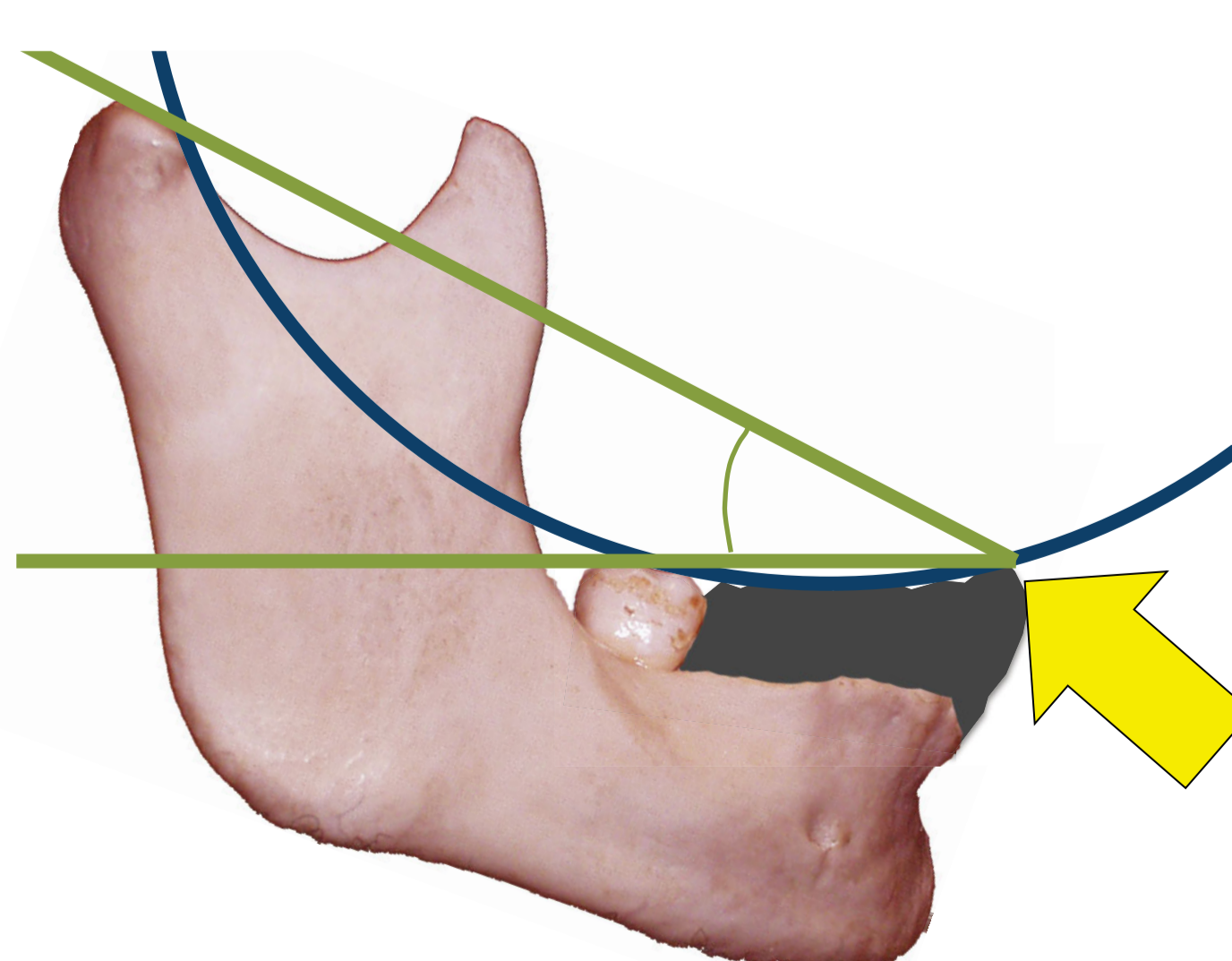
## Discussion :

In the sagittal plane, the joint use of curve of Spee metric values and Balkwill angle angular values can help in the reconstruction of the mandible and/or dental arch.



