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2025



Ultrasound-Guided Chondroprogenitor Cell Therapy for TMJ Osteoarthritis: Translational Approach Toward Tissue Regeneration.

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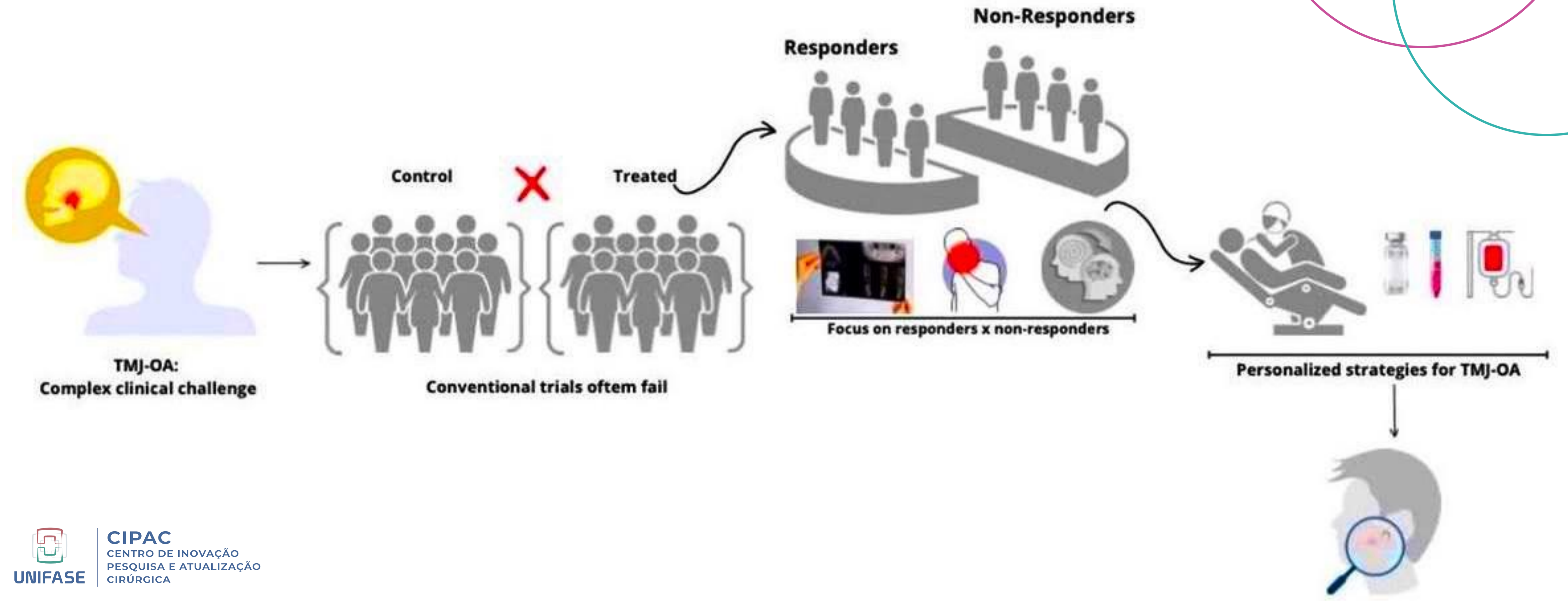
Redefining Clinical Trials on Regenerative Therapies to Target Responsiveness in Temporomandibular Joint Osteoarthritis Treatment

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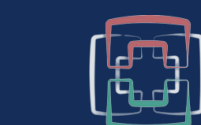
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Unveiling MRI-based structural phenotypes in temporomandibular joint osteoarthritis: implications for clinical practice and research



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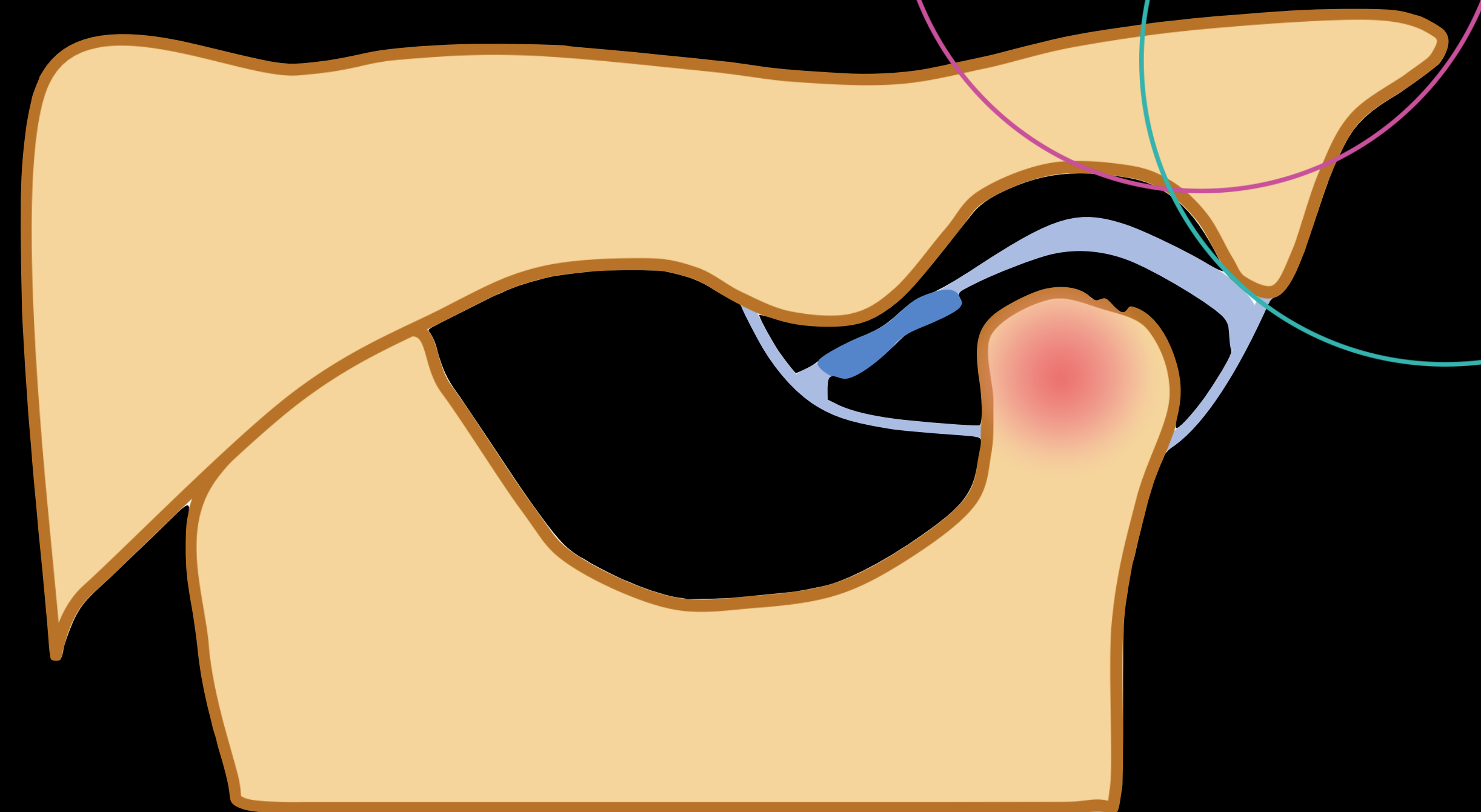
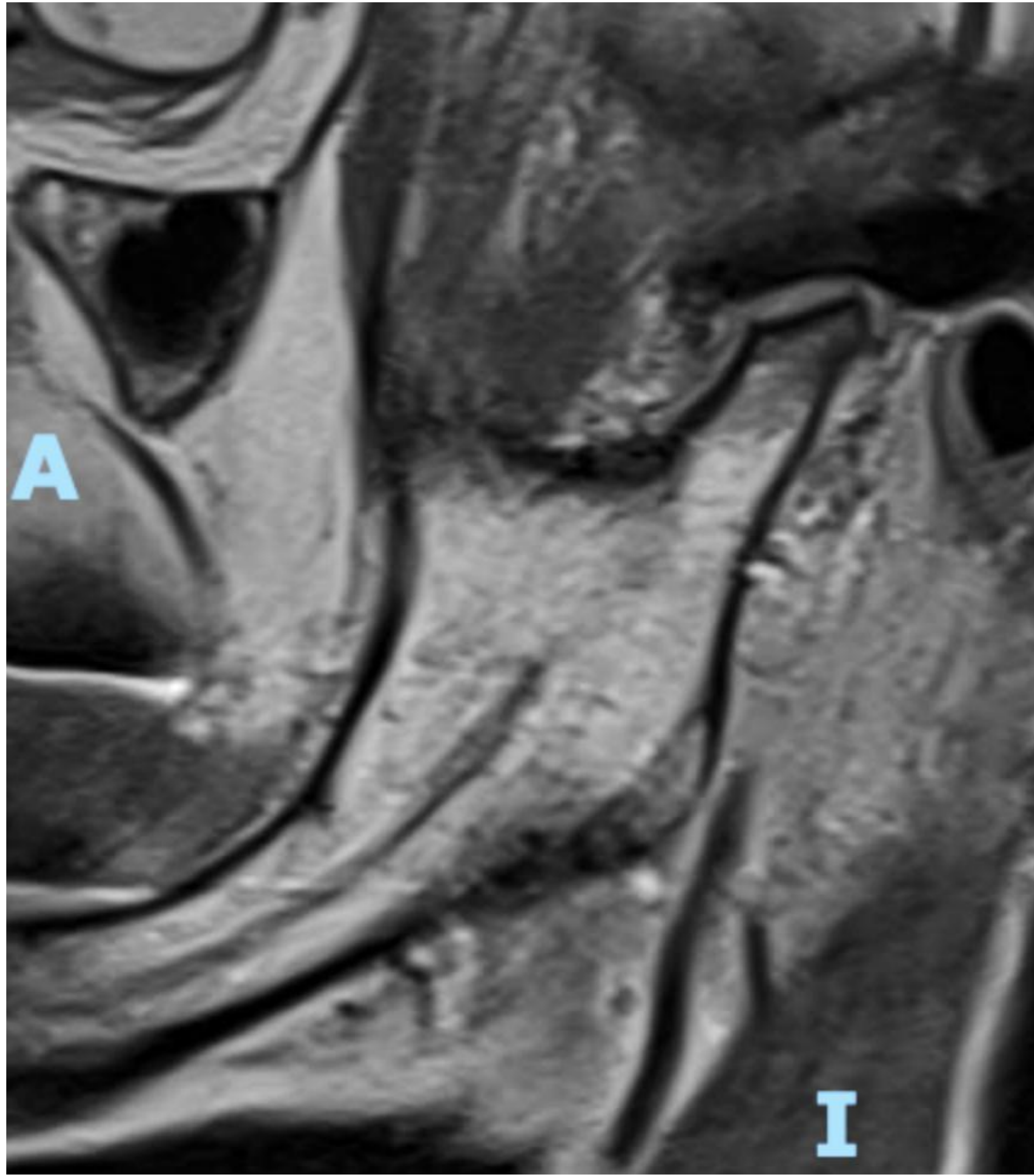
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Subchondral Bone

Reliability of MRI-Based Structural Phenotypes in TMJ OA.
Balaguer, Calcia, Tesch. Journal of Oral Facial Pain & Headache, 2024.

TMJ inferior joint space injections

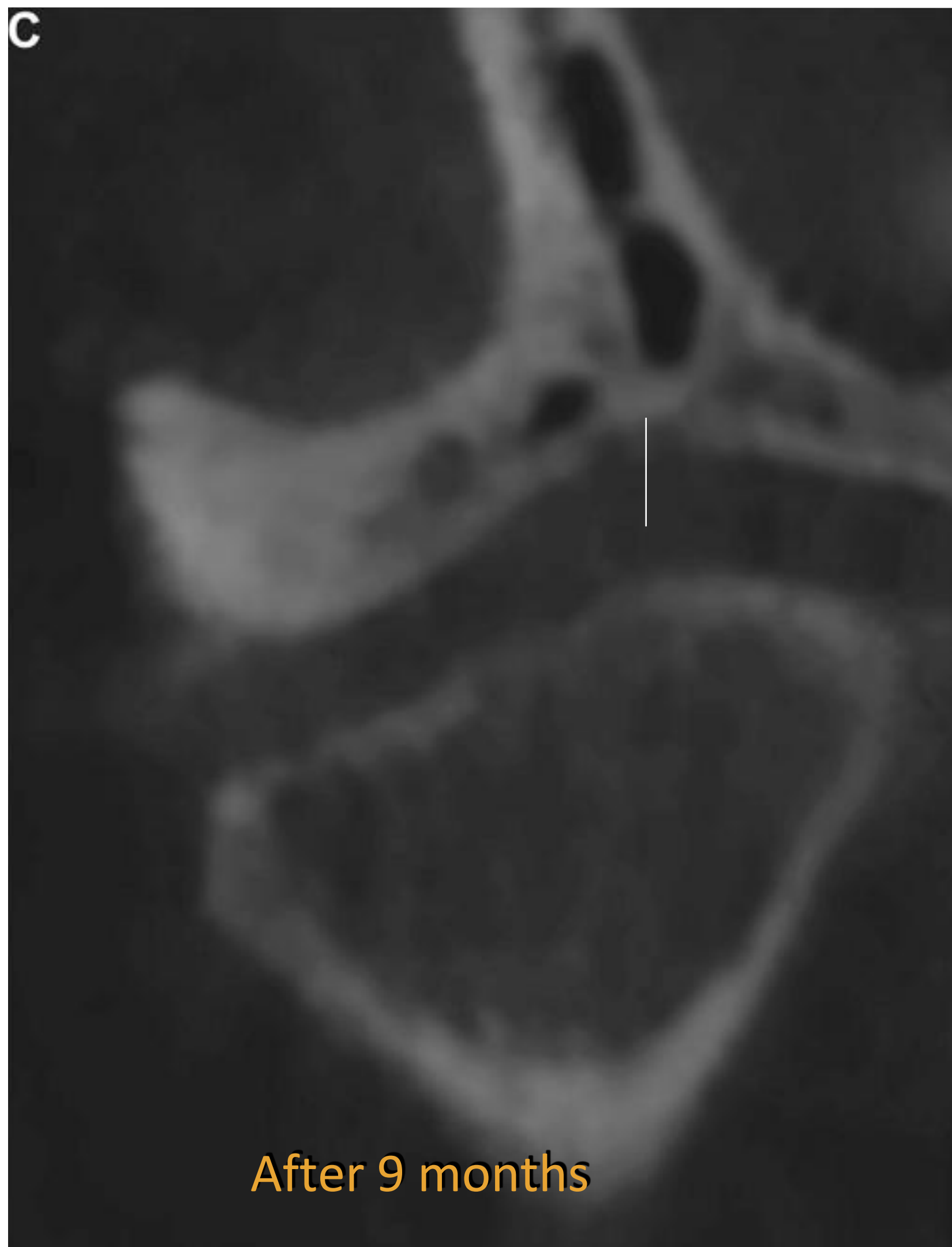
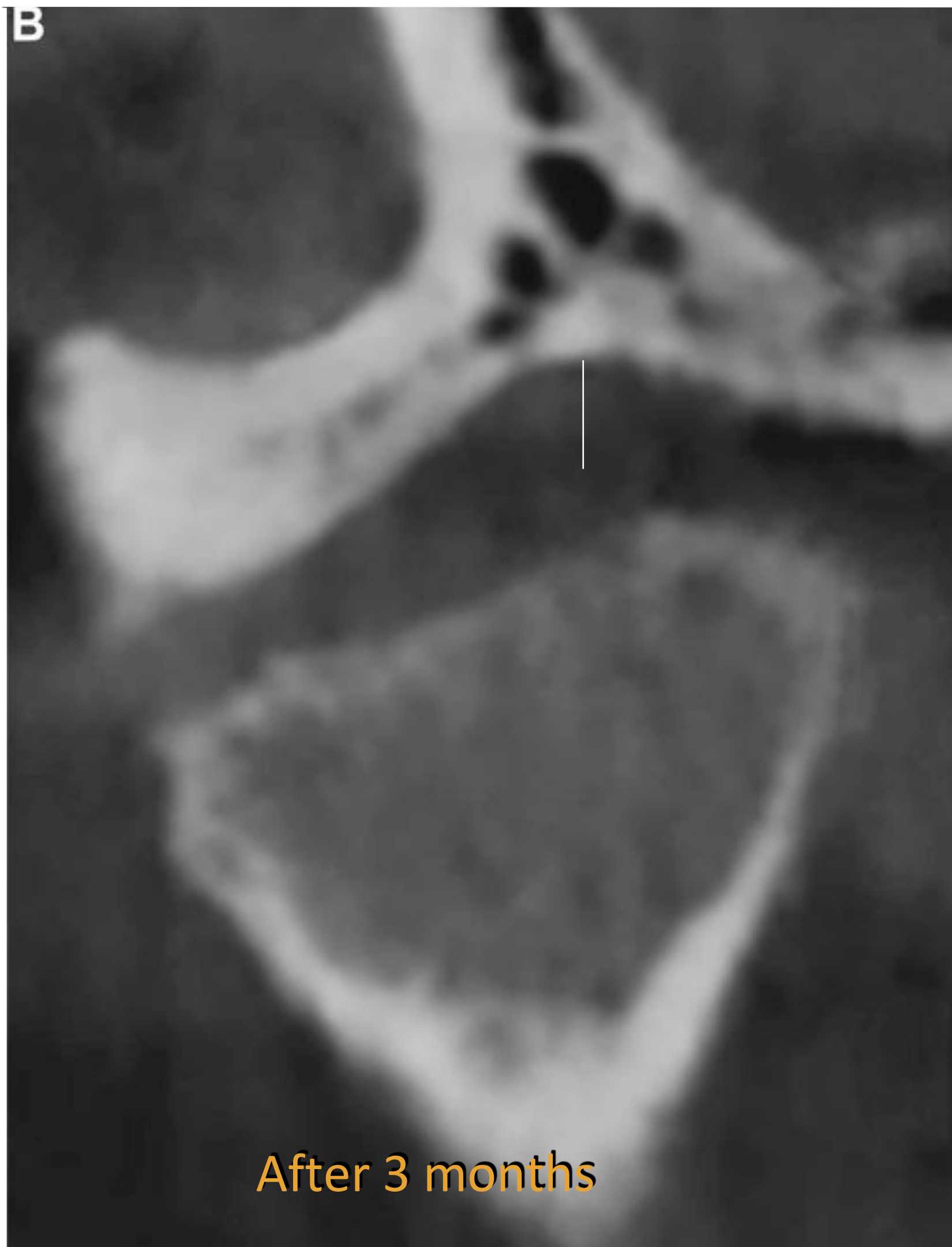
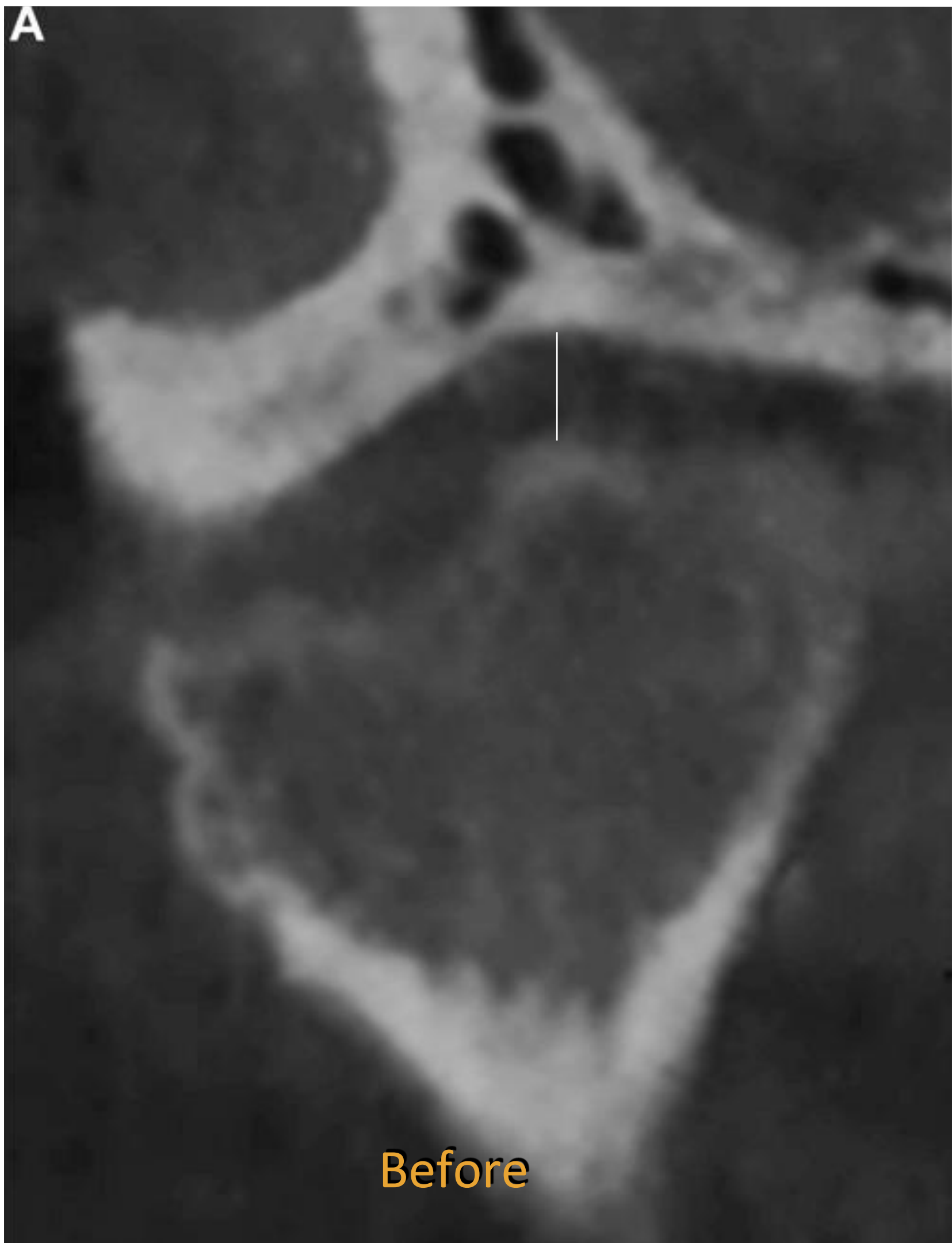
Relieve TMJ pain

Increase mouth opening

Improve TMJ dysfunction

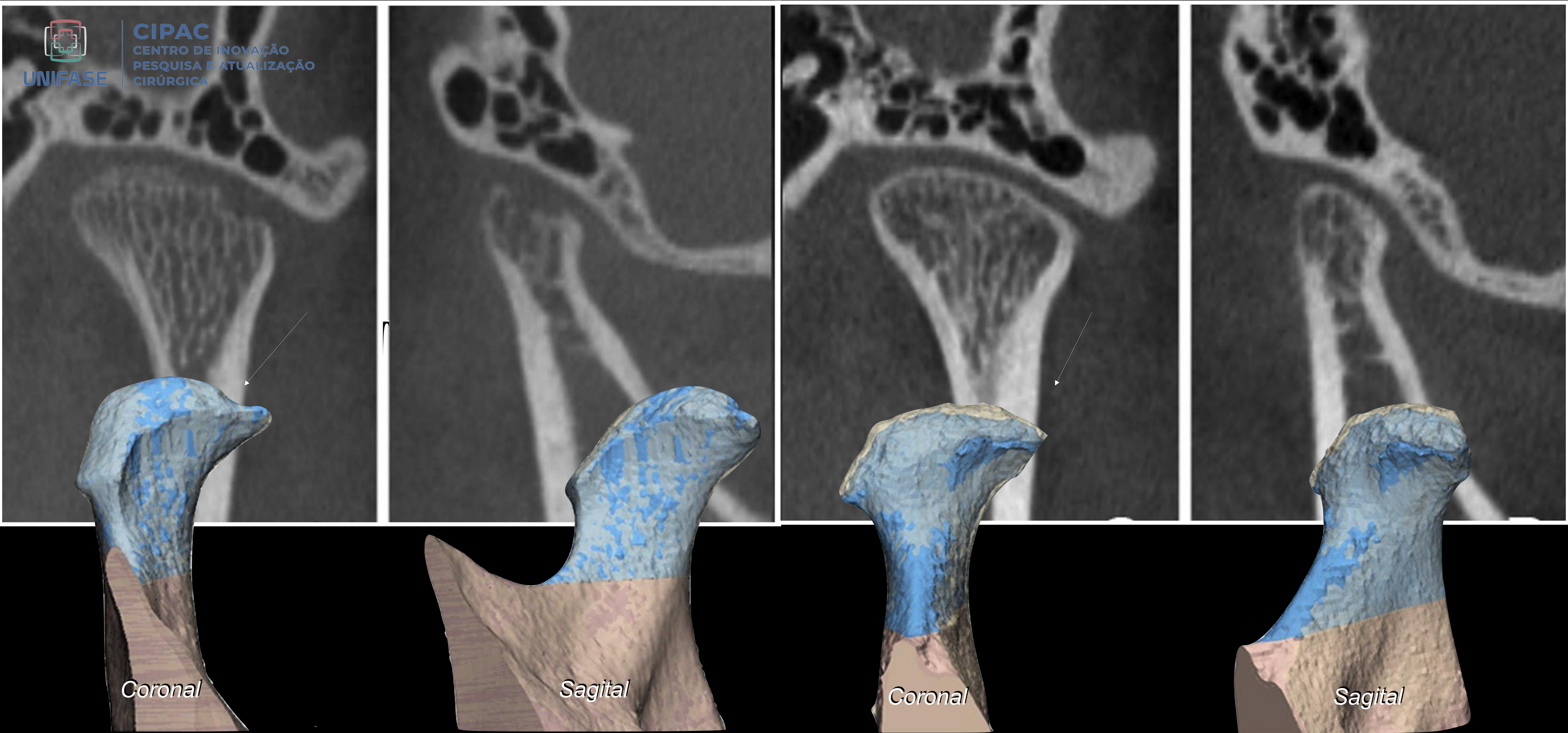
Image-guided techniques
more accurate than
anatomical techniques

Reference	Study design	No. of patients receiving injection (No. of joints)	TMD diagnosis (diagnostic instrument)	Procedure directed to the IJS	Main outcome	Instruments to assess the main outcome	Maximum follow-up period
Yeung et al. 2006 [22]	CX	1 (1)	DD & OA (clinical symptoms & MRI)	1 injection of 1 ml HA	The patient reduced pain from VAS=7 to VAS=1, improved MMO from 29 mm to 40 mm at 6 months postinjection follow-up.	VAS MMO	6 months
Long et al. 2009 [23]	RCT	54 (66)	DDwoR (RDC/TMD)	3 injections of 1 ml HA (1 per 14 days).	At 3 month follow-up, a significant reduction in TMJ pain was found in the IJS injection group compared with the SJS injection group ($P<.001$). At 6 month follow-up, there were significant differences between the IJS injection and SJS injection groups in MMO ($P<0.005$), VAS ($P< 0.001$), and Helkimo's index ($P<.001$).	VAS MMO Helkimo's index	6 months
Li et al. 2011 [24]	RCT	28 (NR)	OA (RDC/TMD)	4 injections of HA to IJS and SJS (1 per week)	HA injections on both IJS and SJS of TMJ reduced pain, increased MMO and improved quality of life (OHIP-14) from week 2 of the follow-up.	VAS MMO OHIP-14	4 weeks
Pan et al. 2012 [26]	CX	1 (NR)	OA (clinical symptoms & CBCT)	4 injections of 0.5 ml HA to IJS and SJS (1 per week)	HA injections on both IJS and SJS of TMJ improved clinical symptoms, increased MMO and CBCT image show bone remodelling at 6 months.	Clinical symptoms MMO CBCT evaluation	6 months
Liu et al. 2015 [27]	RCT	28 (28)	DDwoR (clinical symptoms & MRI)	2 injections of HA (1 per 15 days)	MMO increased significantly ($P<0.01$), and the Friction index decreased significantly ($P < 0.01$) in the IJS injection and SJS injection groups; MMO increased significantly in IJS injection group compared to SJS injection group ($P < 0.05$), and Friction index were significantly lower in IJS injection group than SJS injection group ($P<0.05$).	MMO Friction index	12 months
Li et al. 2015 [28]	RCT	68 (68)	DDwoR & OA (RDC/TMD & CBCT, MRI and arthrography)	3 injections of 1 mL HA (1 per 2 weeks)	There were no significant differences in MMO between groups at 3 and 9 months. Helkimo's index of the IJS injection group was significantly lower than the SJS injection group at 3 and 9 months. The remodelling score was significantly superior in the IJS injection group at 3 months ($P = .002$) and 9 months ($P=.002$) follow-ups.	MMO Helkimo's index Damage score Remodelling score	9 months
Fouda, 2018 [30]	RCT	18 (NR)	TMJ pain & DDwR (clinical symptoms & MRI)	1 injection of 1.5 ml solution of 25% hypertonic dextrose	The IJS group achieved a significant reduction in pain at 2 weeks and 3 months follow-ups ($P<0.0005$). Mean MMO improved from 34.6 mm to 36.8 mm at 3 months follow-up.	VAS MMO	3 months
Sun et al. 2018 [31]	CX	51 (56)	OA (RDC/TMD & CBCT)	4 injections of 2 ml HA to IJS and SJS (1 per week).	HA injection on SJS and IJS significantly improved MMO, the Ai, and the Di ($P<0.05$). There were no significant differences between groups (short-term and long-term follow-up) in condylar bony changes seen by CBCT (sclerosis, erosion, hyperplasia, and flattening) ($P>0.05$).	MMO Helkimo's index Anamnestic index (Ai) Clinical dysfunction	>12 months



Osteoarthritic changes after superior and inferior joint space injection of hyaluronic acid for the treatment of TMJ osteoarthritis with anterior disc displacement without reduction: a CBCT evaluation. Li et. al. Journal of Oral and Maxillofacial Surgery, 2015.

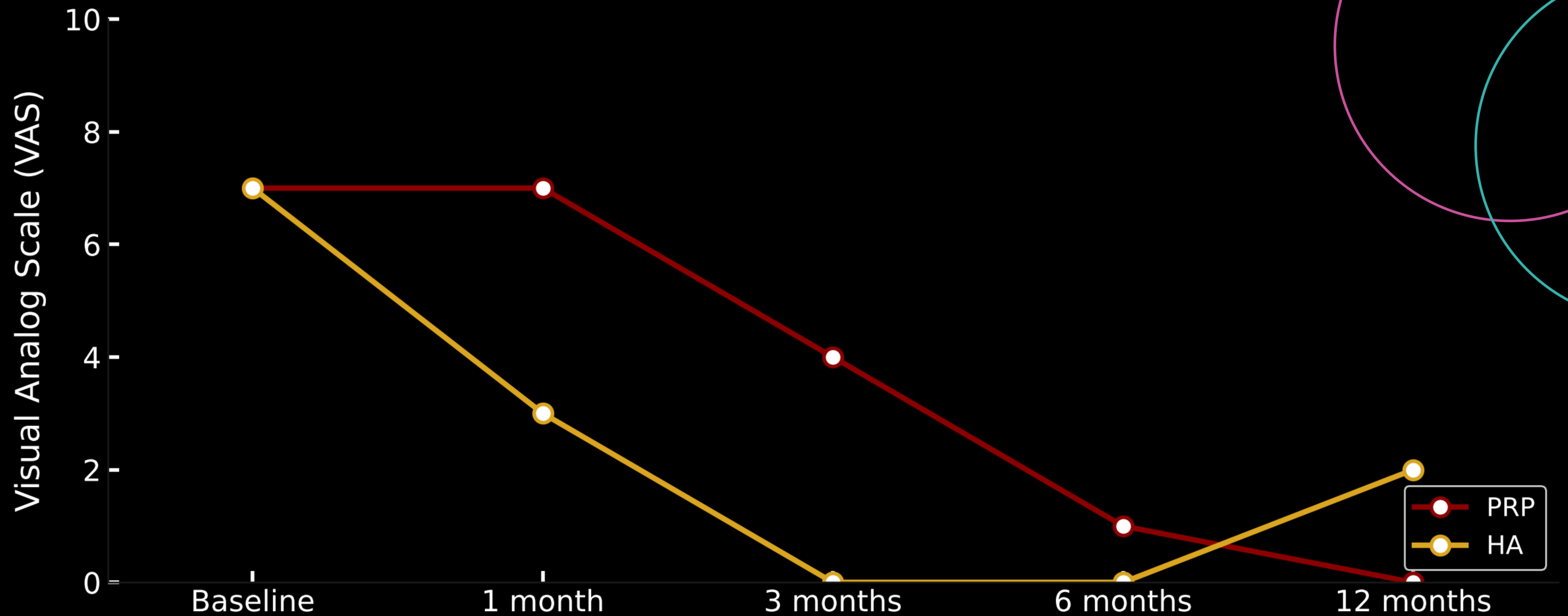




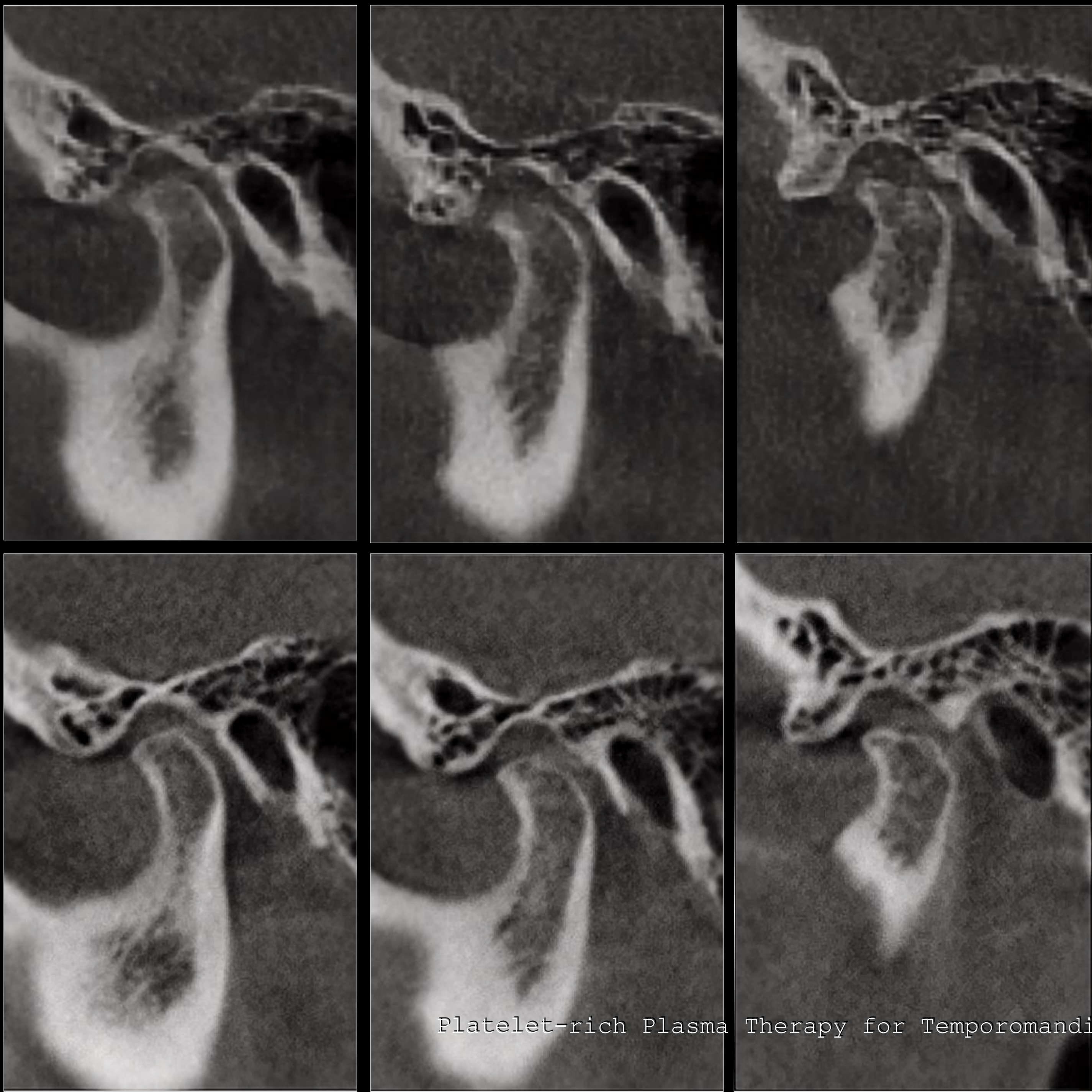
Initial 728 mm³ X Final 737 mm³ (CVCR = +1%)

Initial 1100 mm³ X Final 931 mm³ (CVCR = -15%)

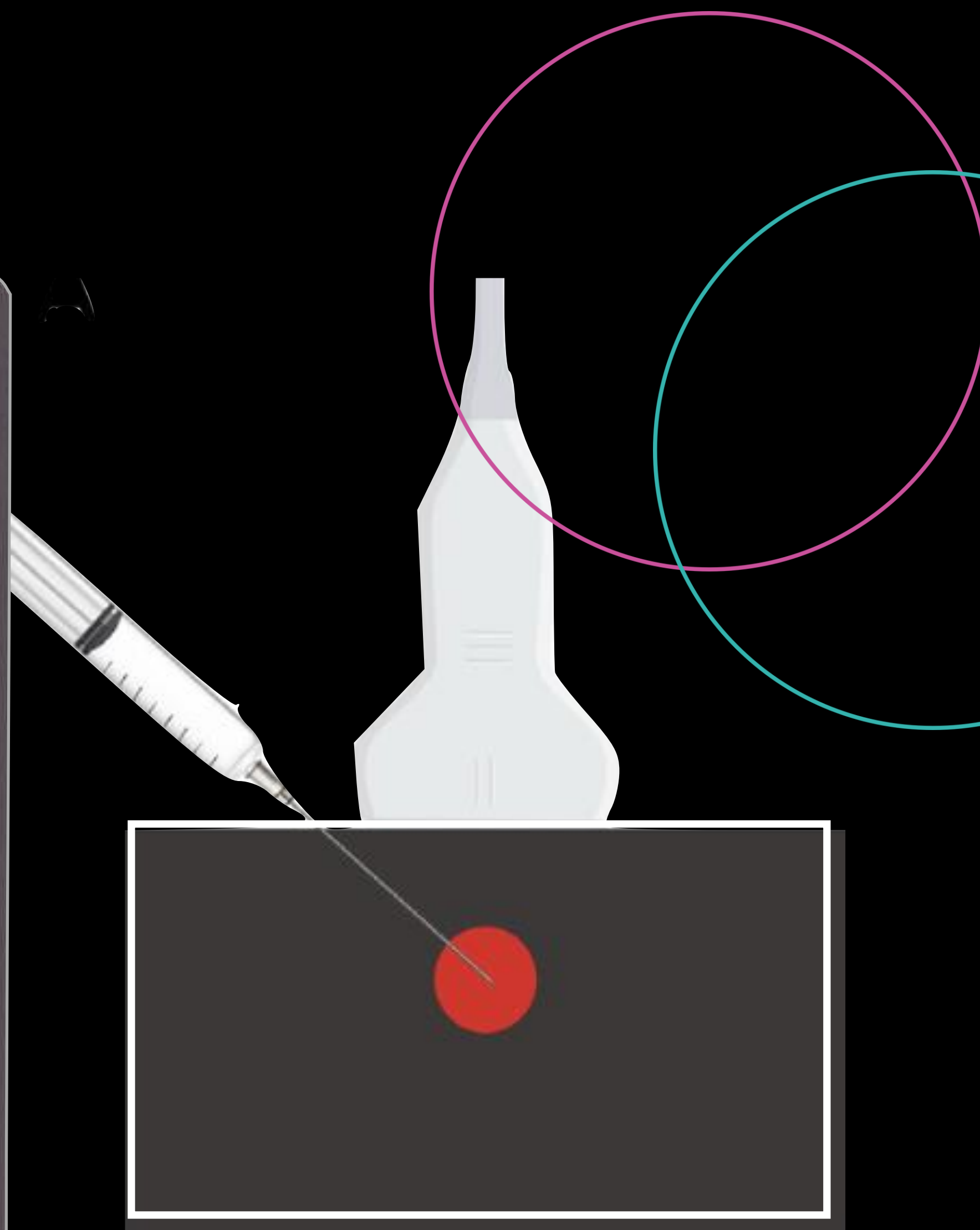
Natural Course of Severe TMJ Osteoarthritis Evaluated by a
 Novel Condylar Remodeling Scoring System and Quantitative Volumetric Analysis.
 Sun et al. International Journal of Oral and Maxillofacial Surgery, 2023.



Platelet-Rich Plasma Injection as an Effective Treatment for Temporomandibular Joint Osteoarthritis.
Hegab et. al., International Journal of Oral and Maxillofacial Surgery, 2015.

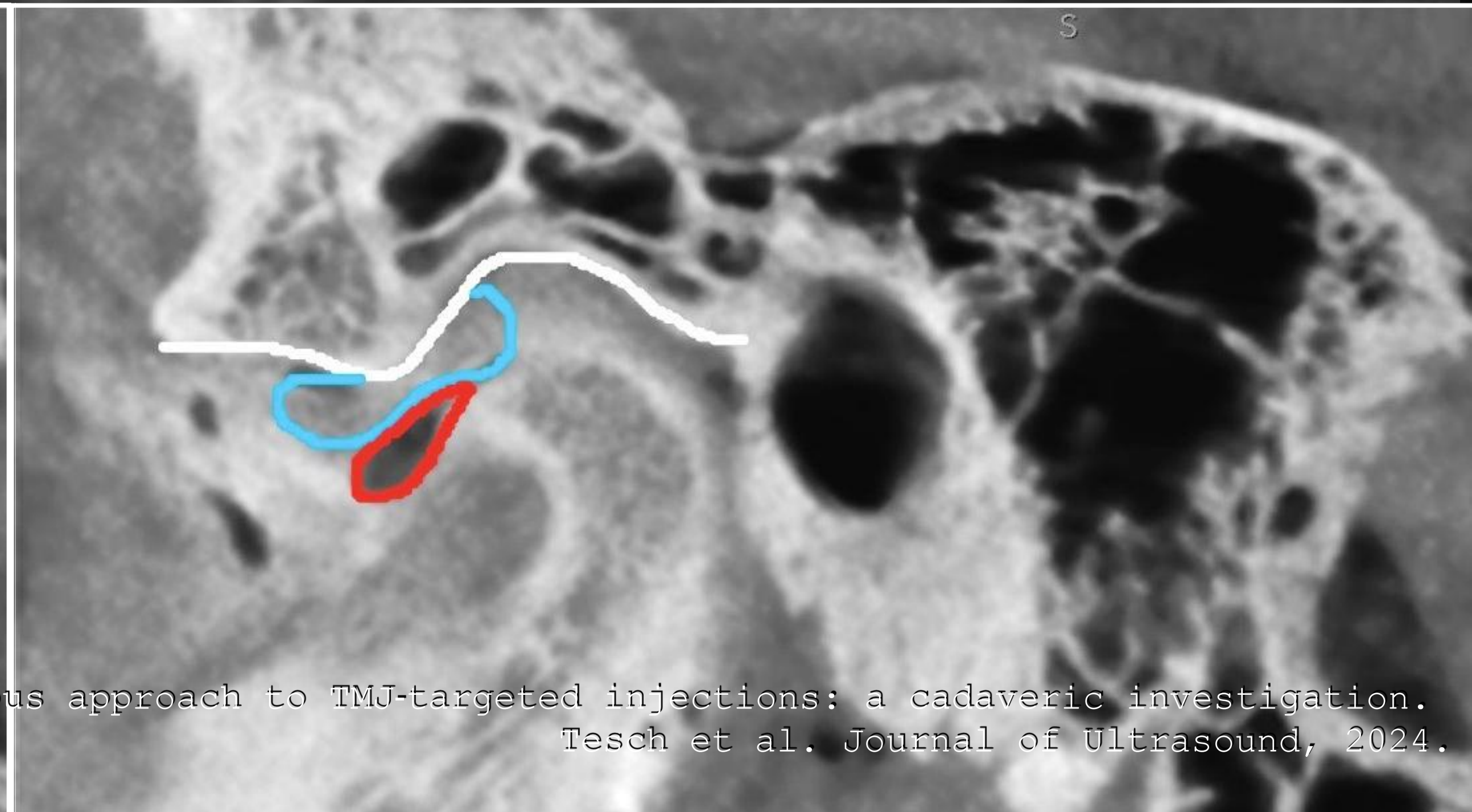
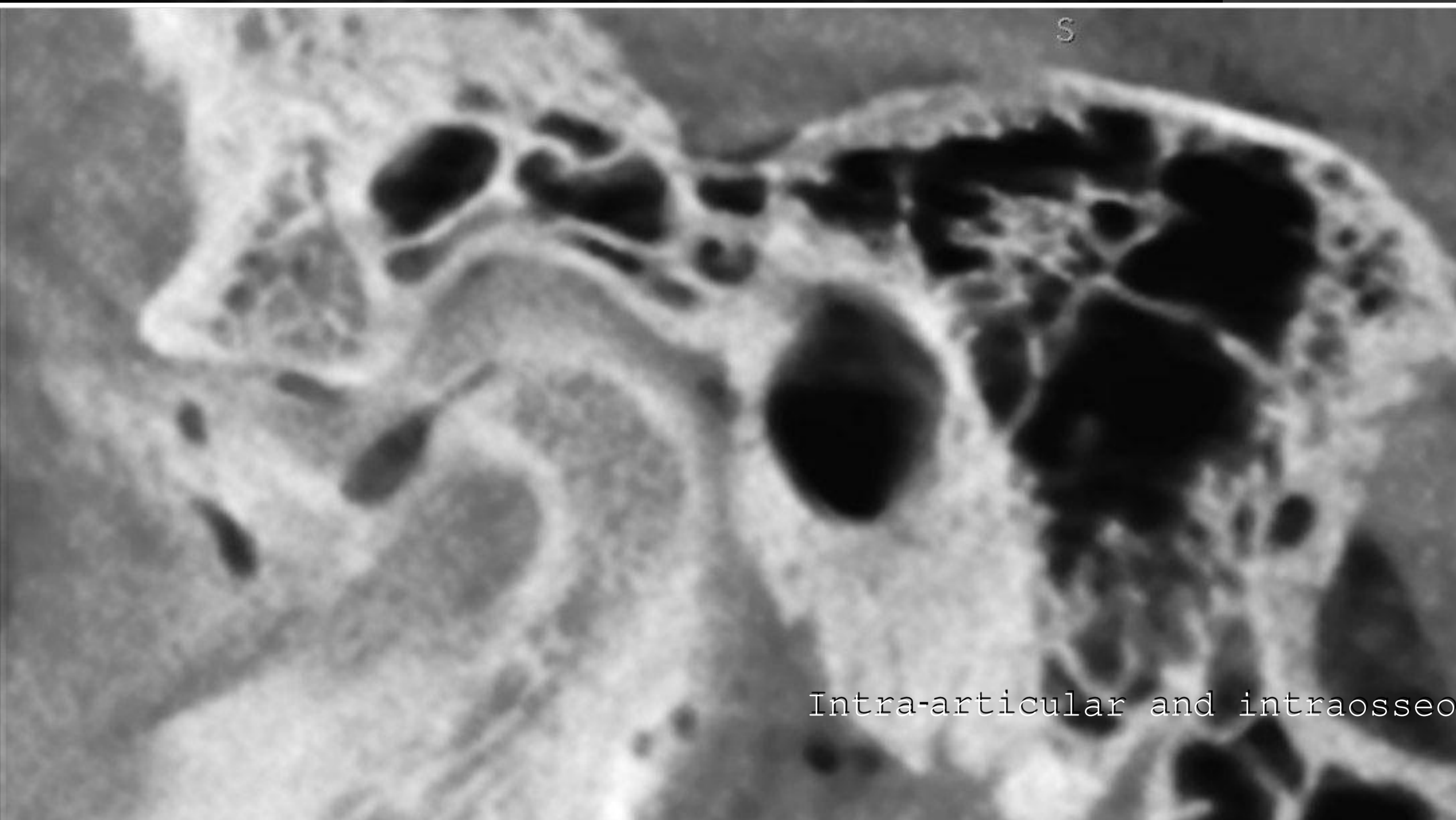
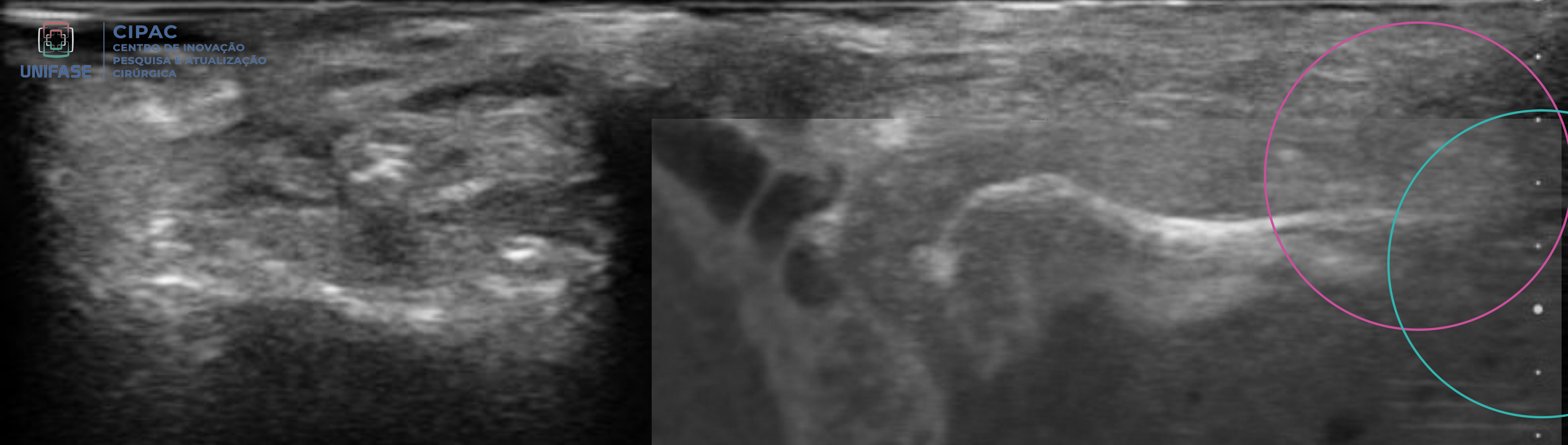


Therapy	Repair	Stable	Resorption
2.4. PRP injection group The PRP used in the experiment was prepared using a Regen ACR kit (Regenlab, Switzerland). Subsequently, 10 mL of blood was centrifuged at a low speed (1500 g, 9 min), using an LC-04C centrifuge, to obtain approximately 2 mL of PRP. Under ultrasound guidance, approximately 0.8 mL of PRP was injected into the inferior space of the patient's TMJ. The entire process did not exceed 30 min. Each patient received one injection. 2.5. HA injection group Under ultrasound guidance, approximately 0.8 mL of HA (Freda, China) was injected into the inferior space of the TMJ. Each patient received two injections, with a 14-day interval in between.			
			$p \leq 0.005$