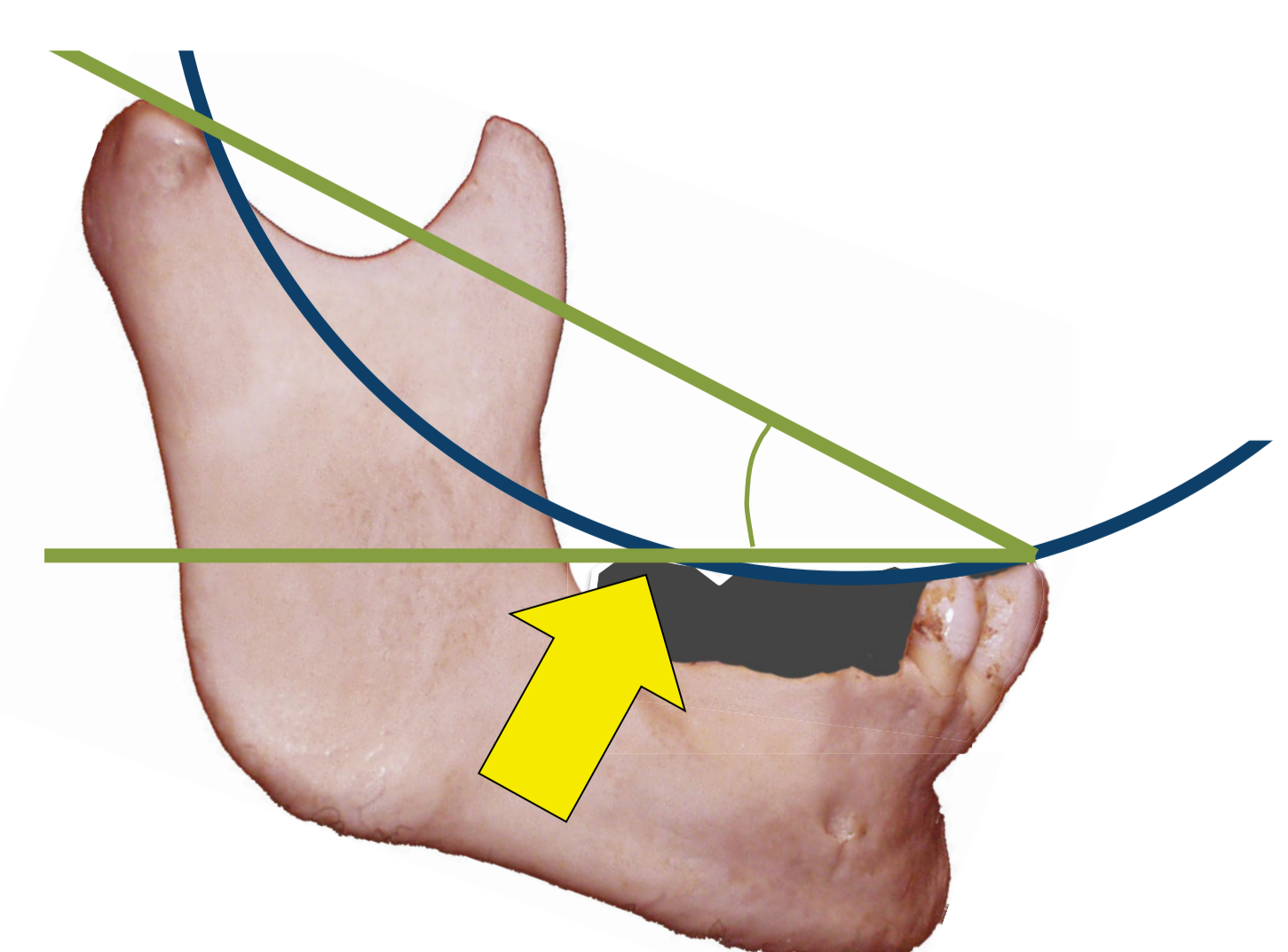
CONDYLE

Intersection of curve of Spee and closing radius through by canine tip



ANTERIOR TEETH

Intersection of curve of Spee, closing radius through by canine tip and occlusal plane



POSTERIOR TEETH

Intersection of curve of Spee and occlusal plane