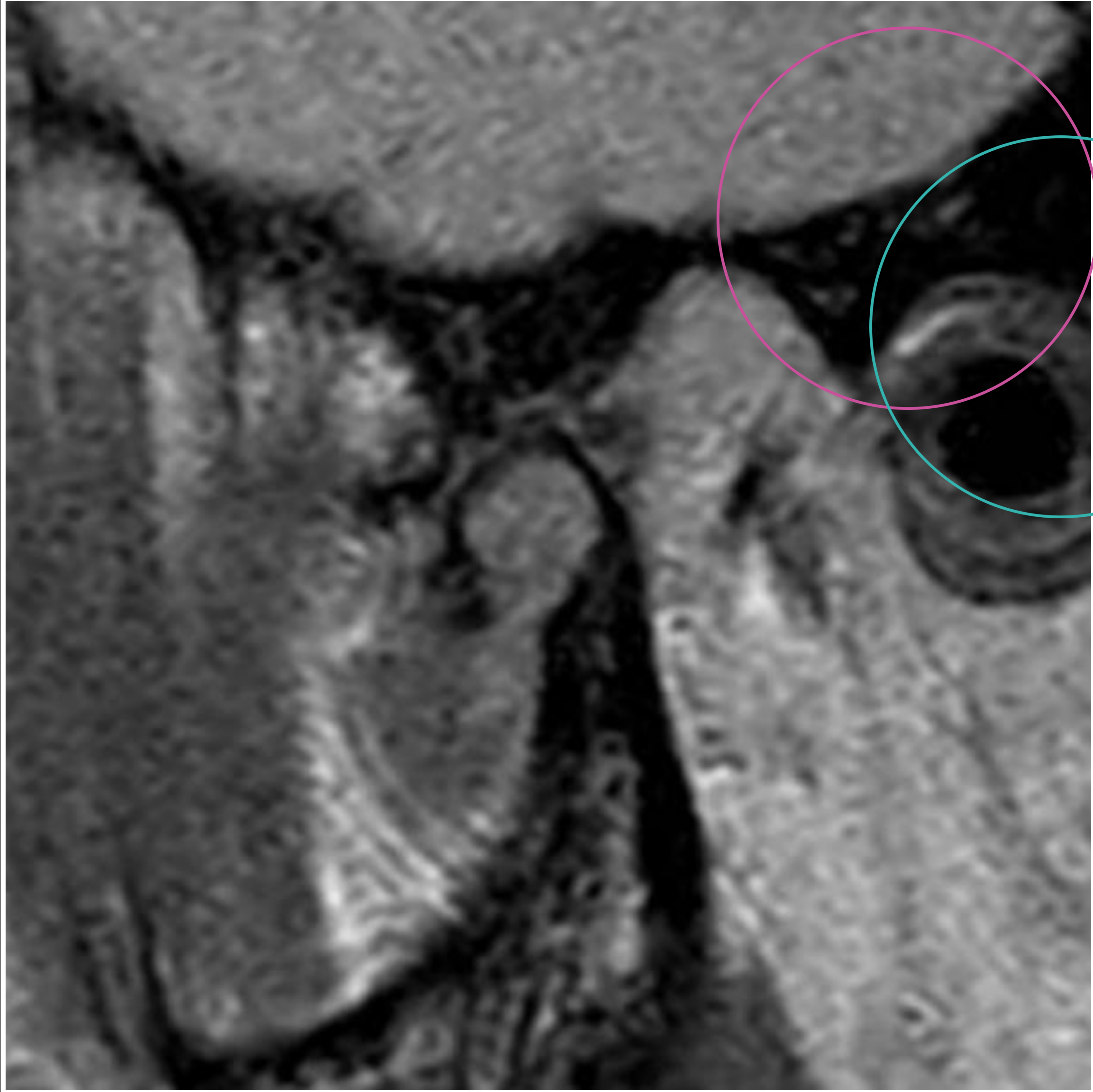


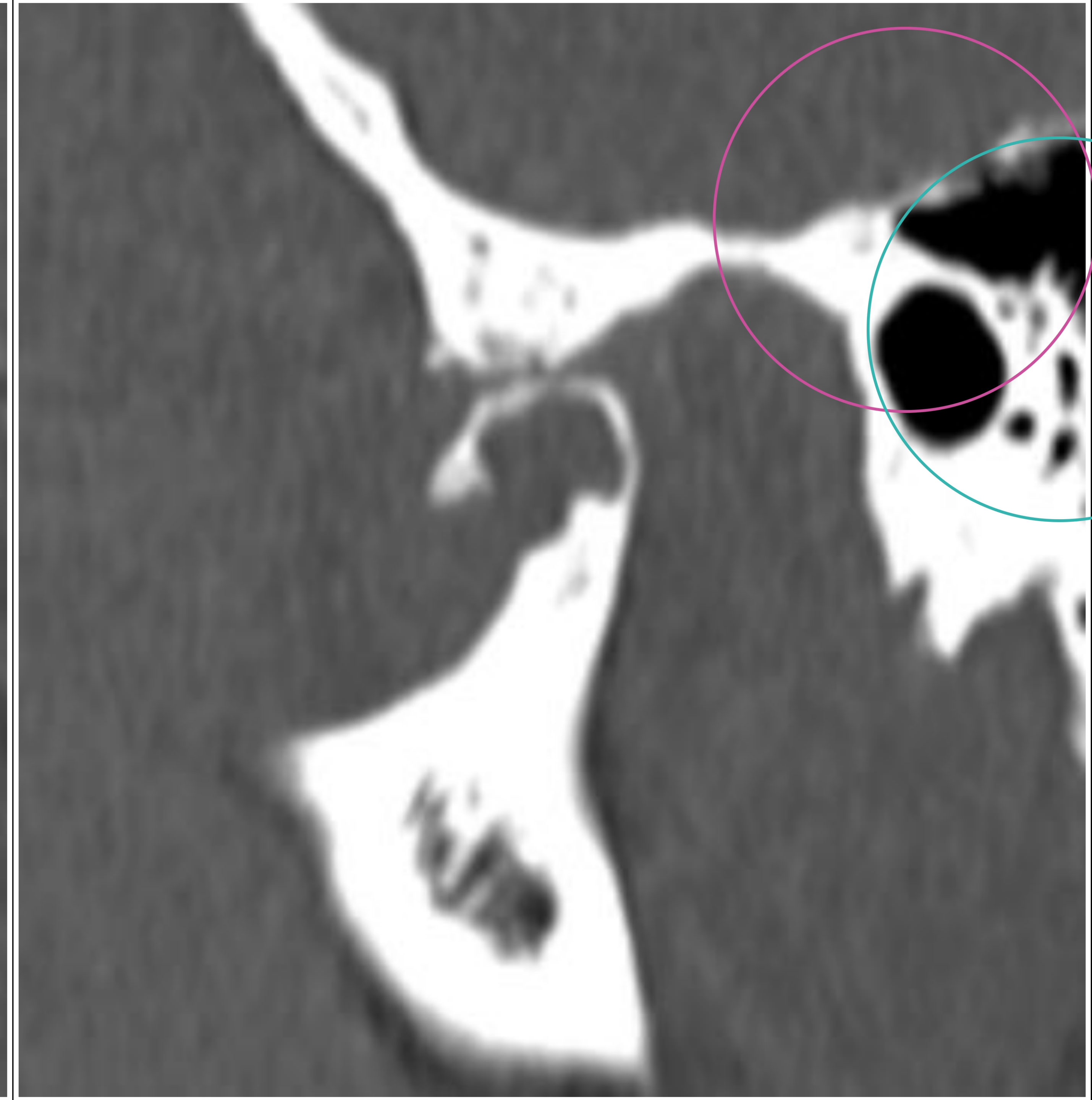
***Access to the Superior TMJ Space
Ultrasound-Guided – Mouth Open***

***Access to the Superior TMJ Space
Blind – Mouth Open***



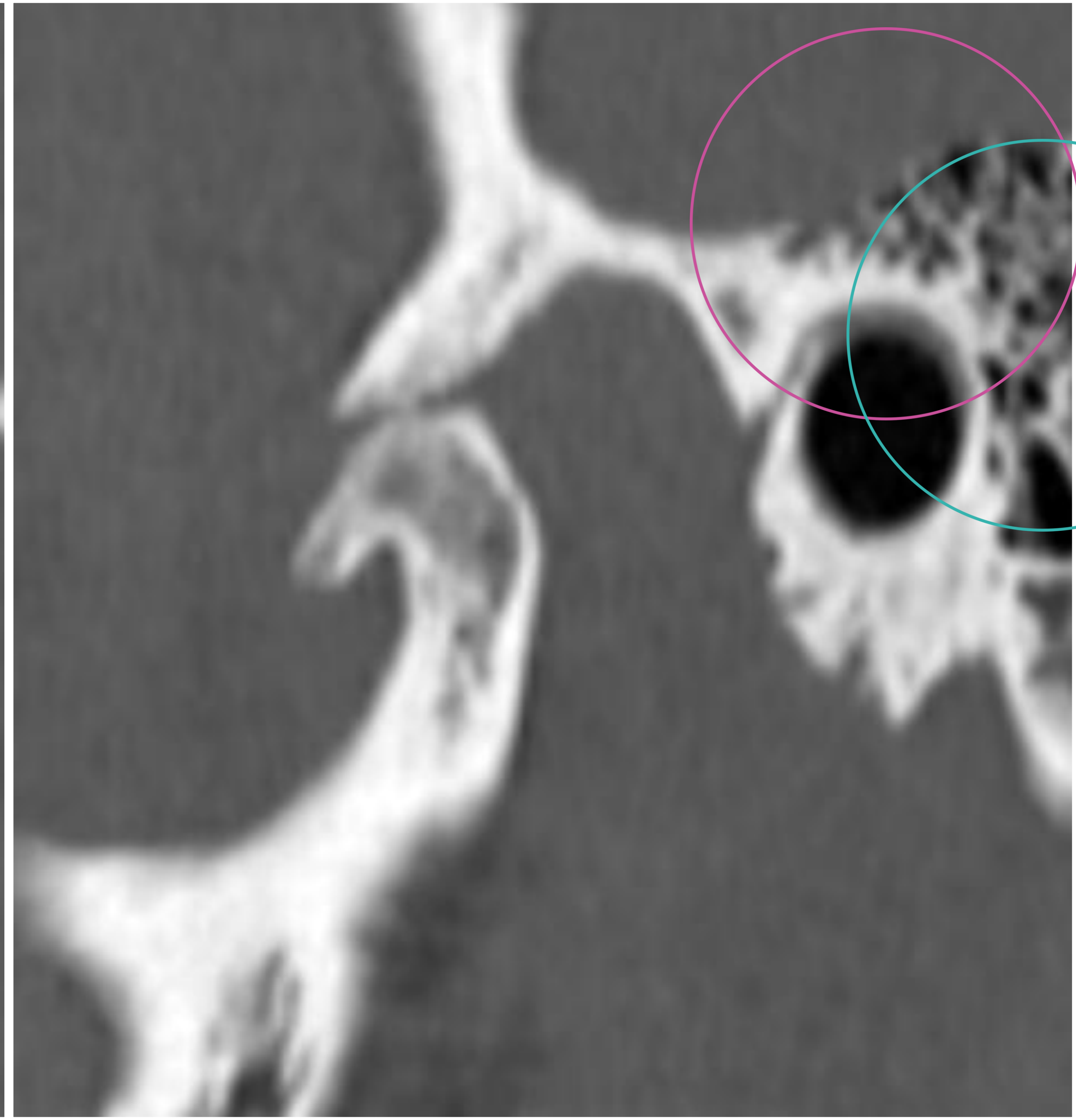
Intra-articular and intraosseous approach to TMJ-targeted injections: a cadaveric investigation.
Tesch et al. Journal of Ultrasound, 2024.

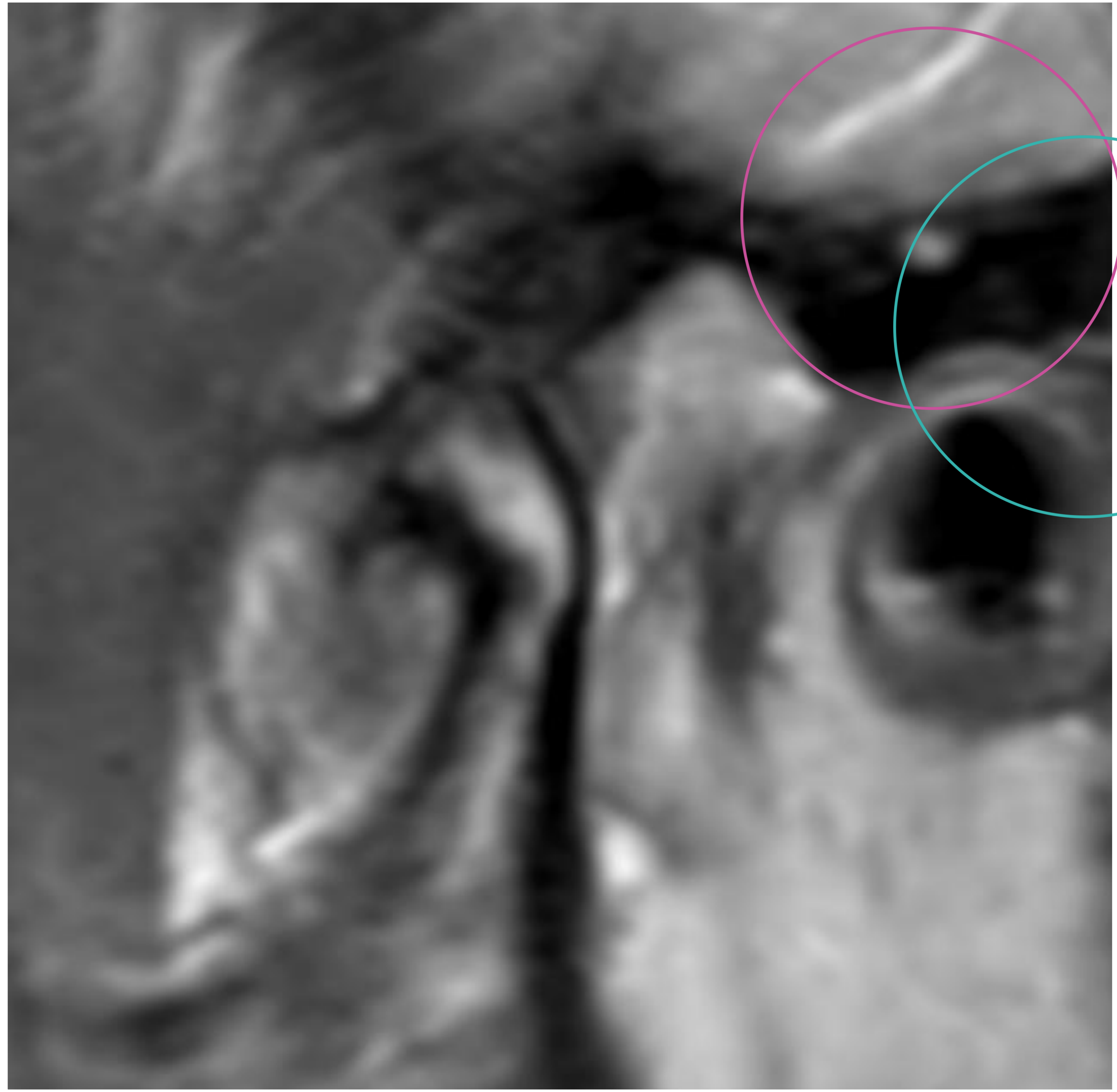
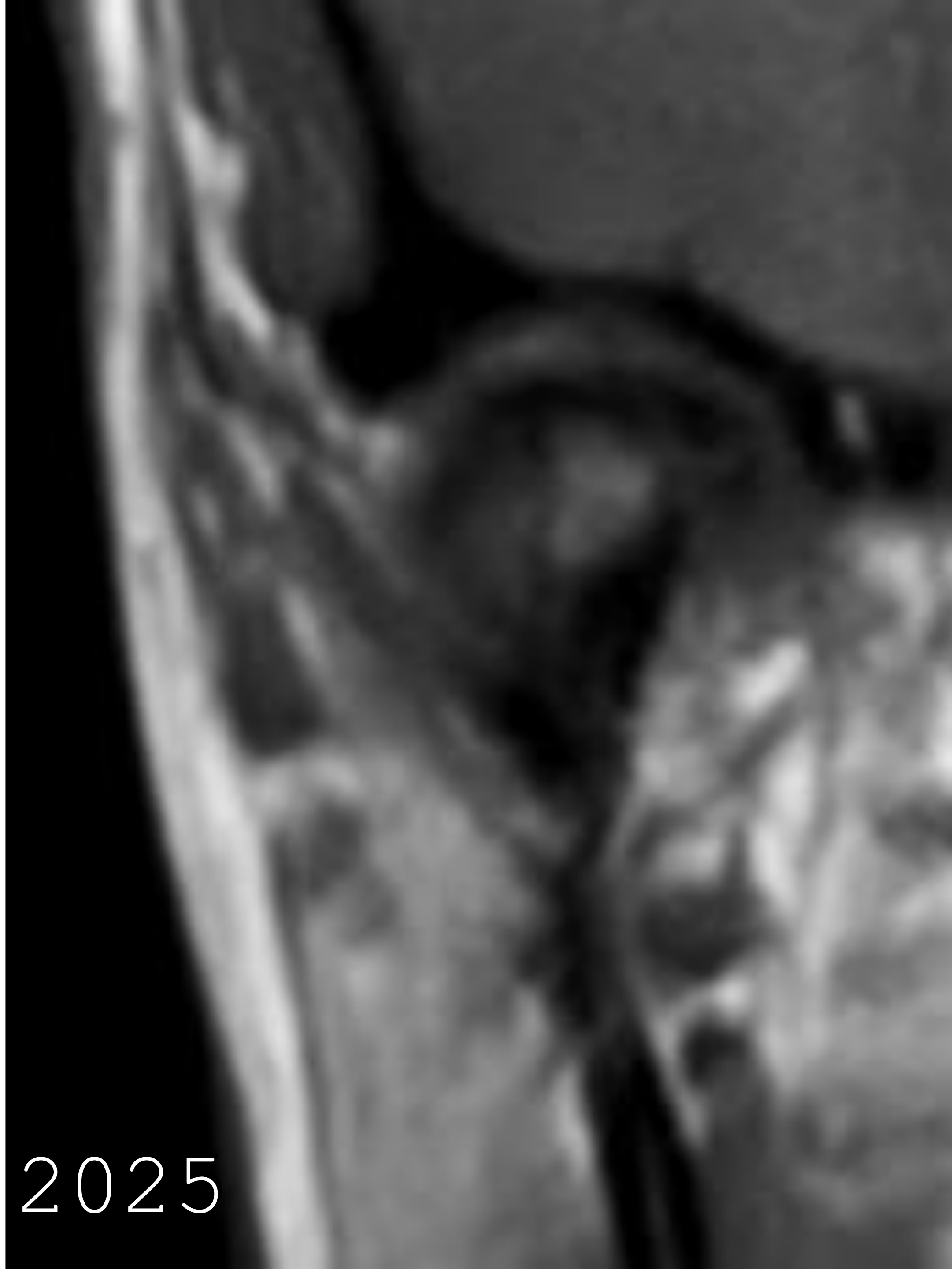






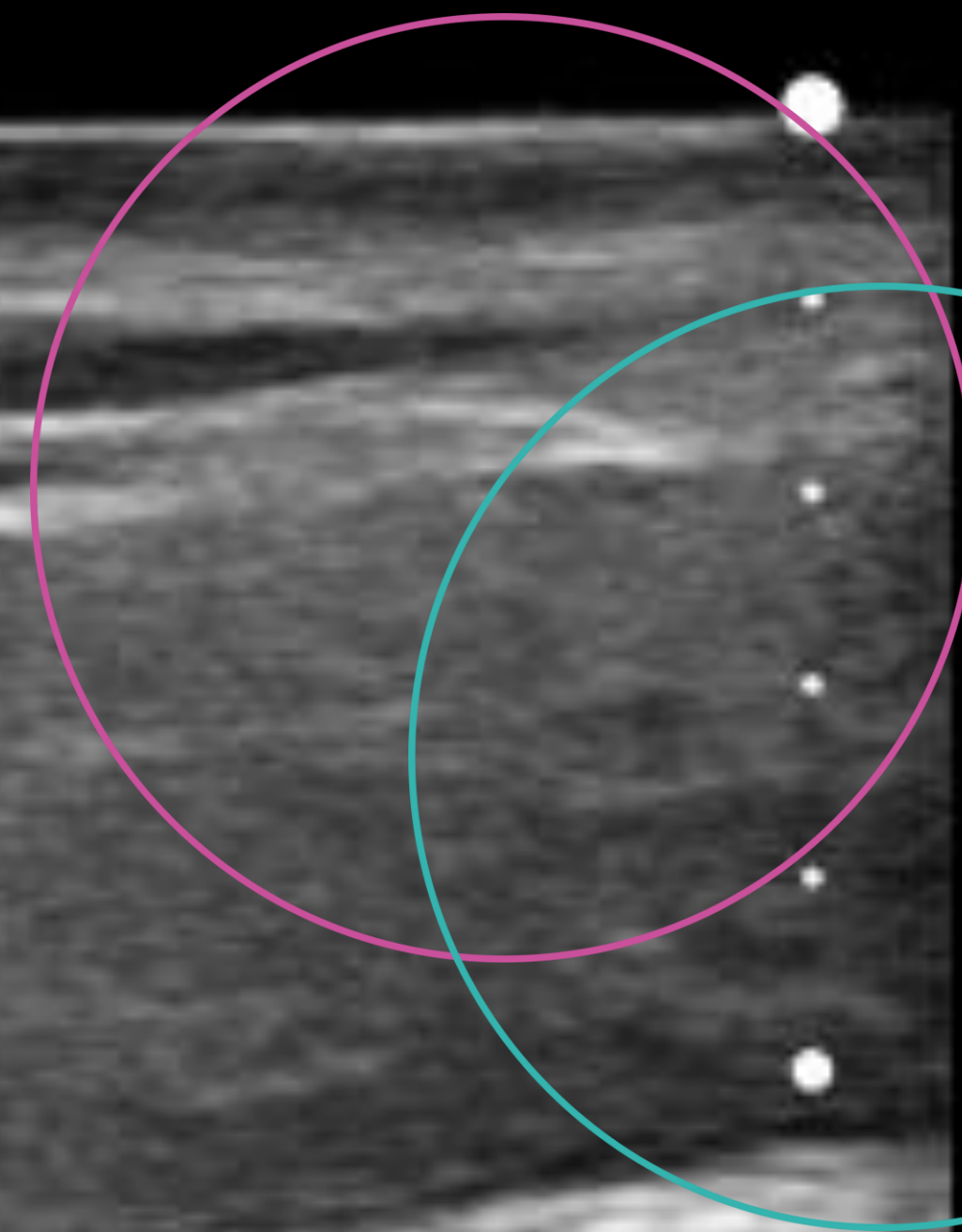
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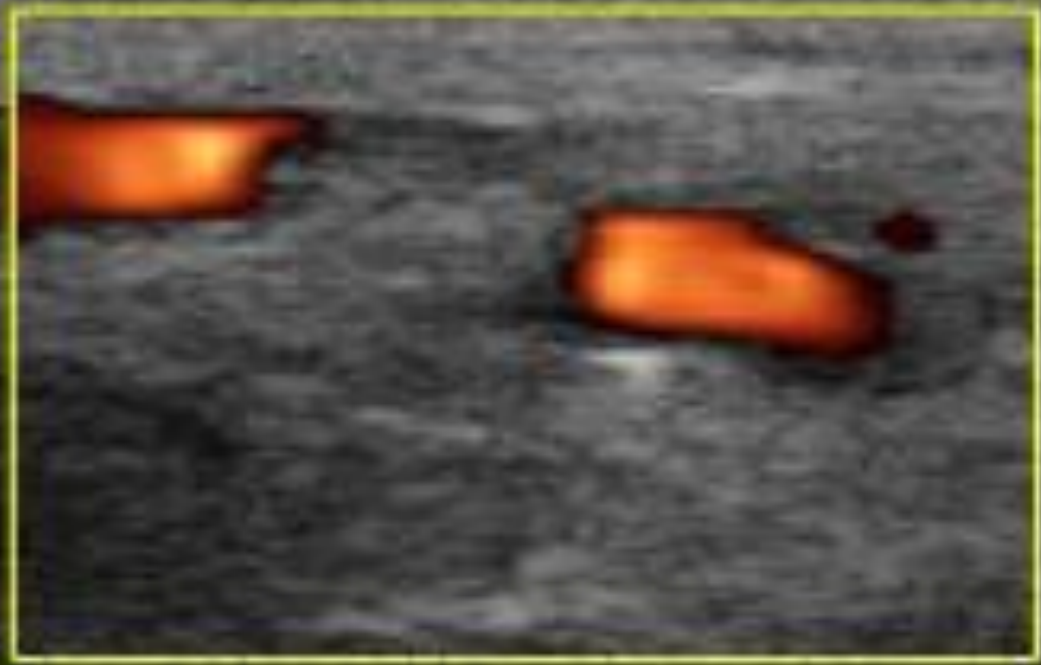




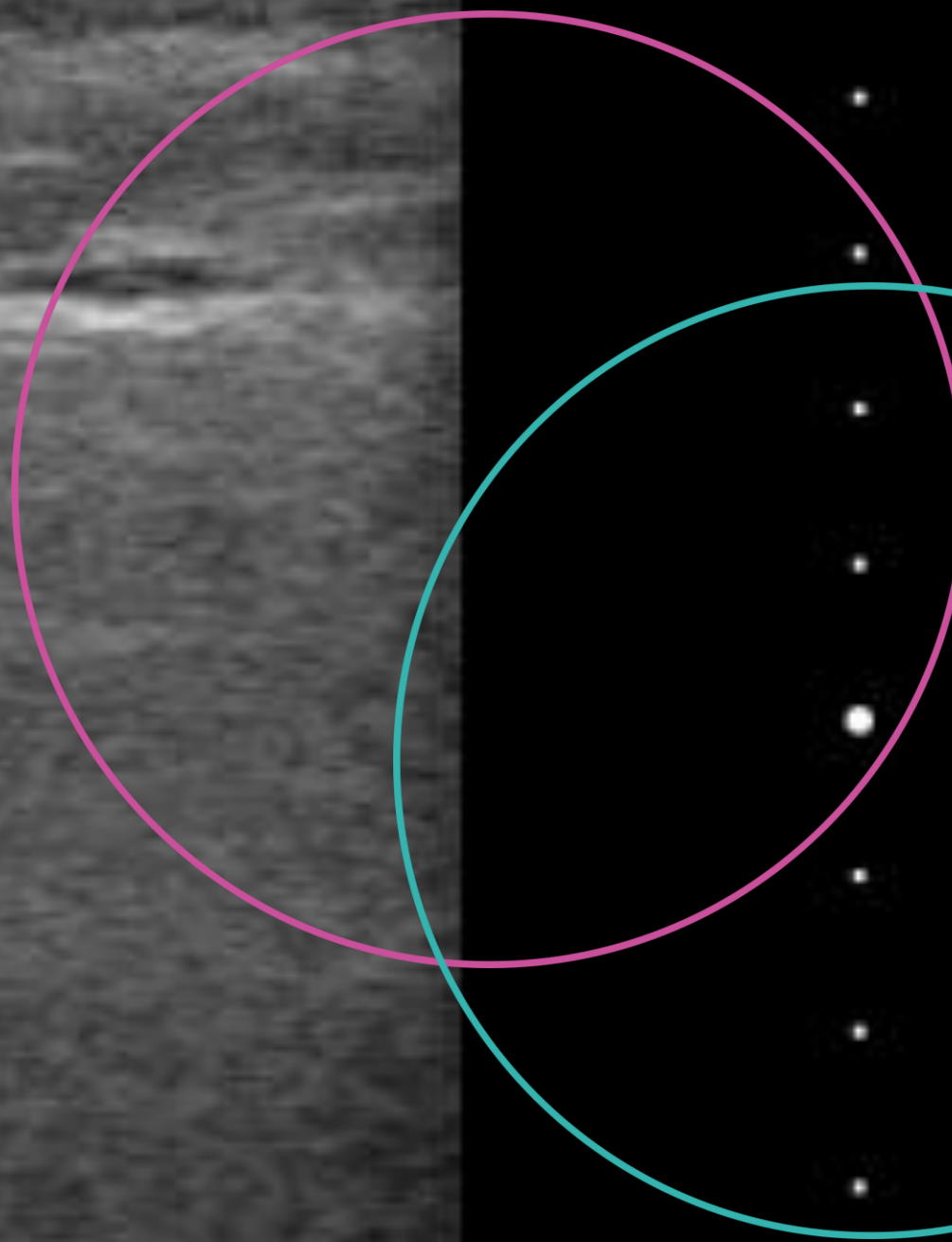
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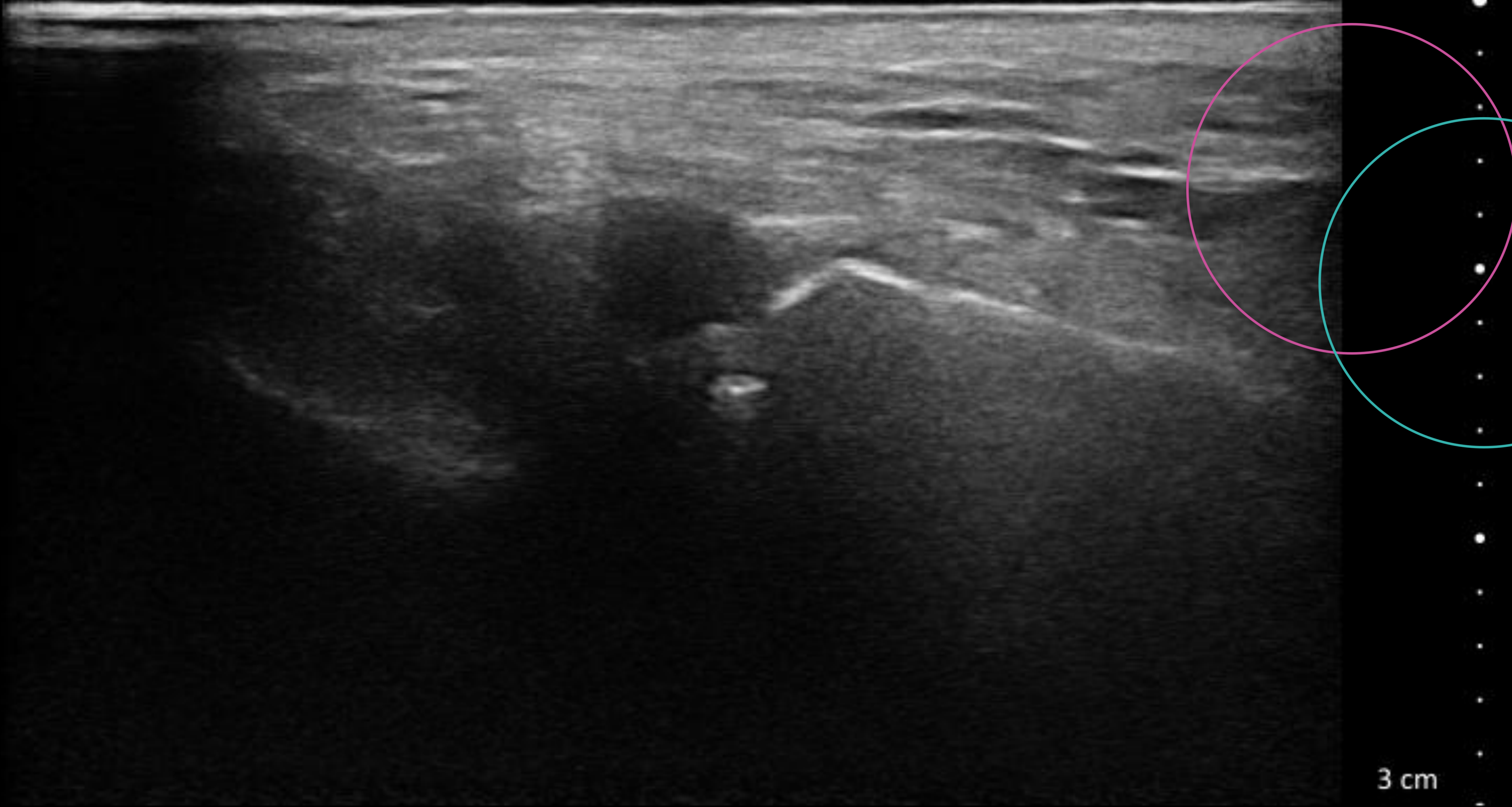
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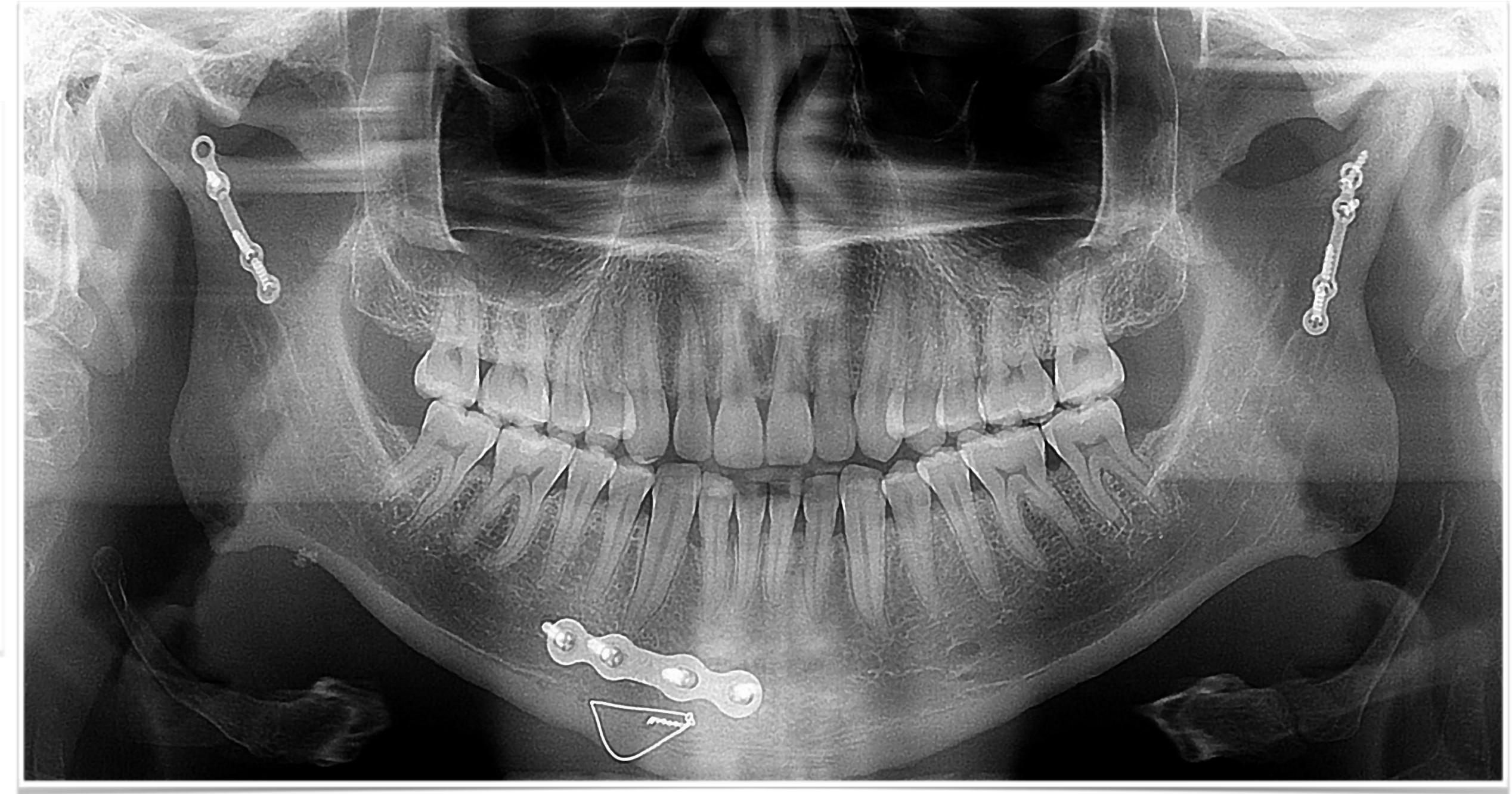
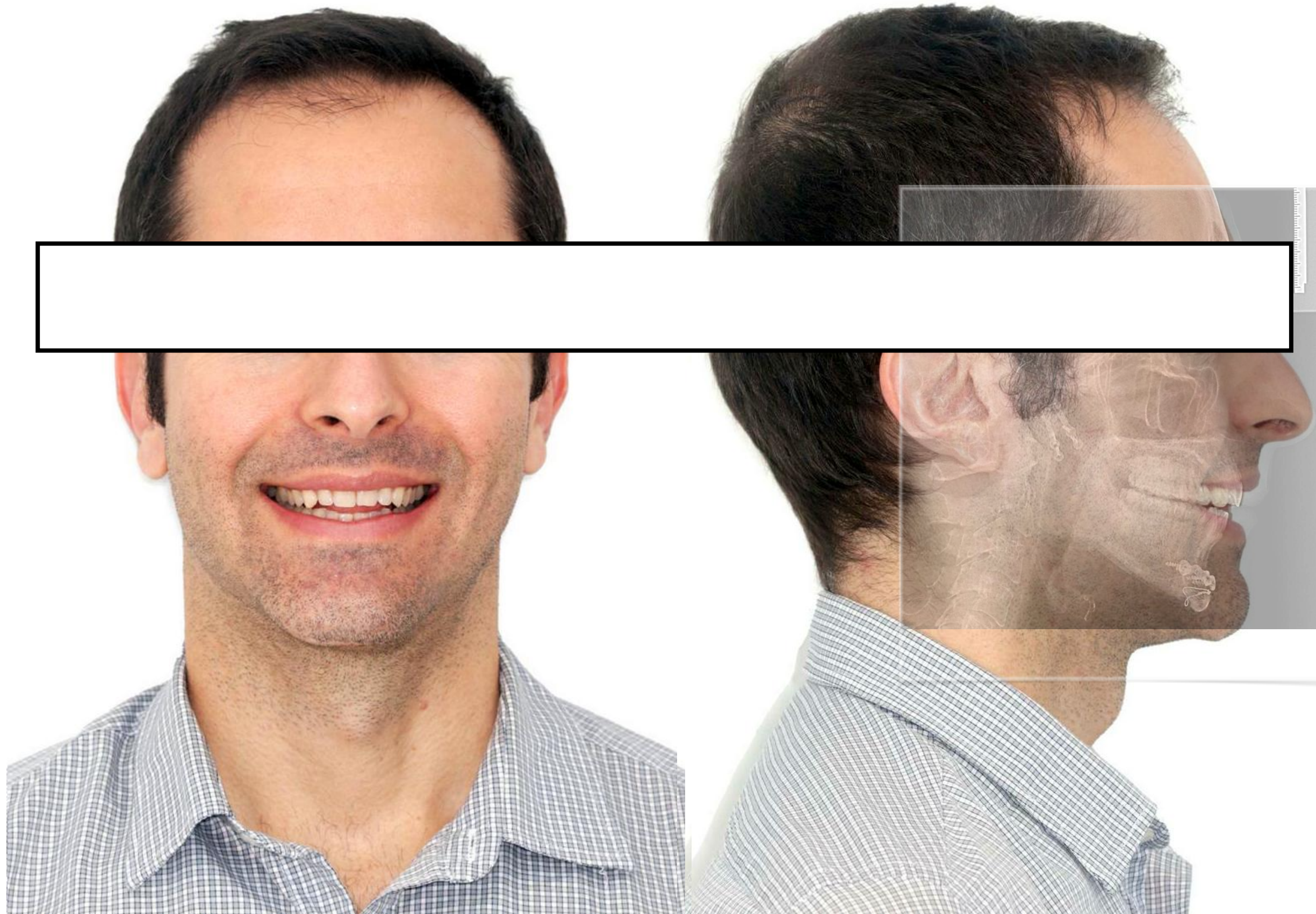
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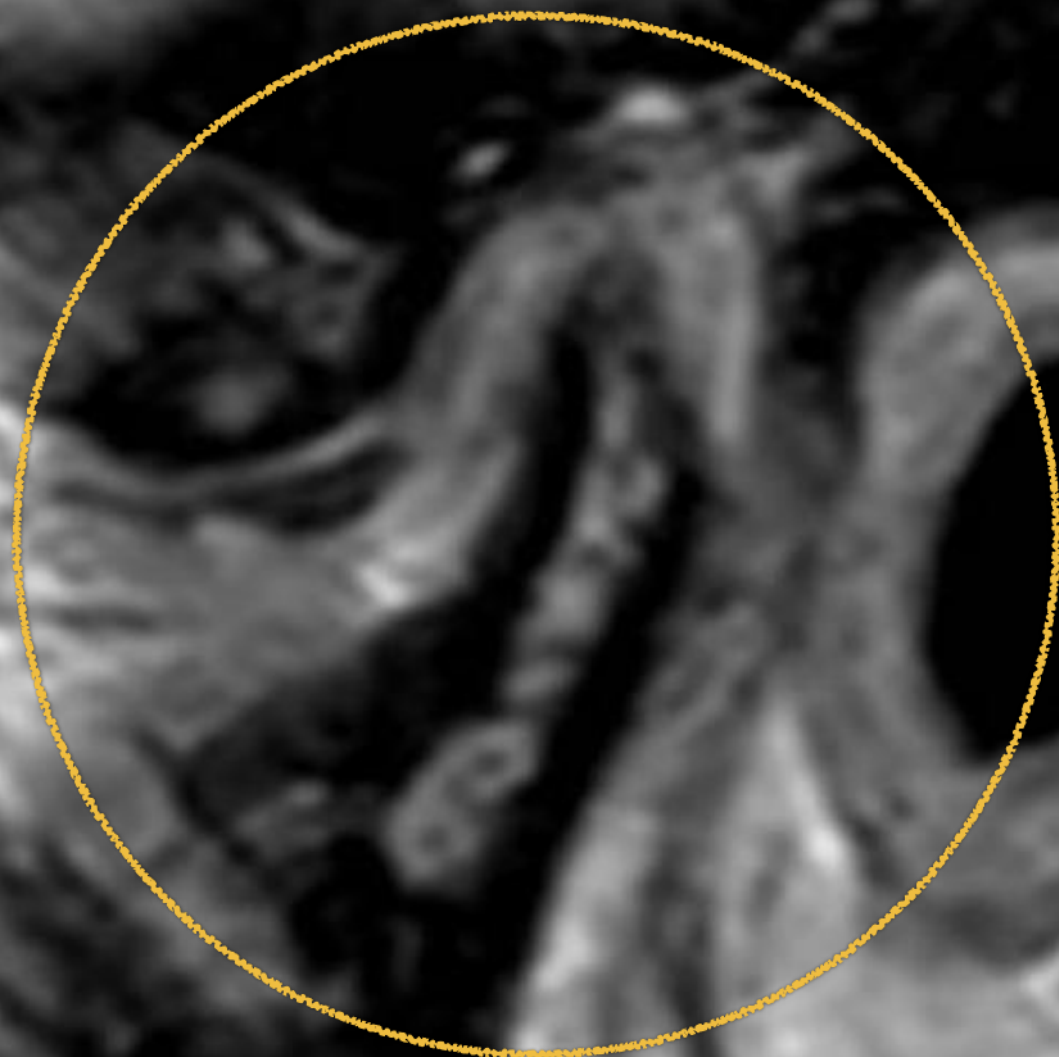
3 cm



3 cm

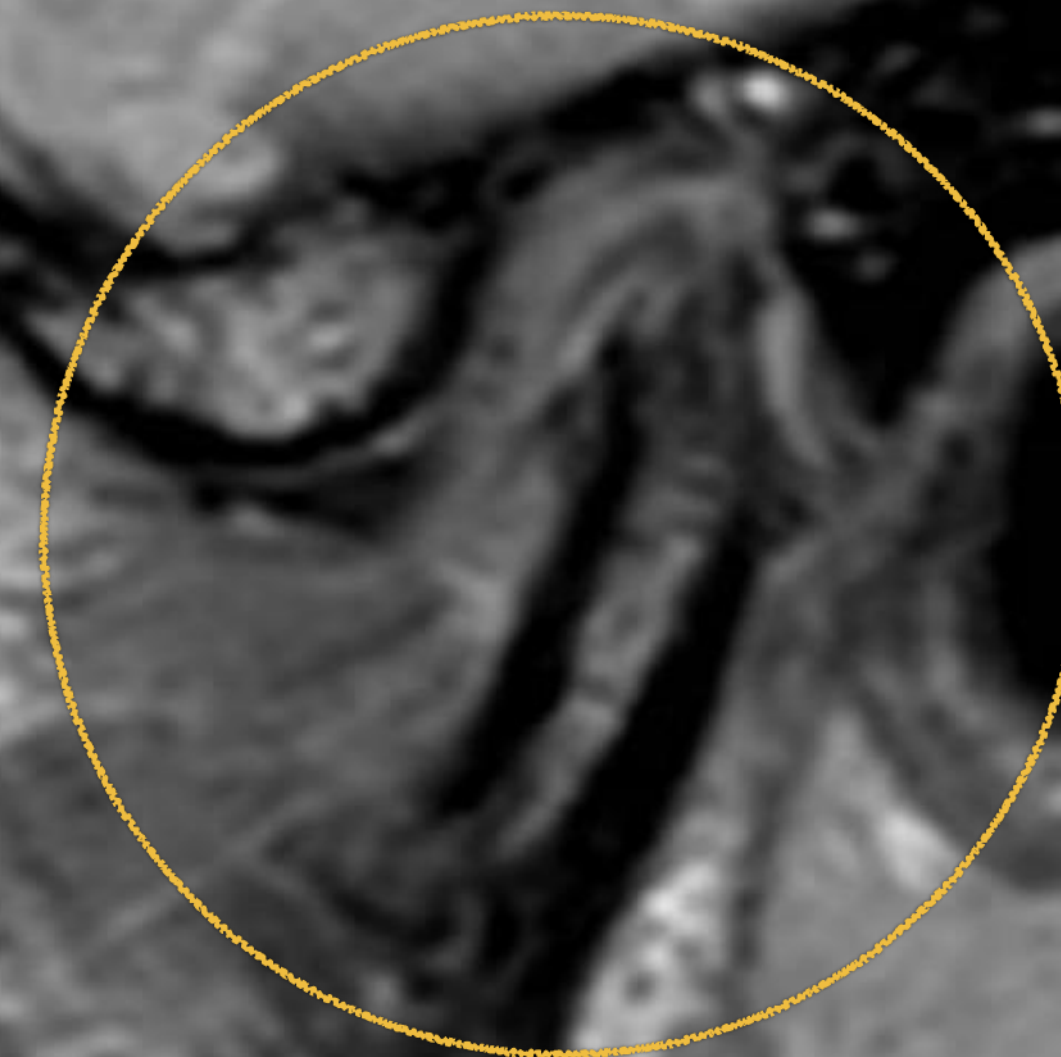


Condylar Resorption and Bone Regeneration Following Mandibular Trauma: A Case Report.
American Academy of Orofacial Pain 49th Scientific Meeting, 2025.



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Condylar Resorption and Bone Regeneration Following Mandibular Trauma: A Case Report.
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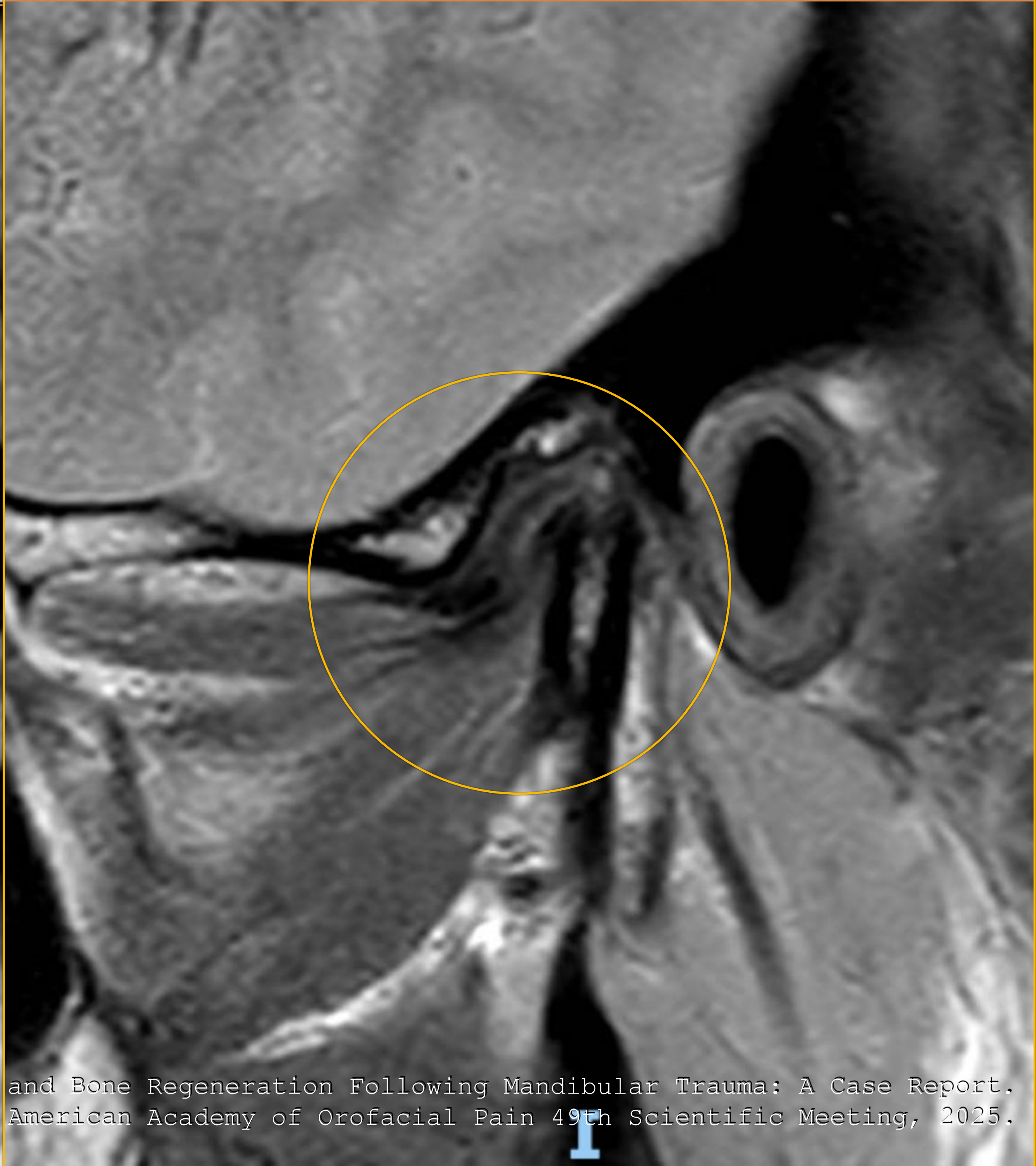
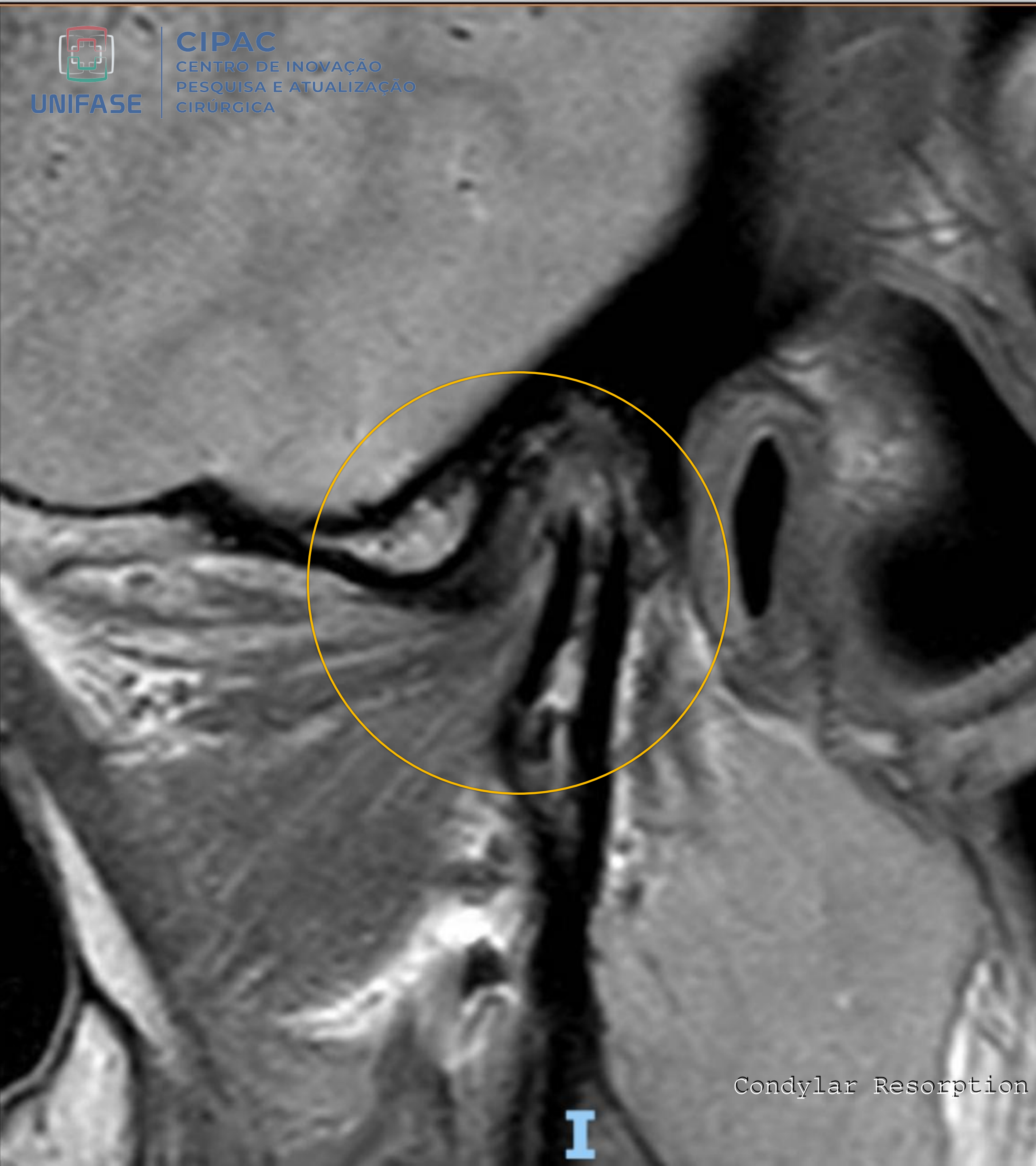
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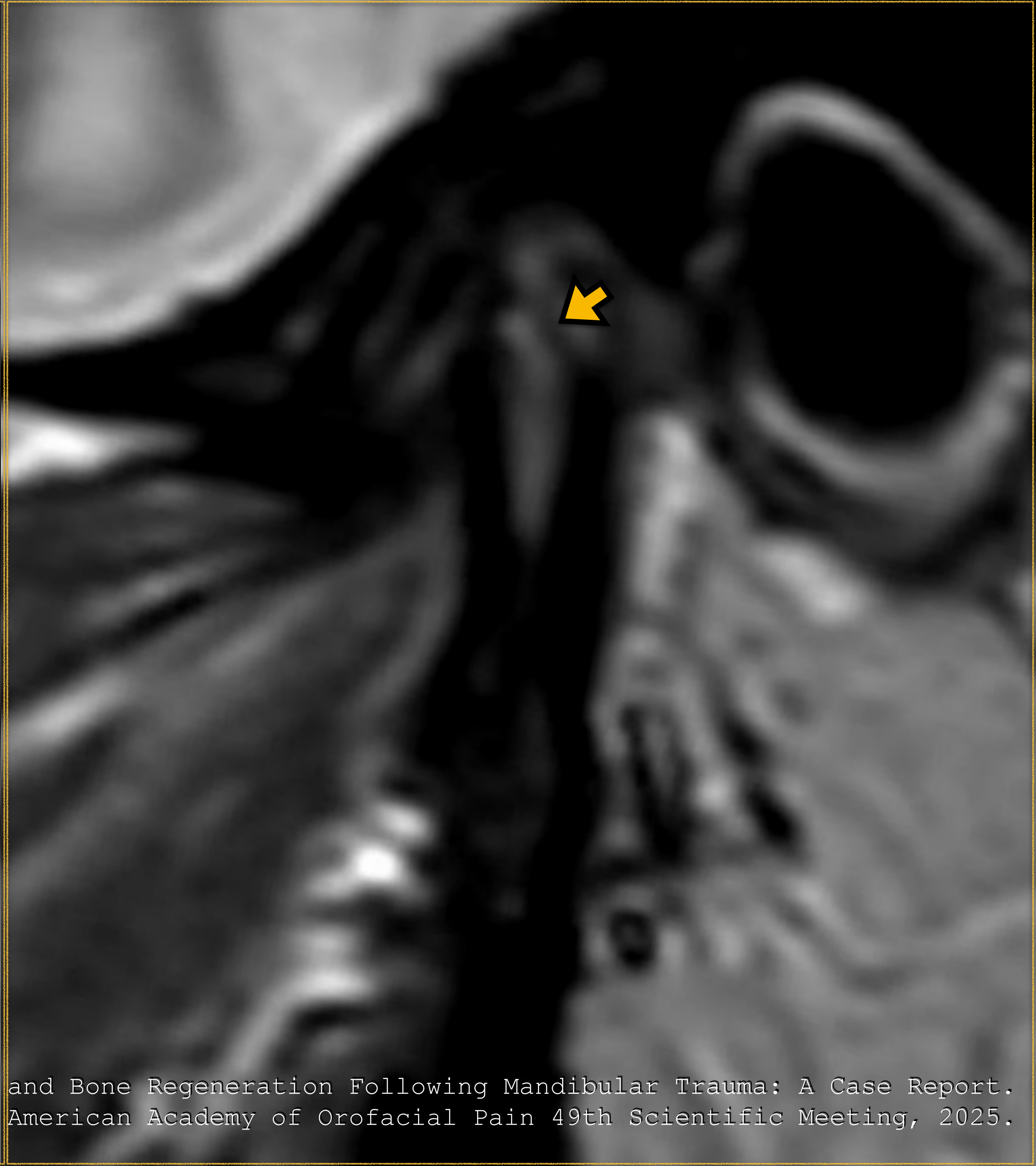
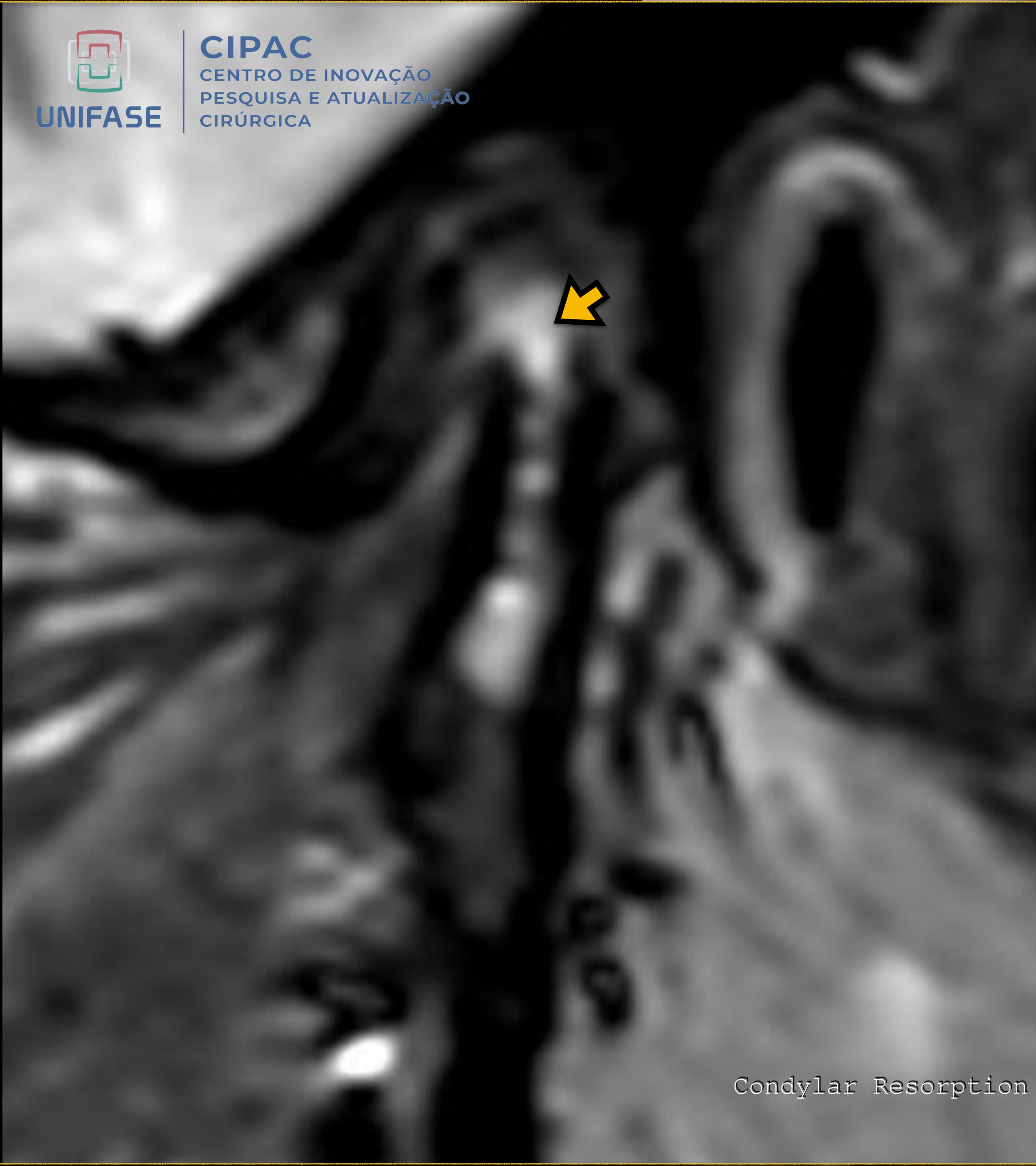


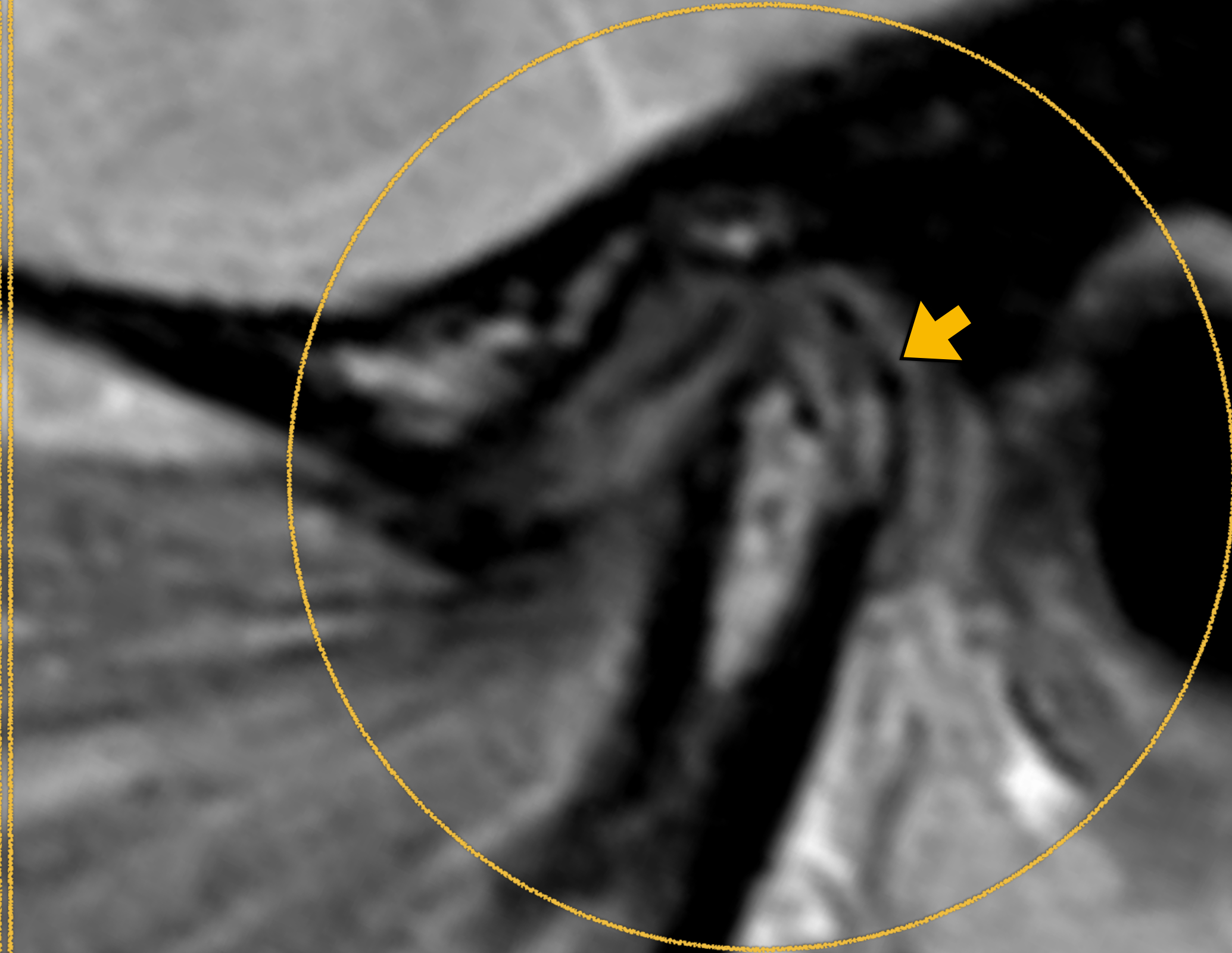
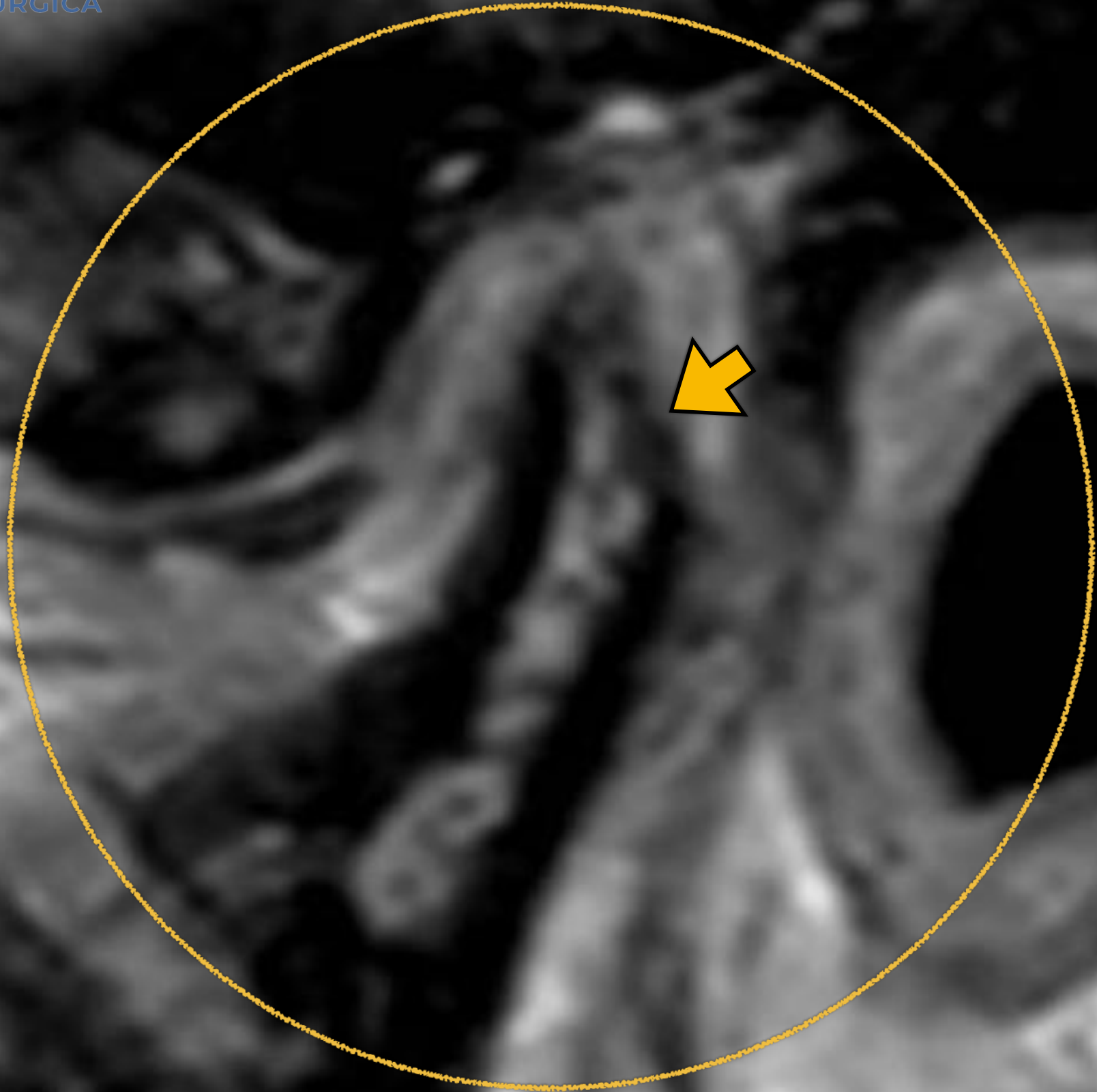
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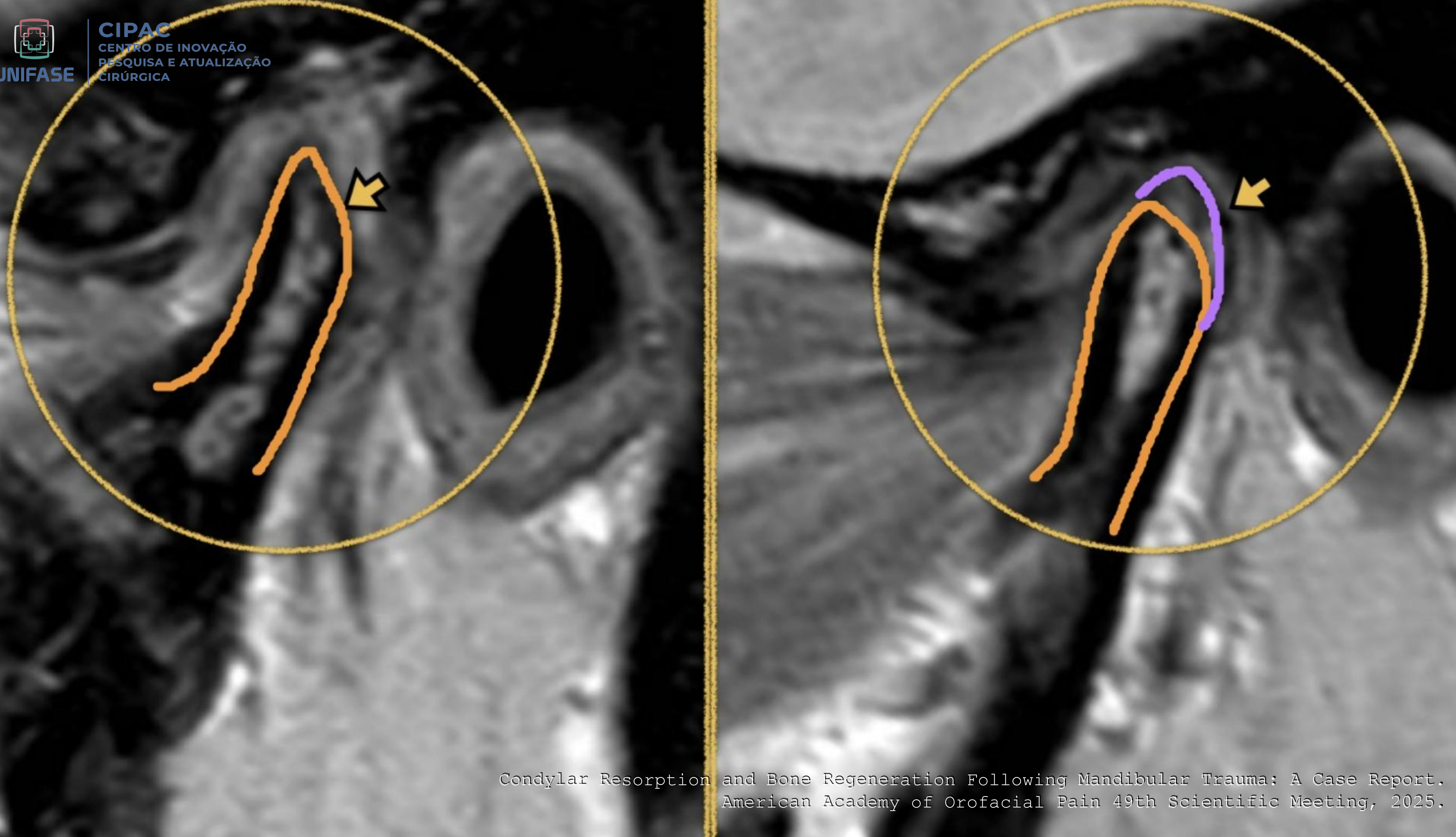


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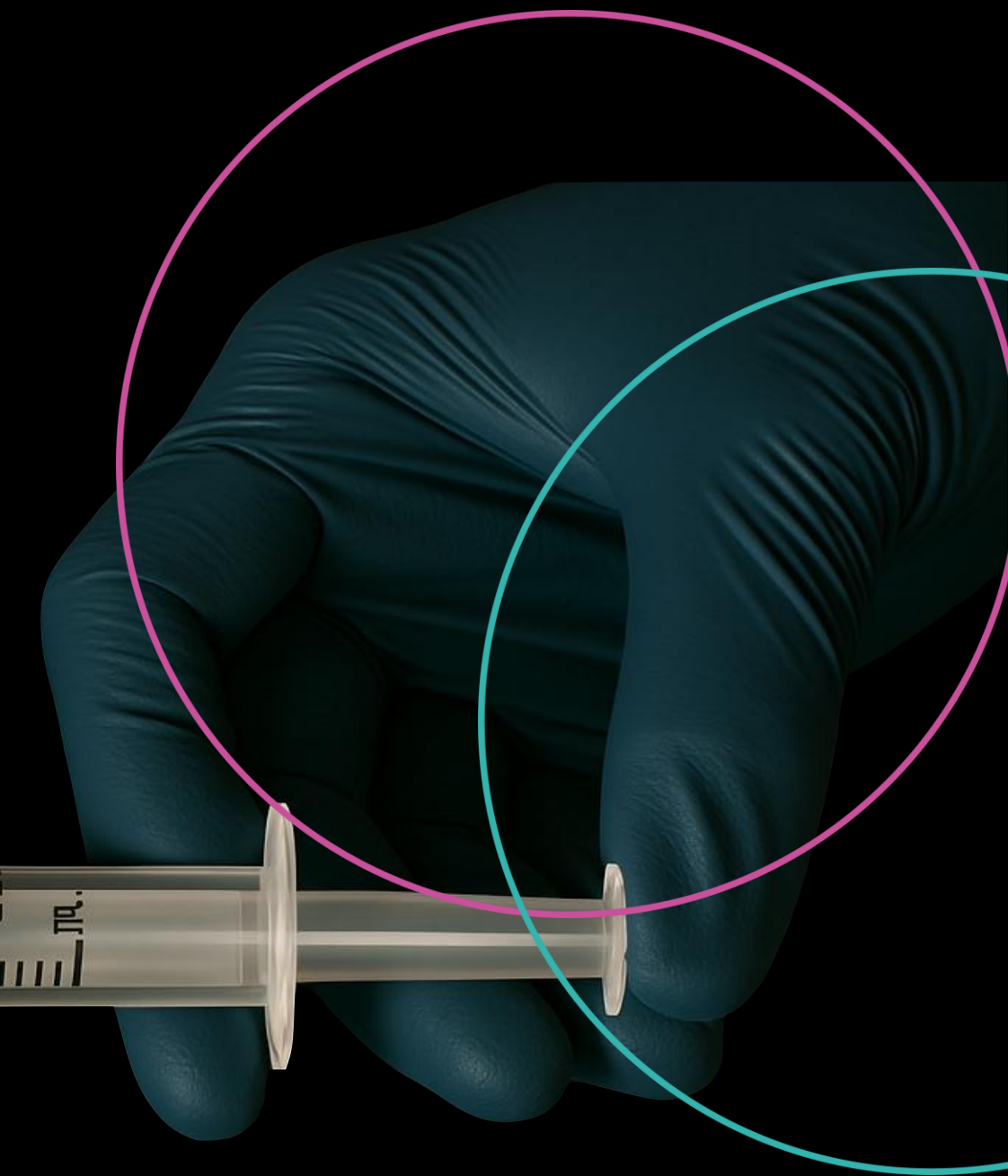
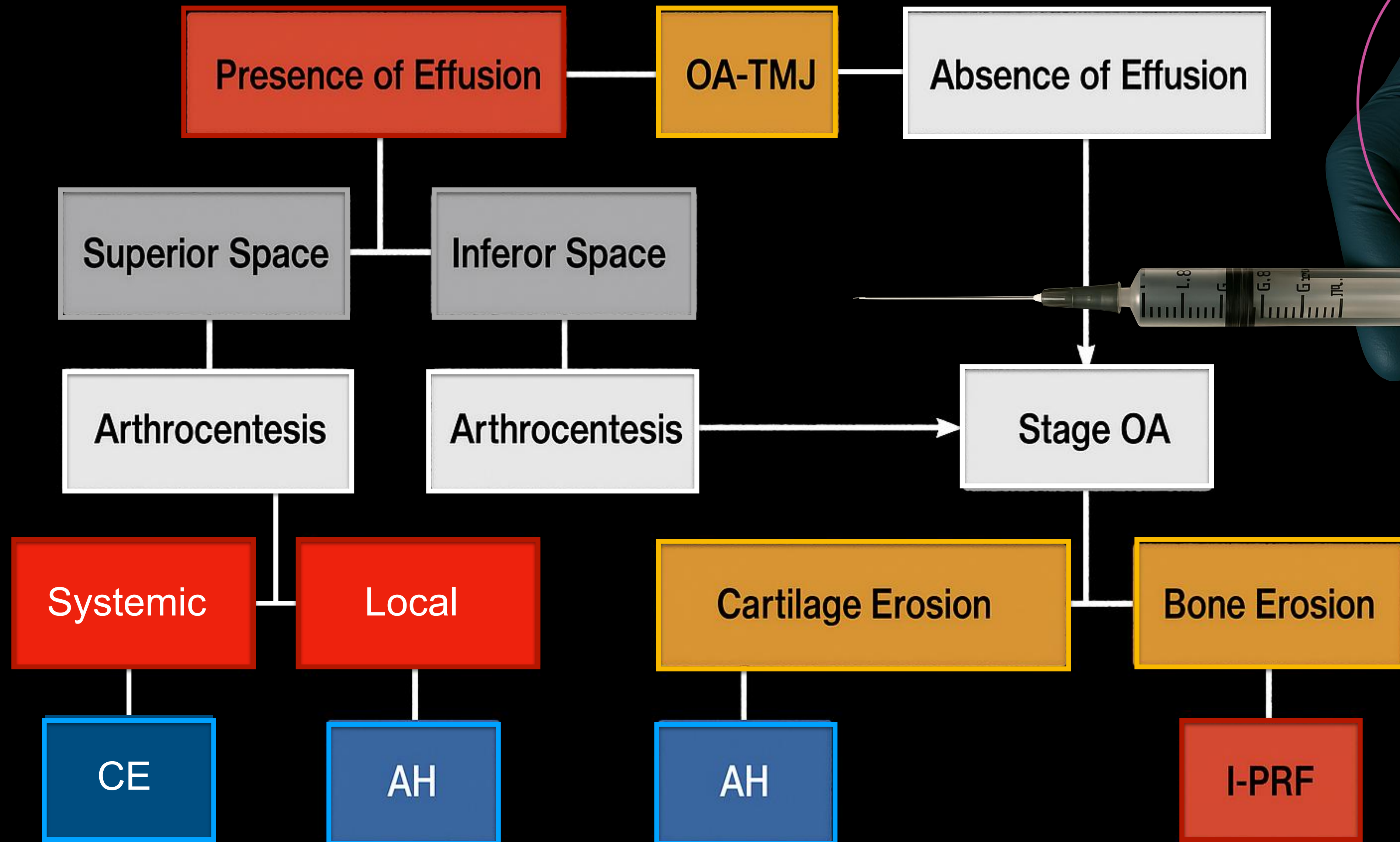




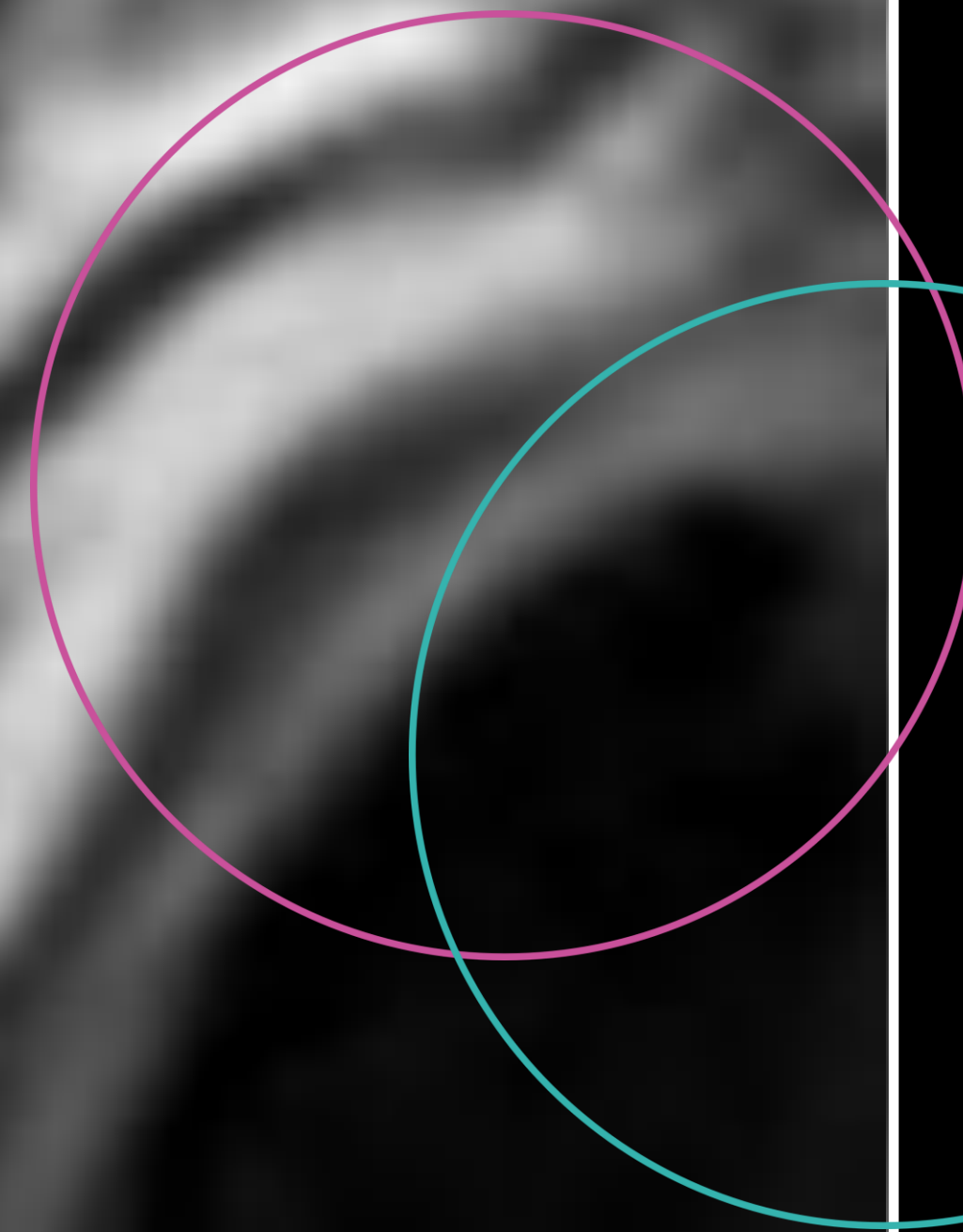
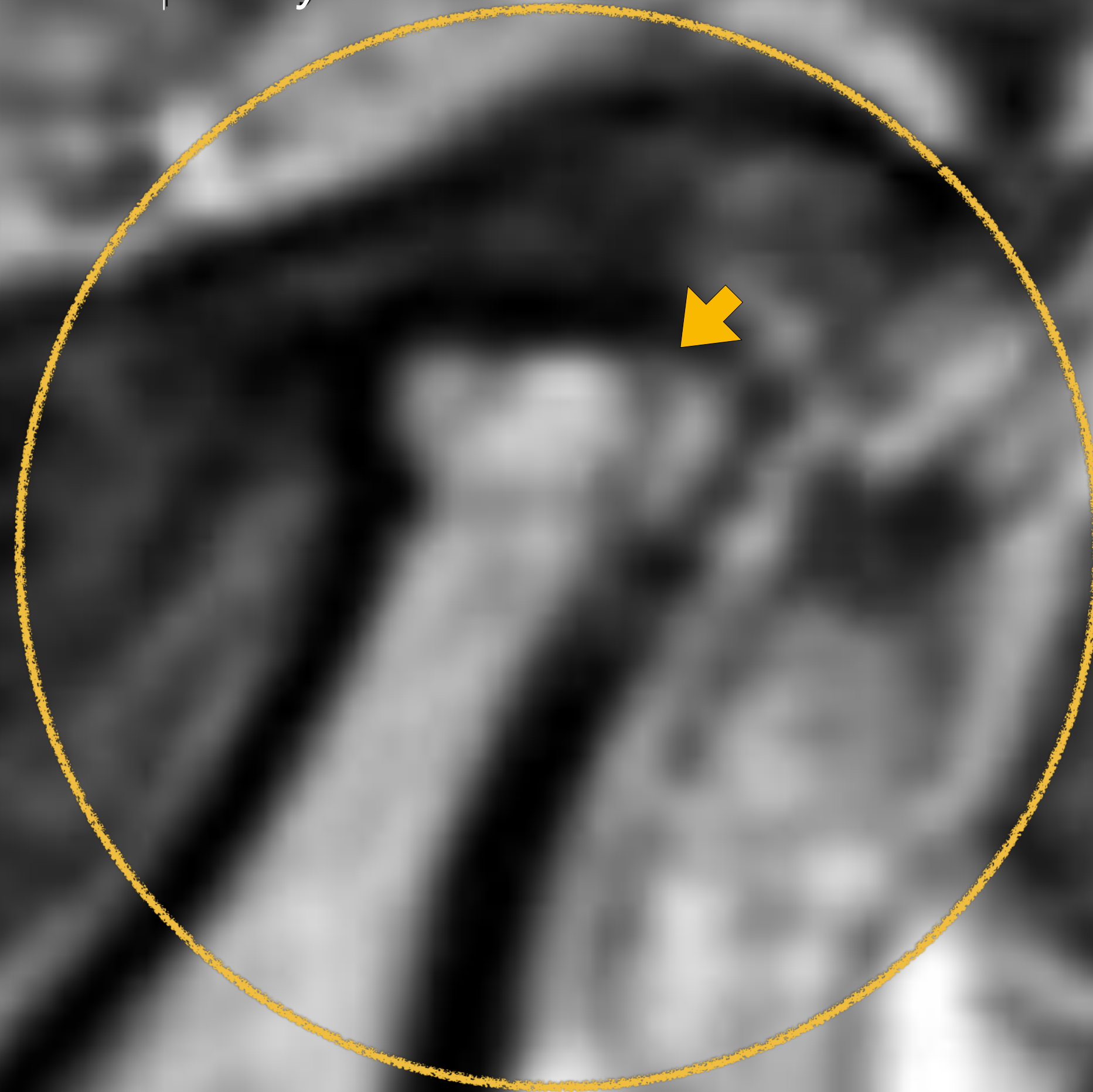


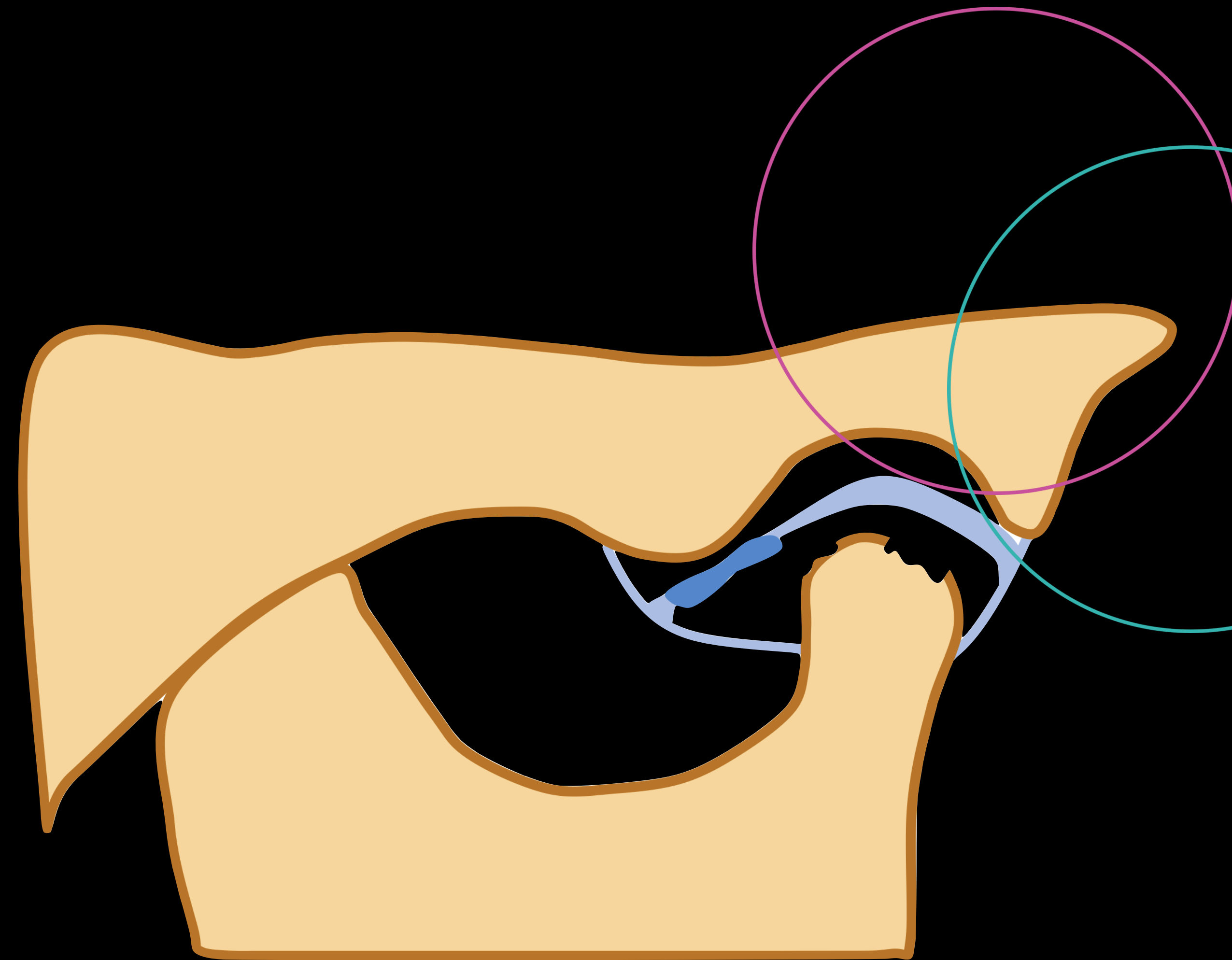




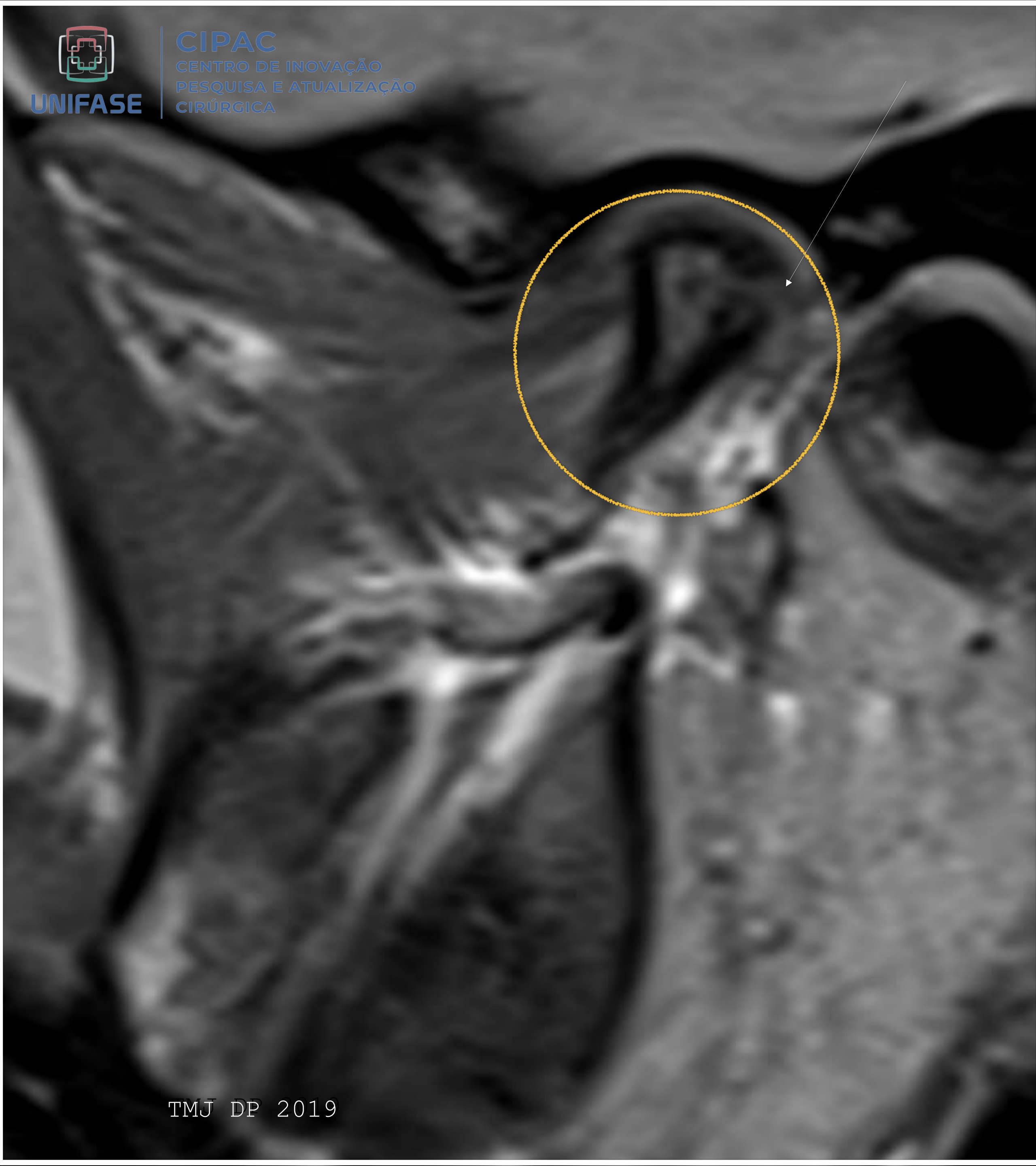


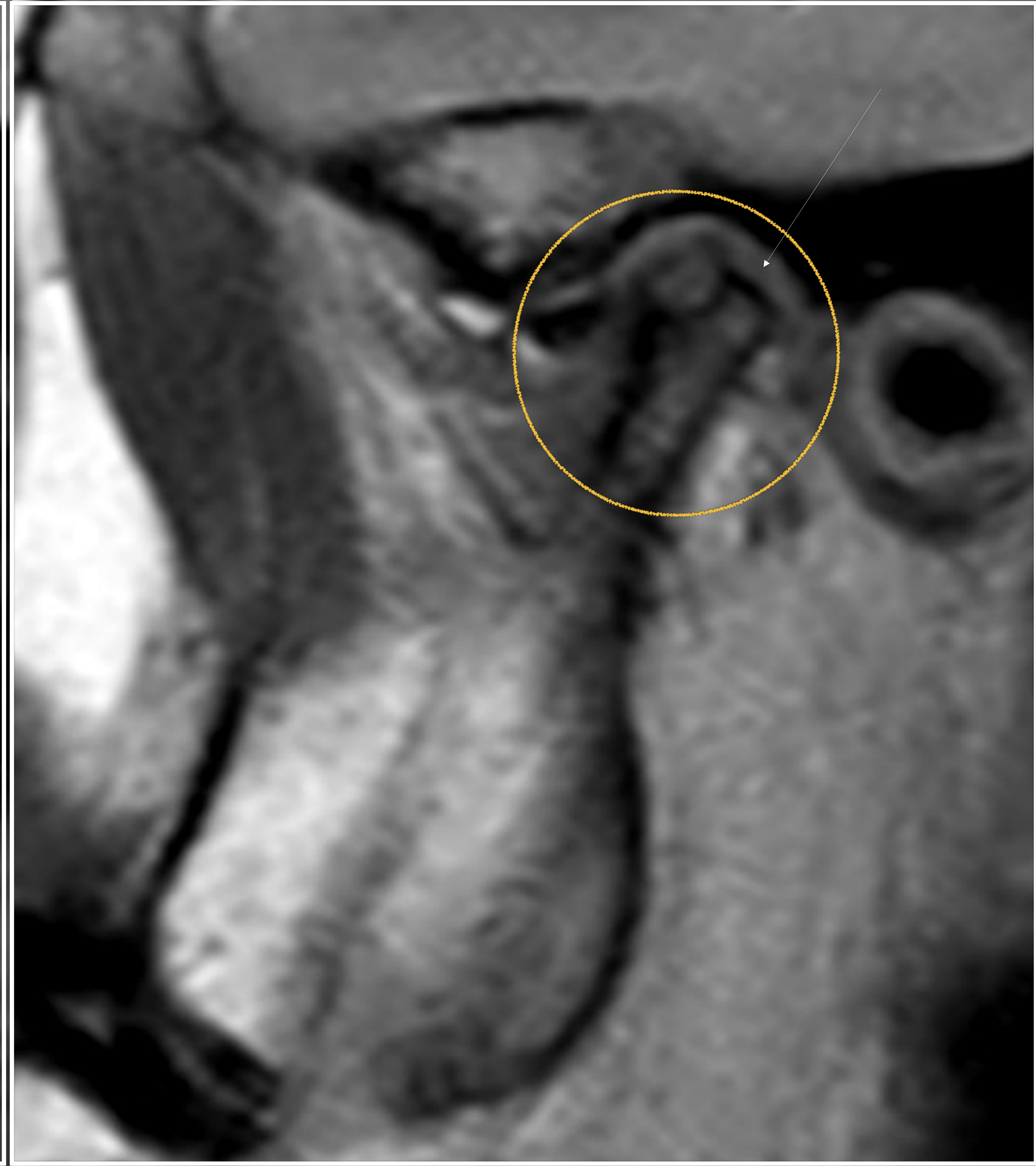
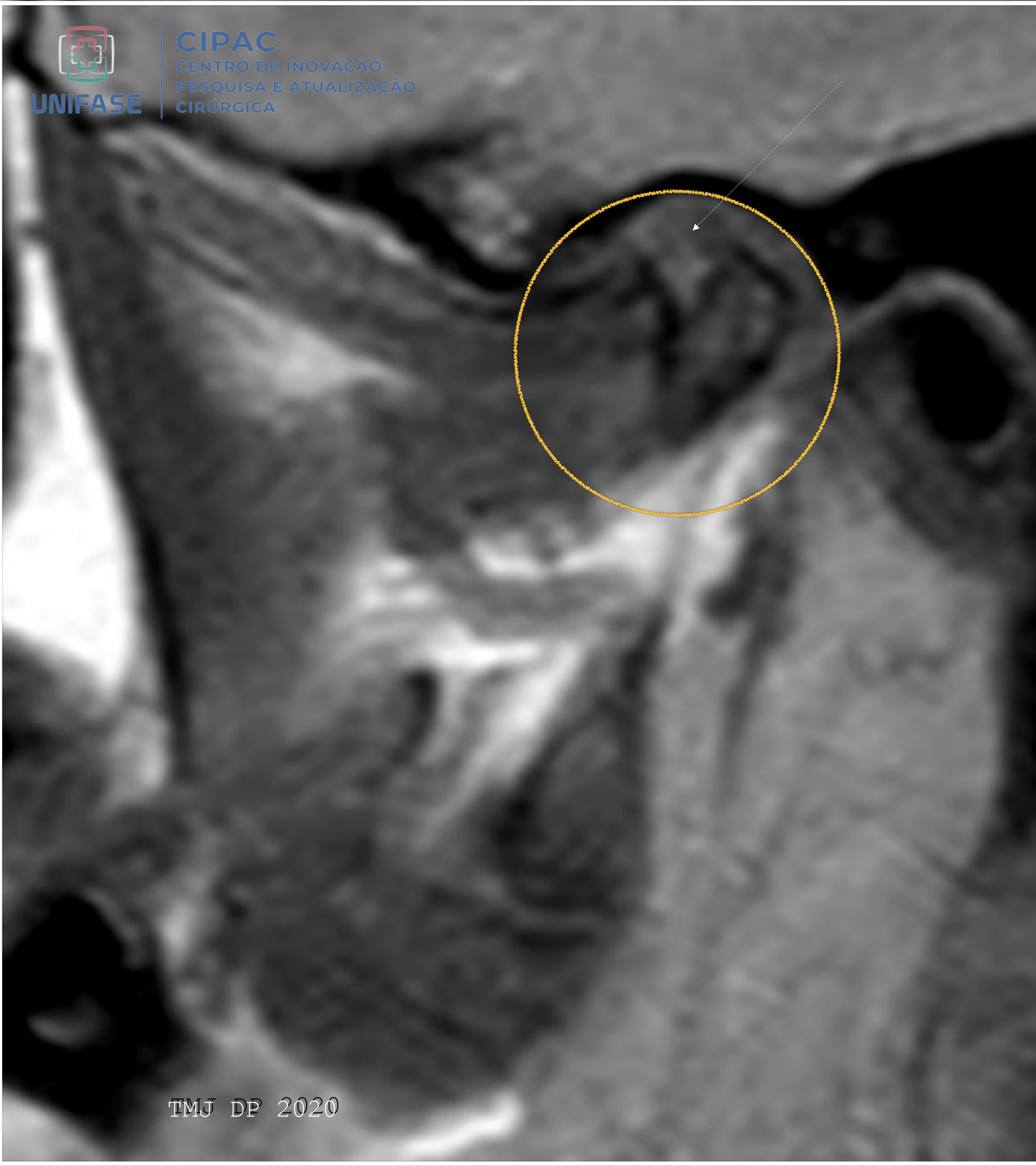
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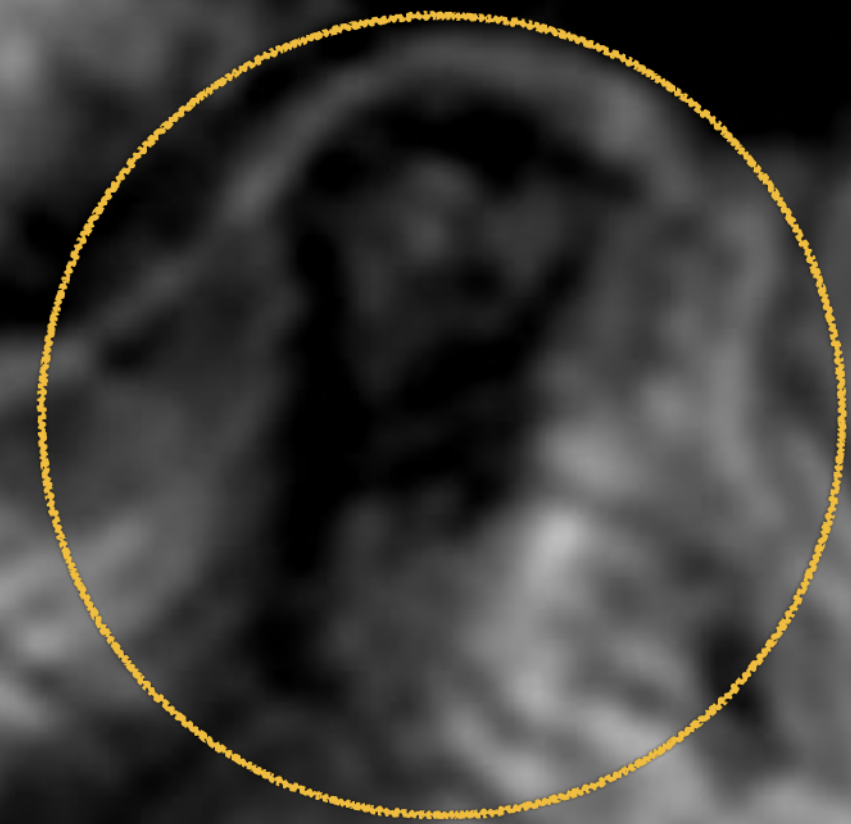
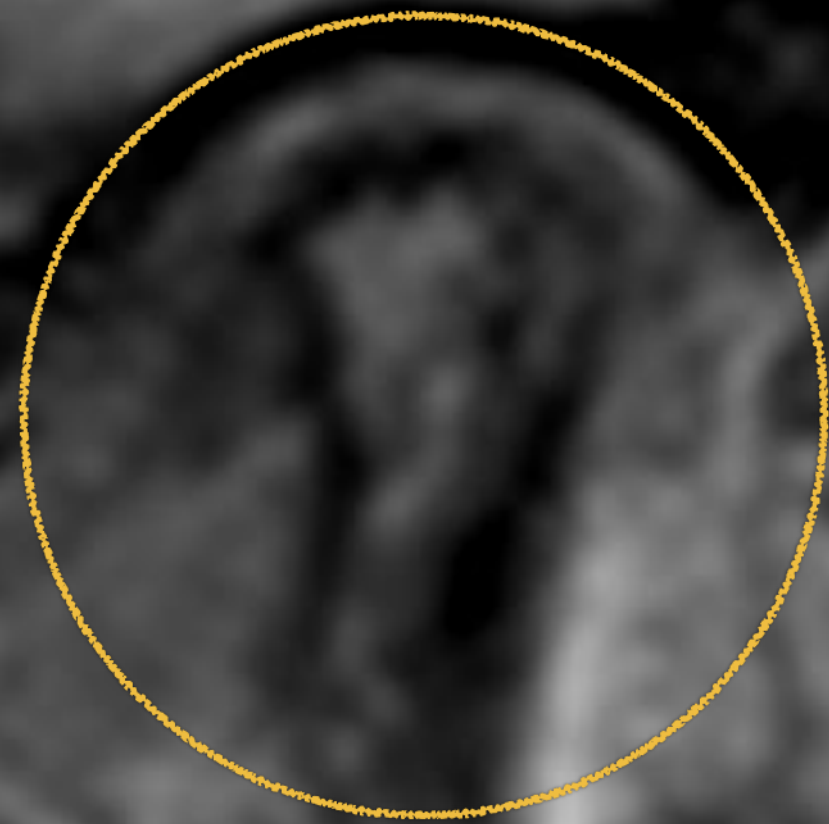


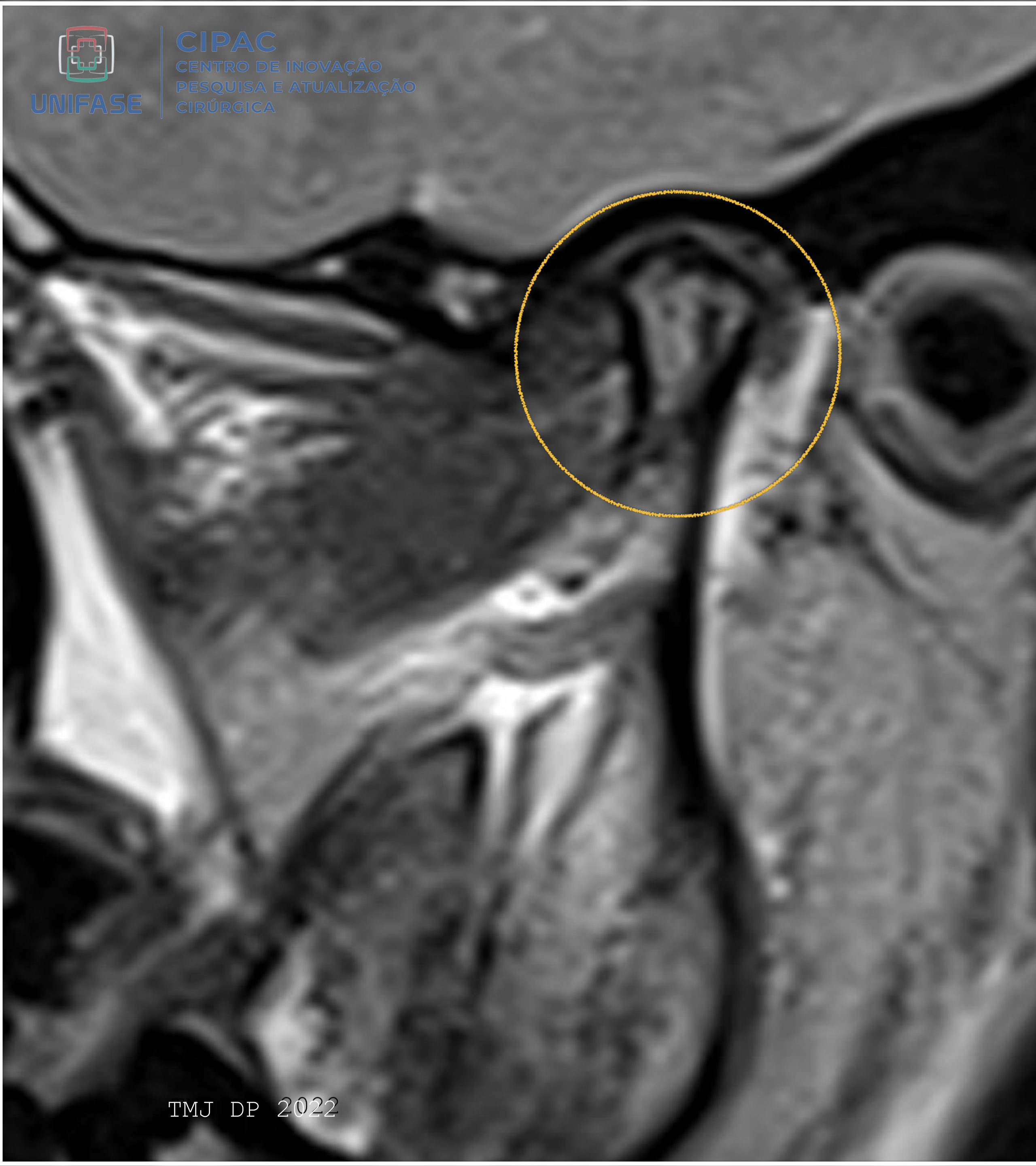


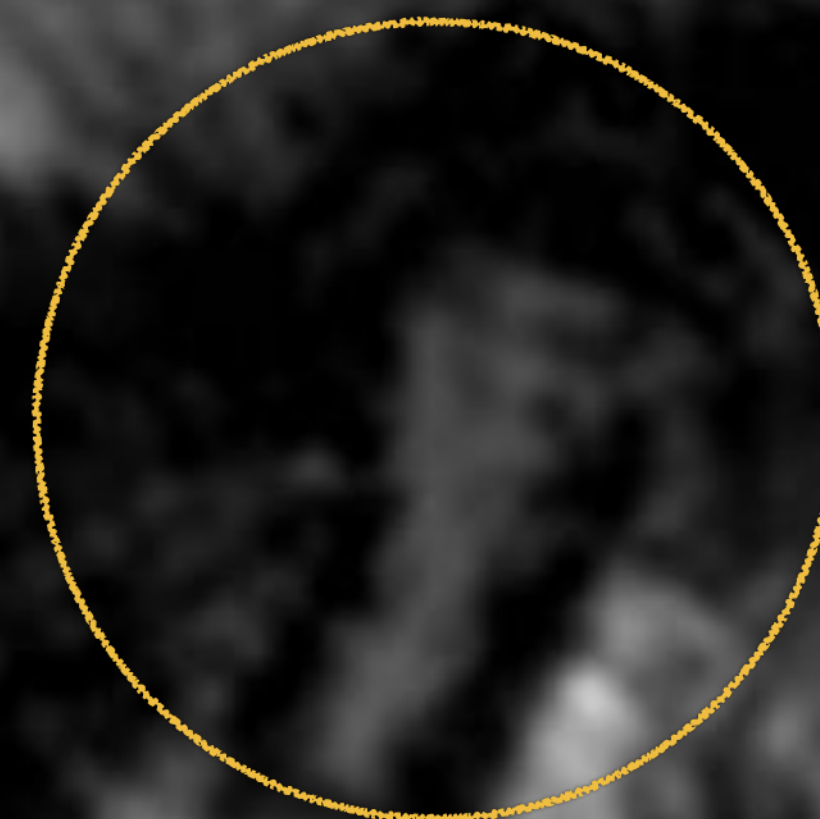
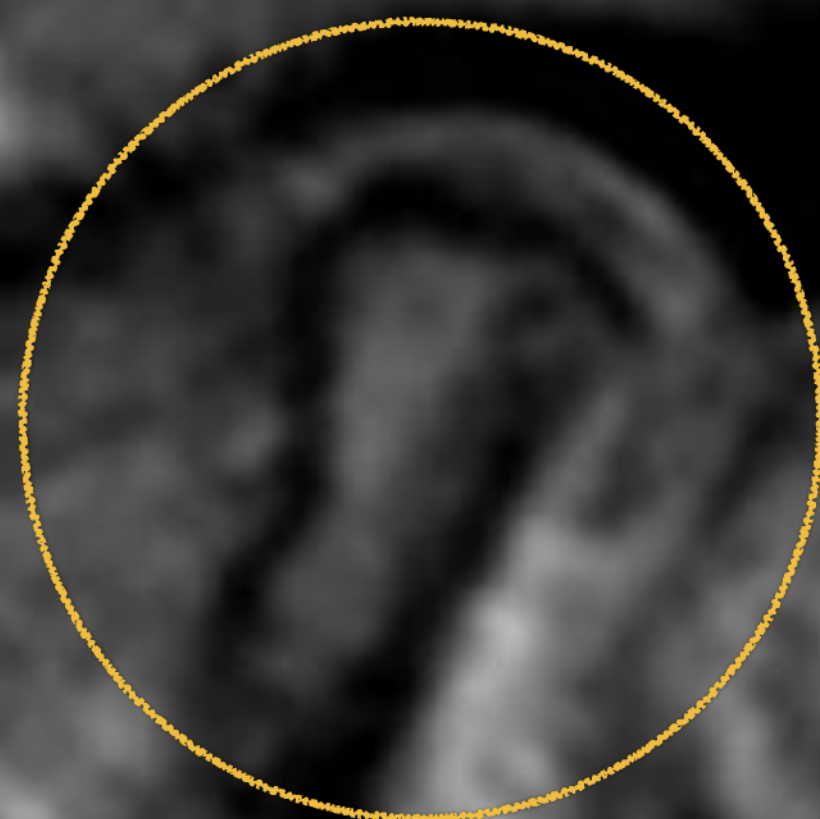
Meniscus/Cartilage

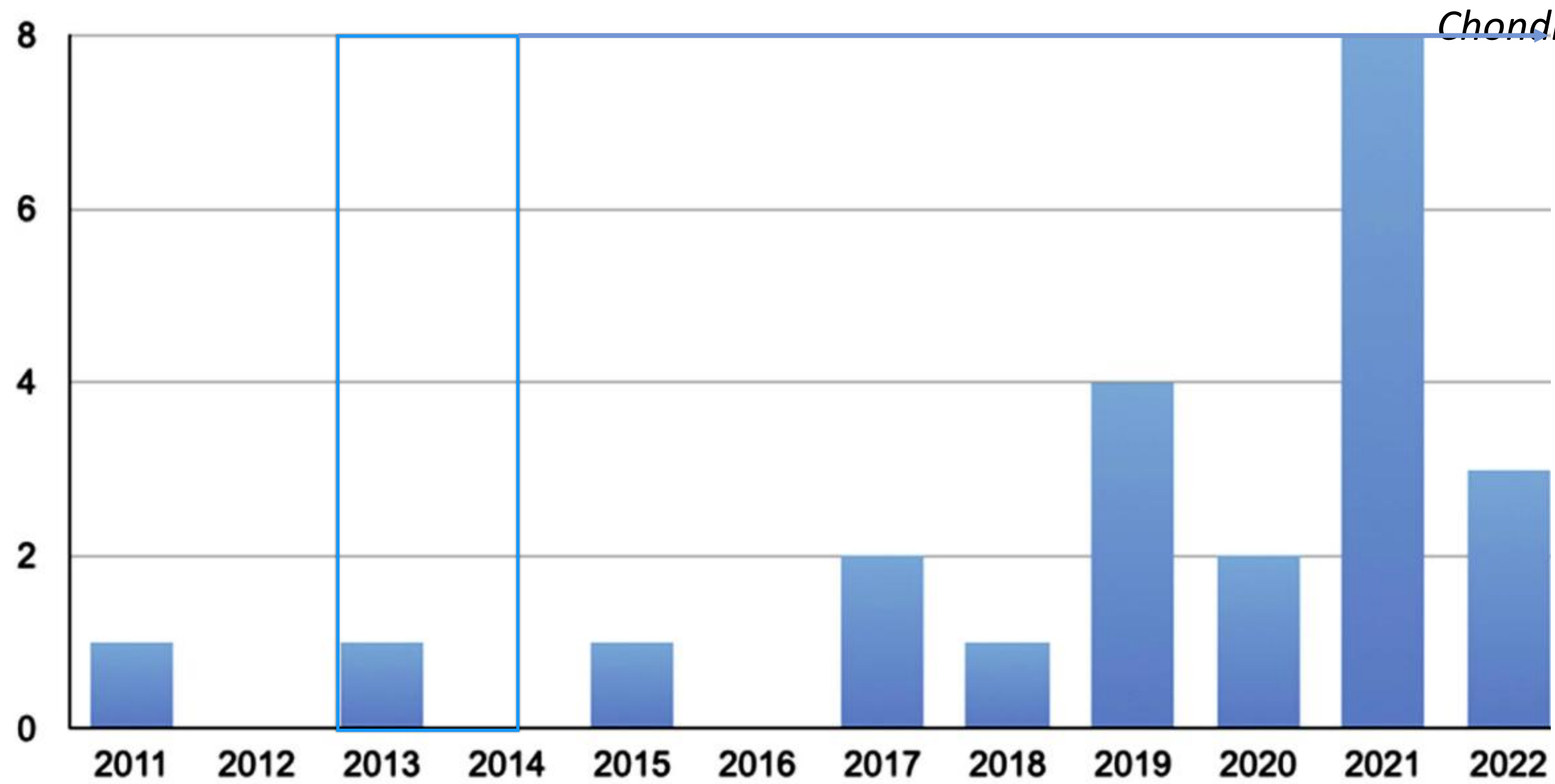




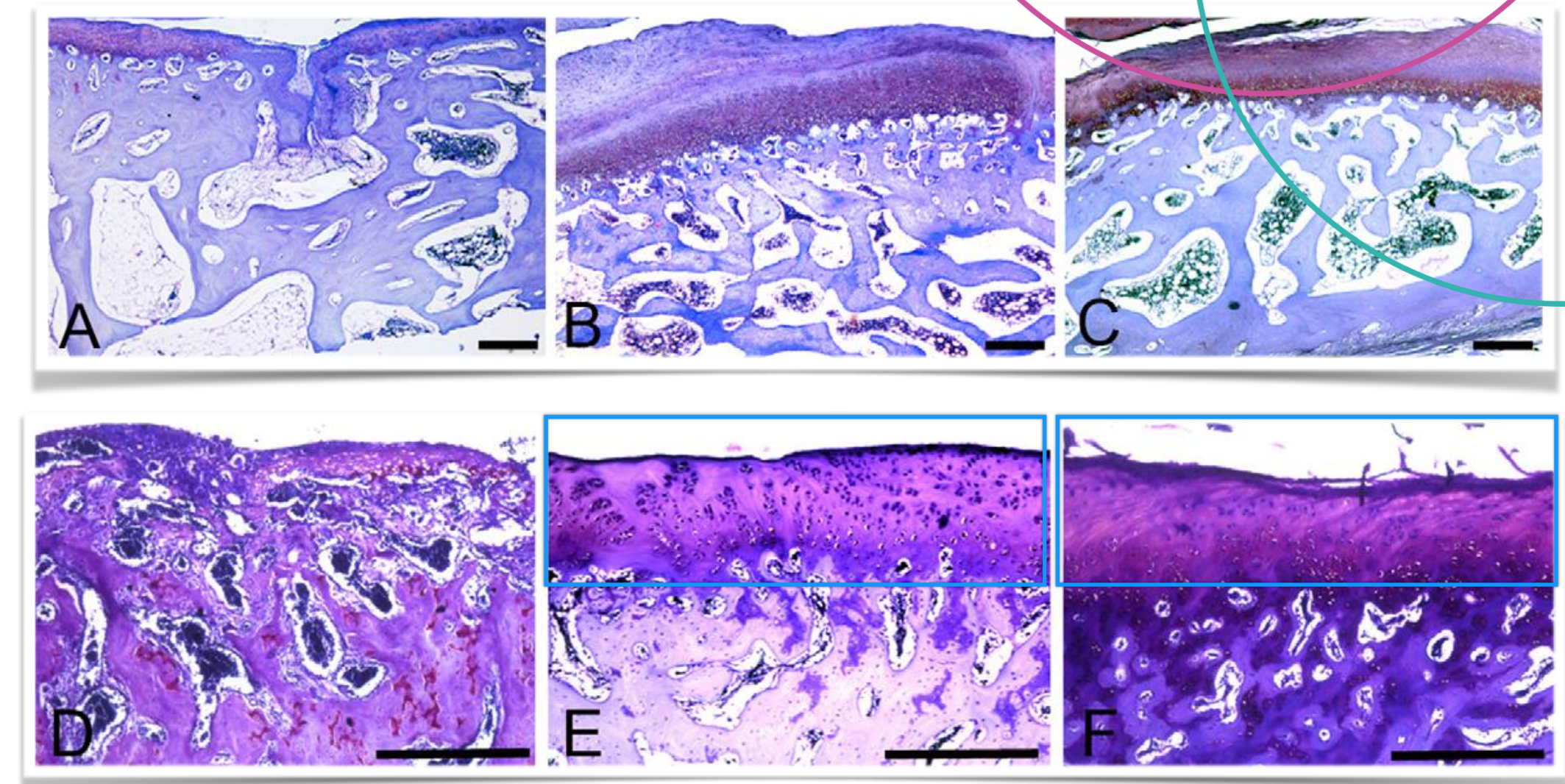


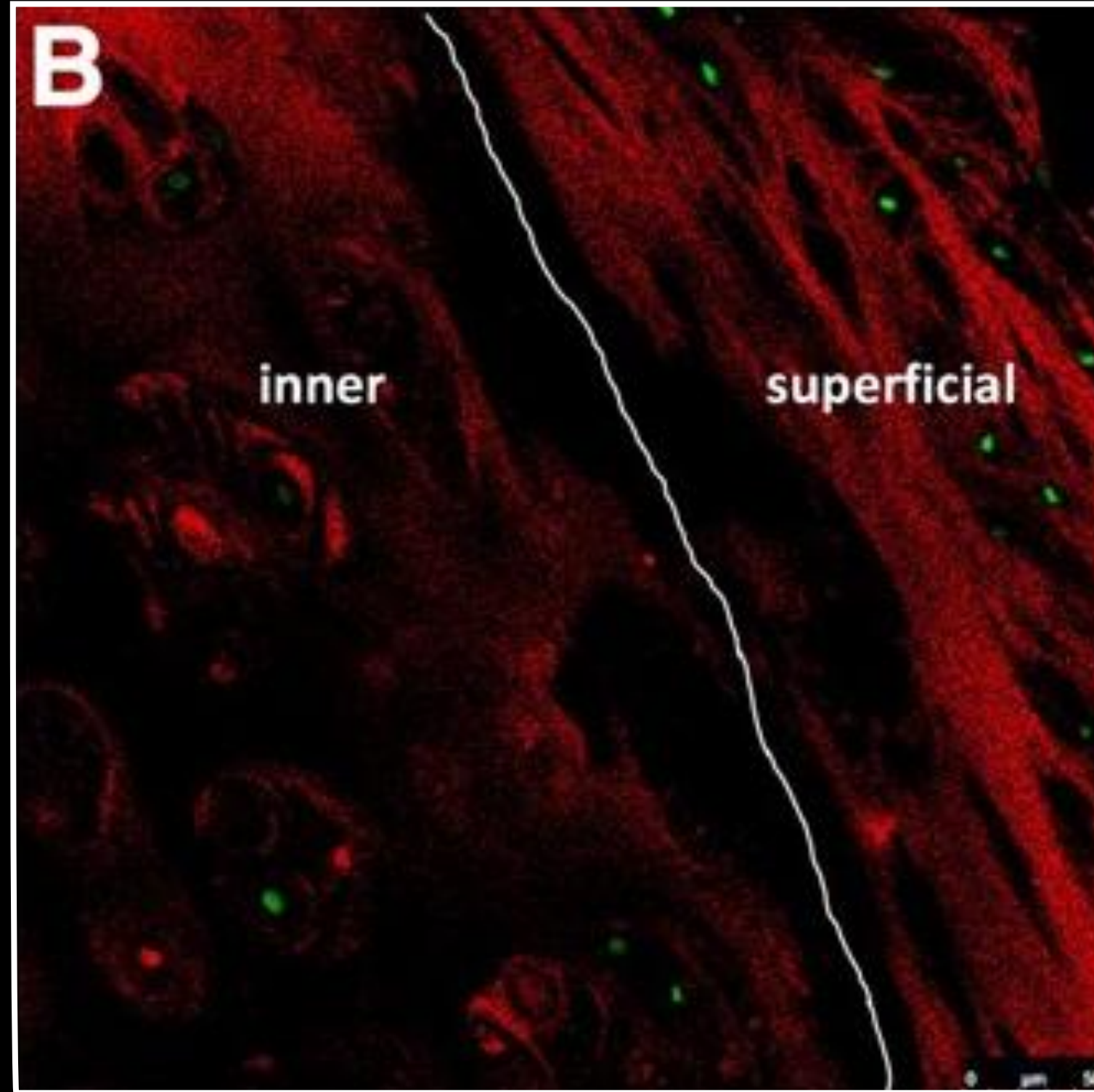
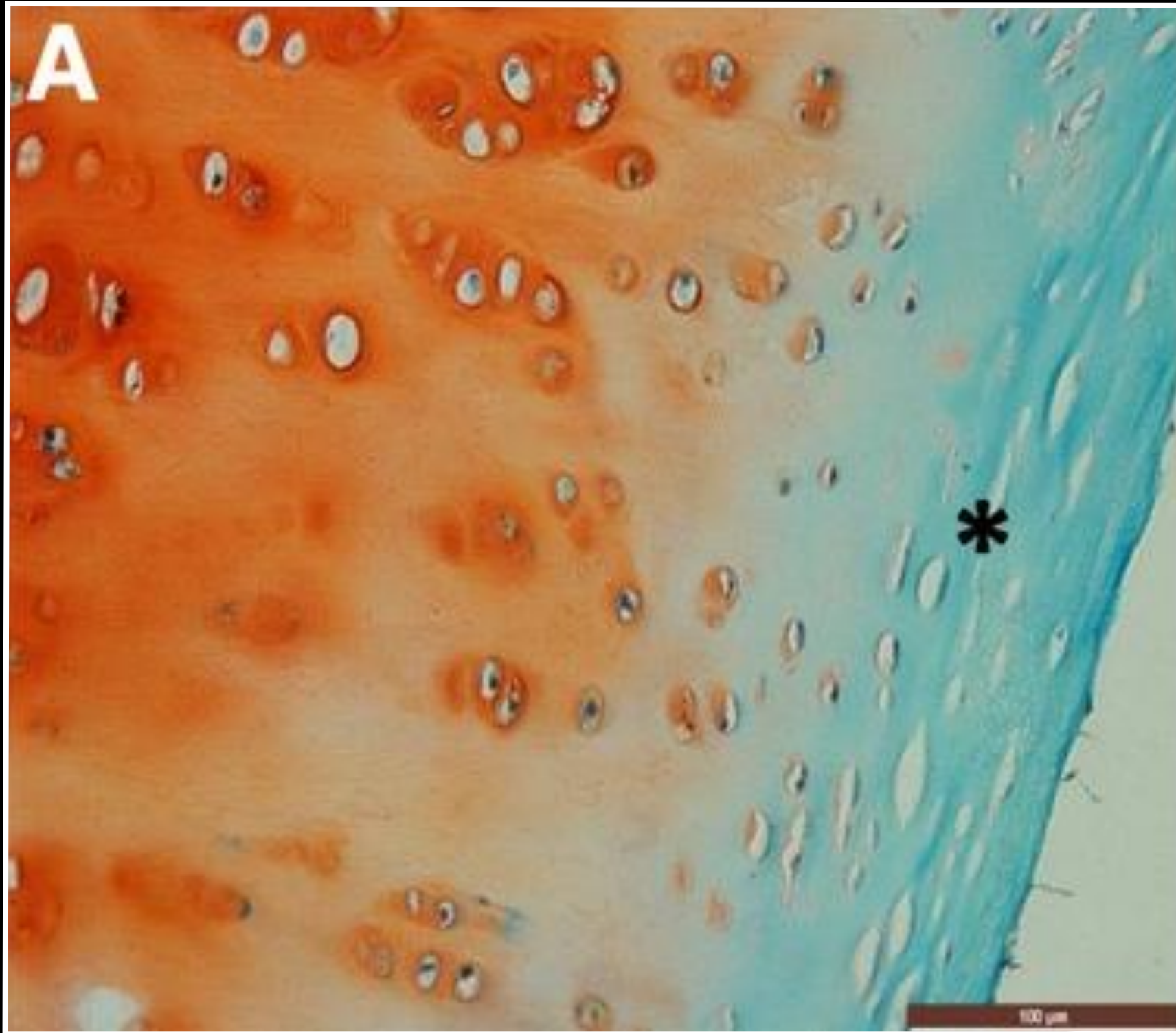


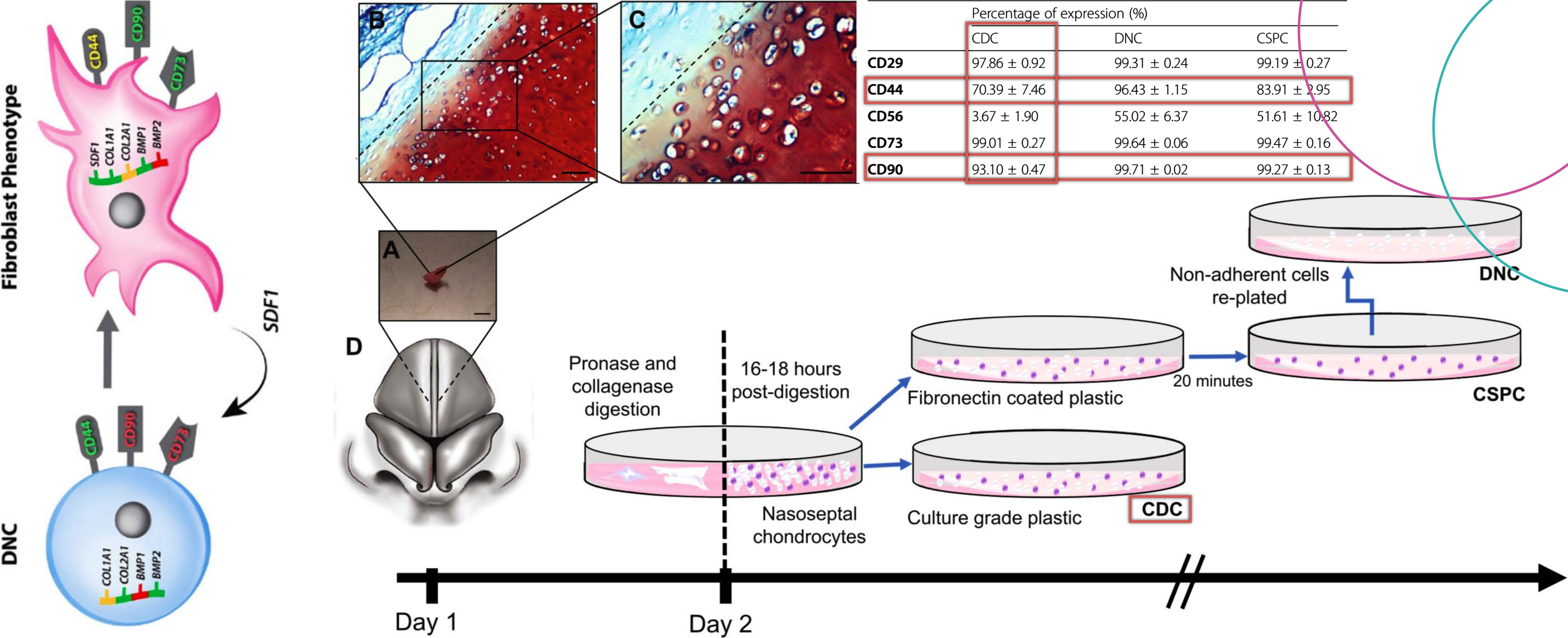




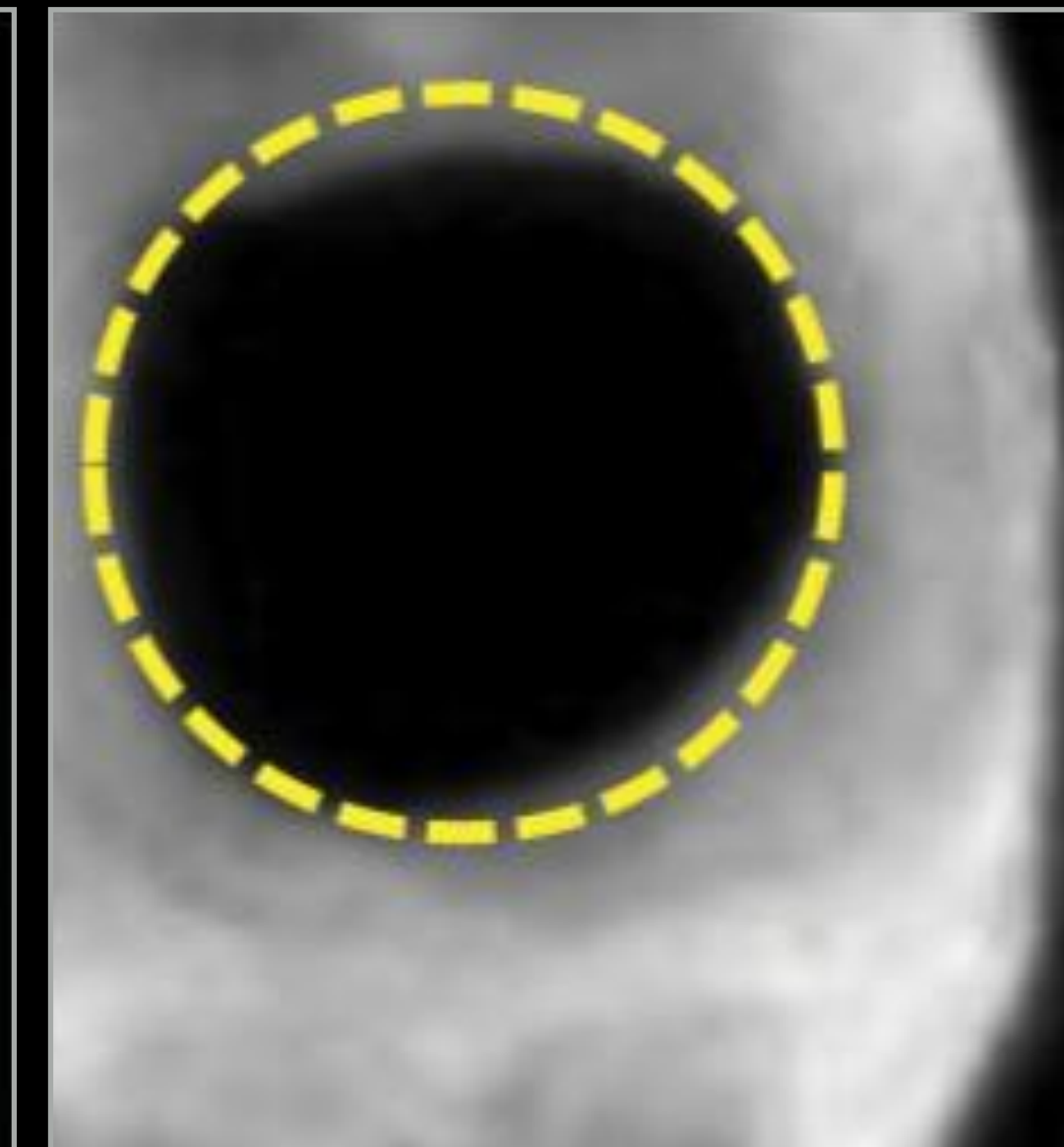
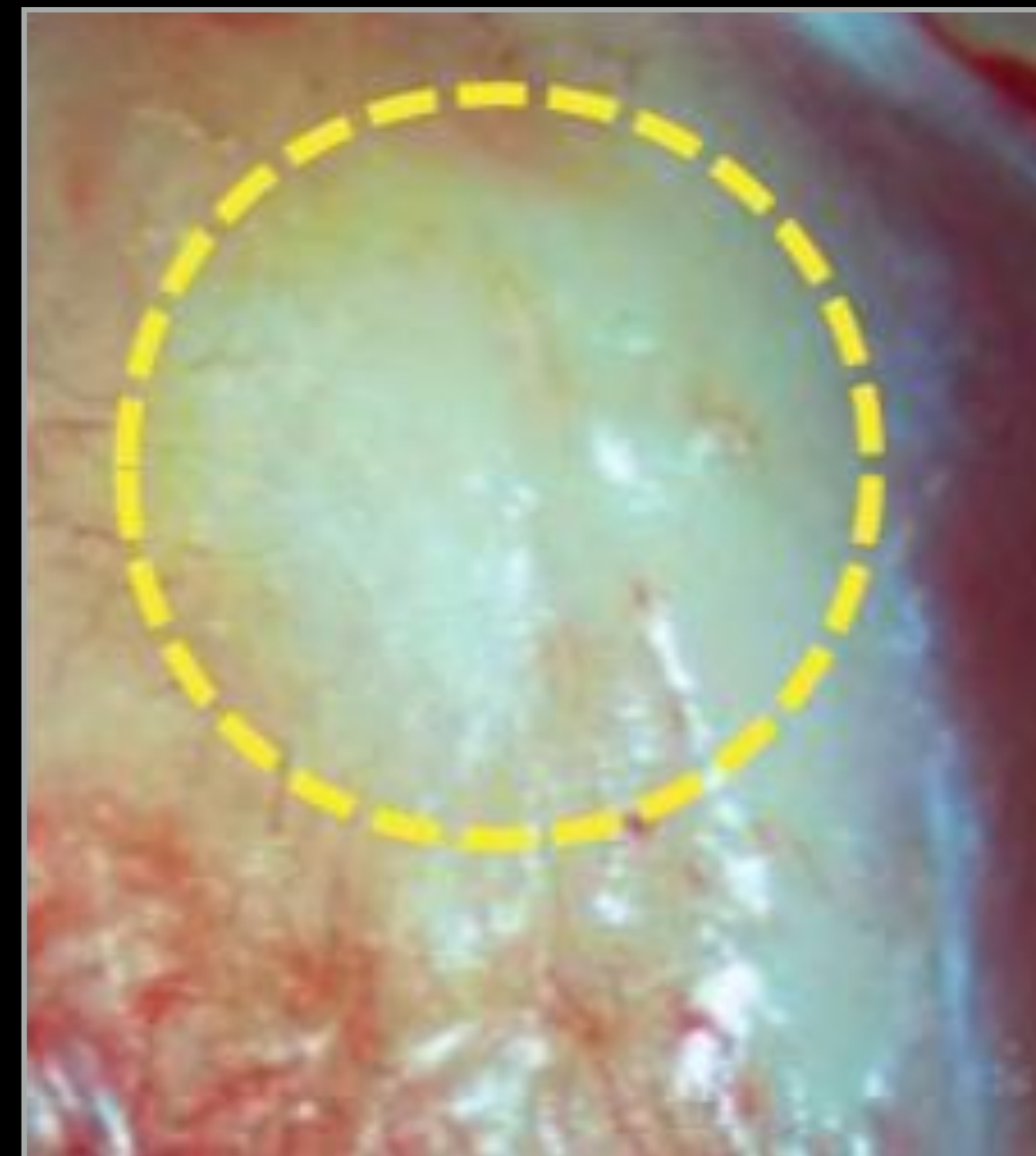
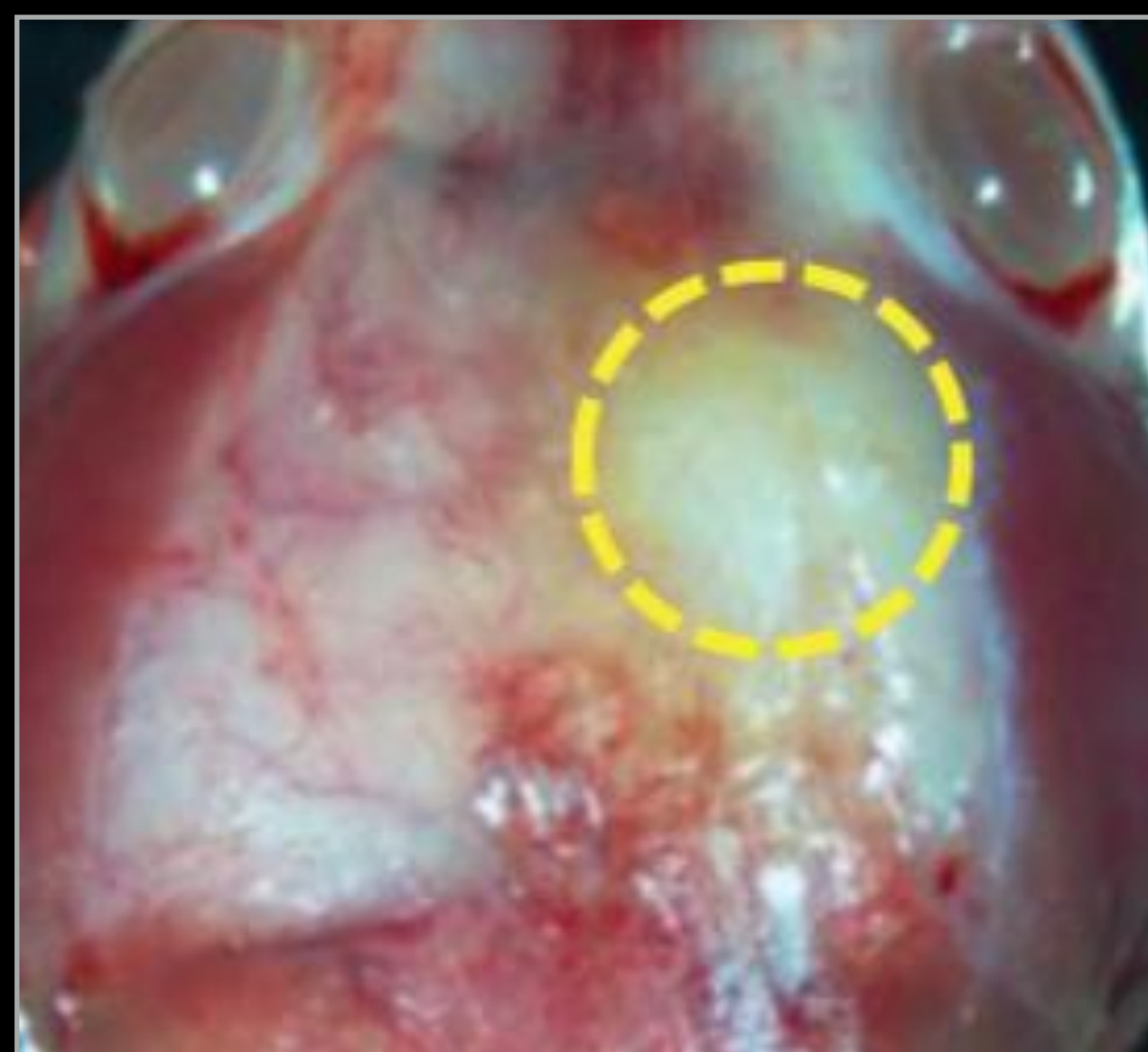
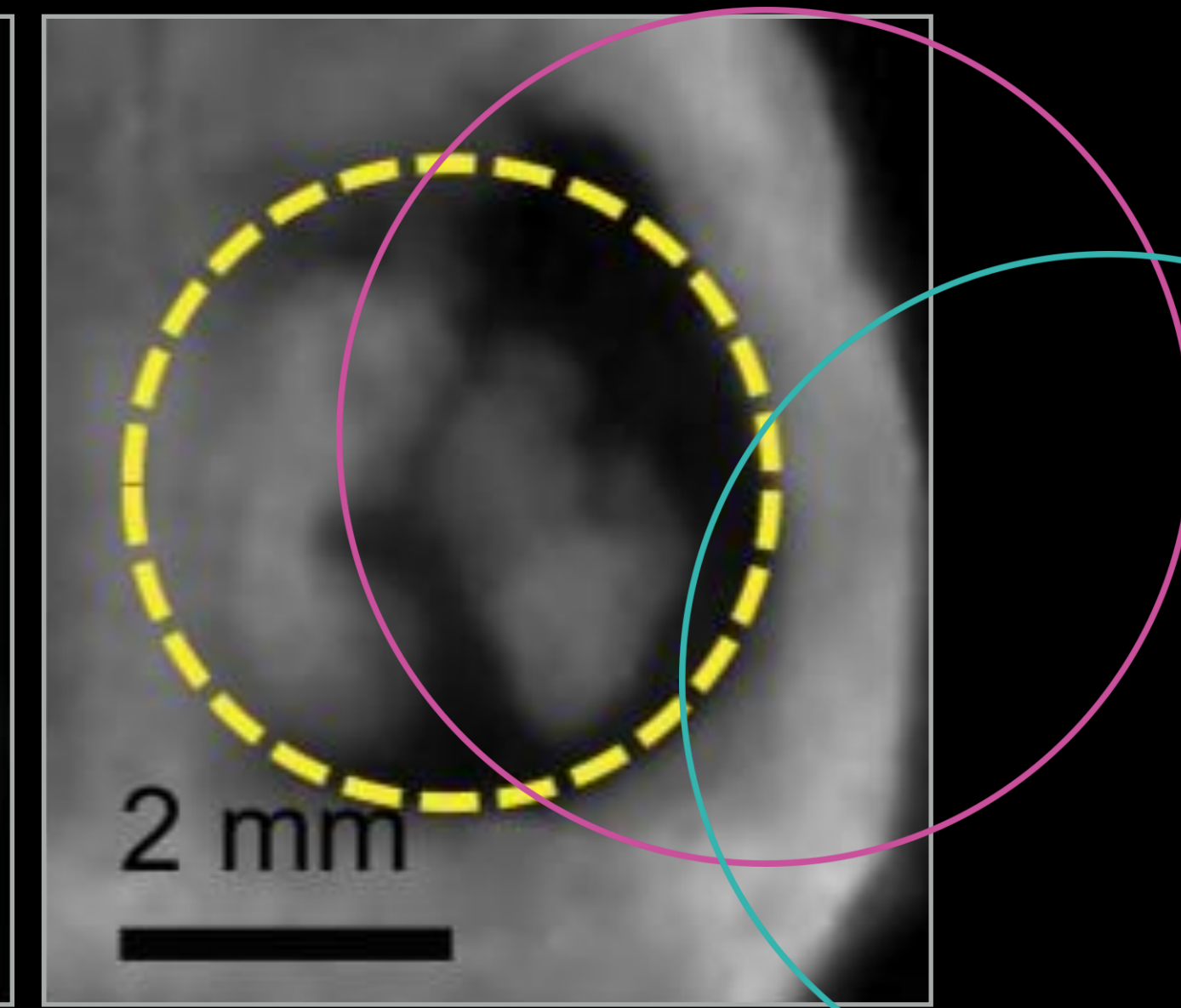
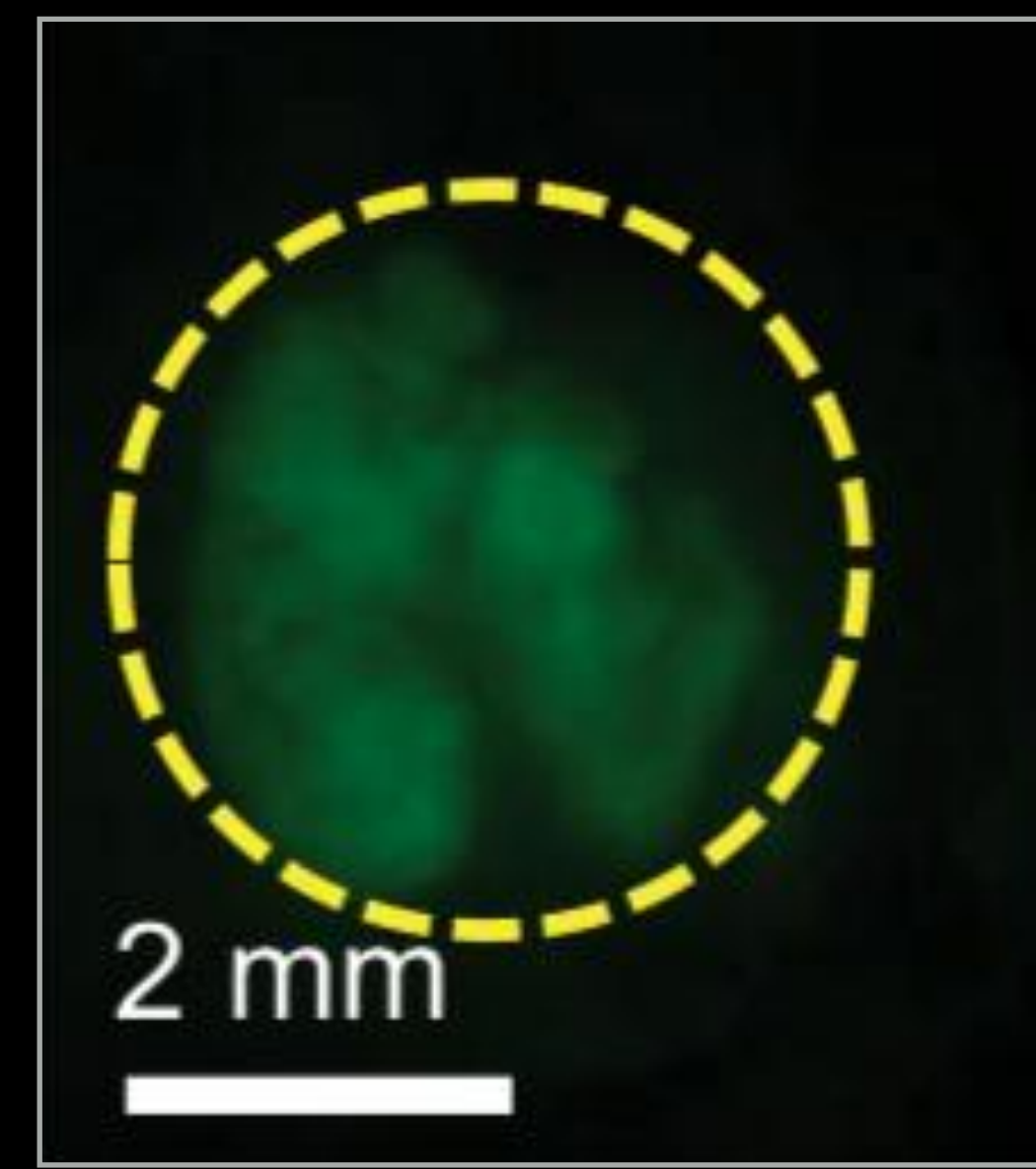
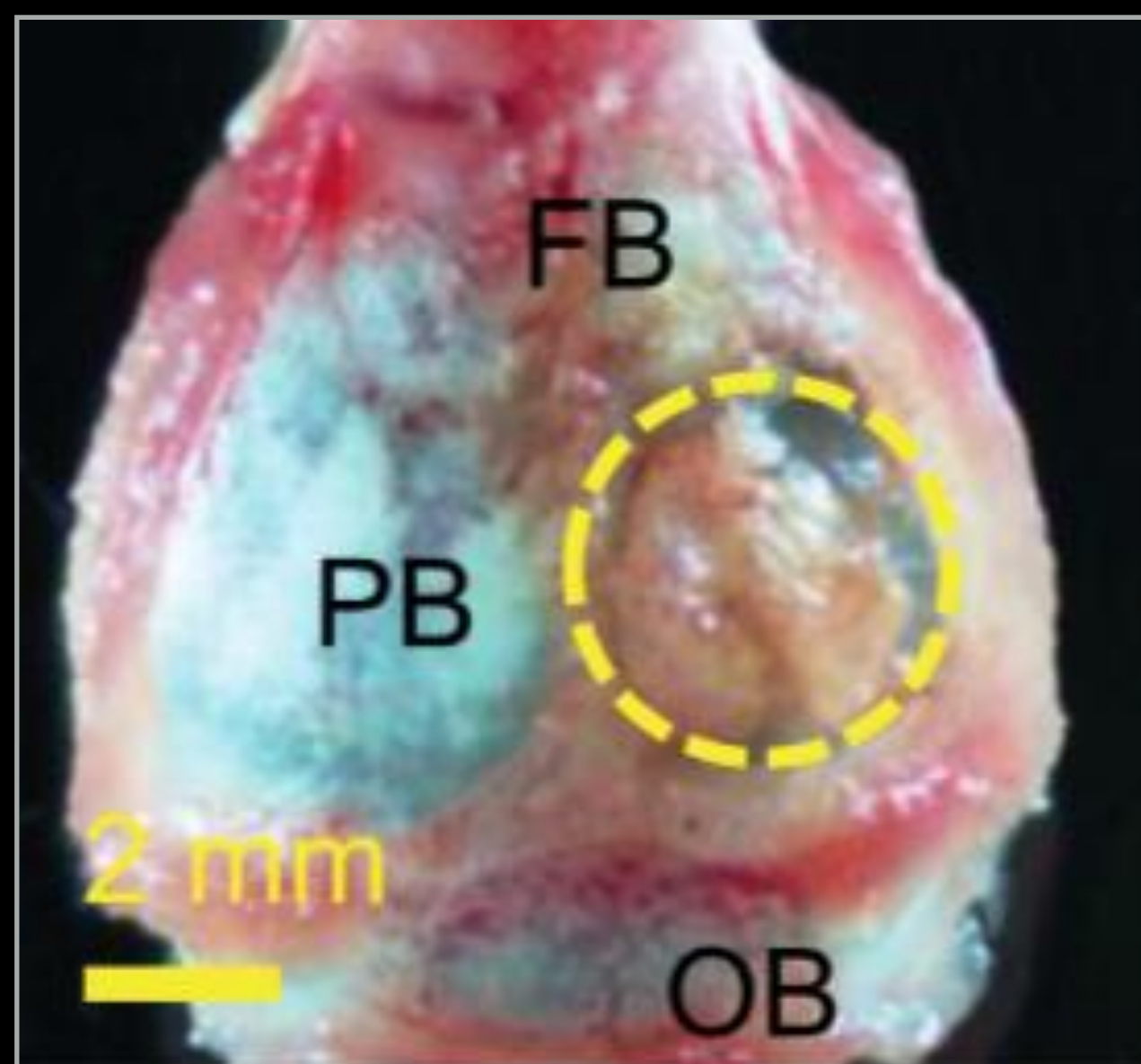
*Chondrogenic differentiation of MSC on cartilage and subchondral bone in TMJ-OA.
Chen et. al. Int J Oral Maxillofac Surg, 2013.*



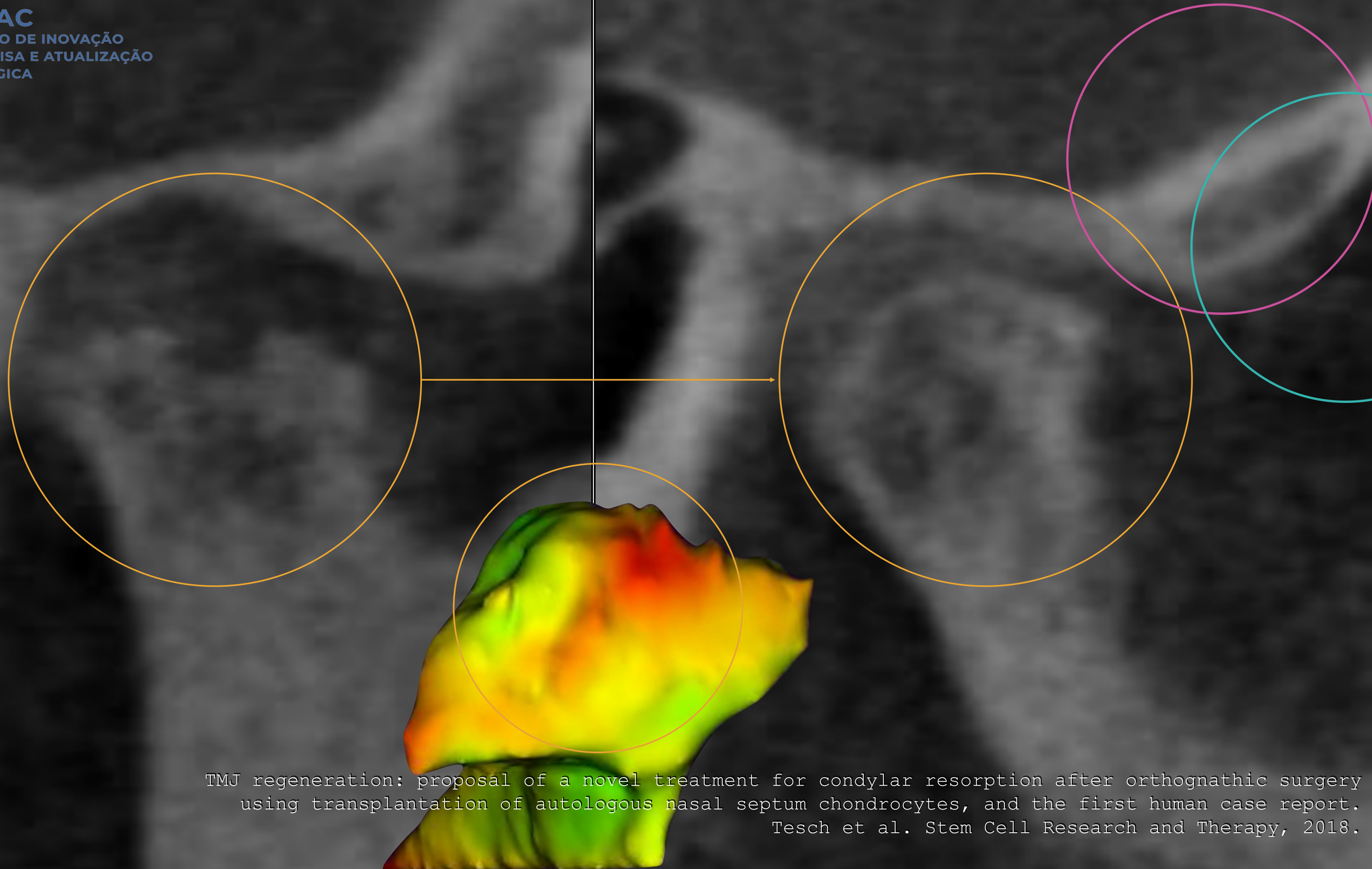




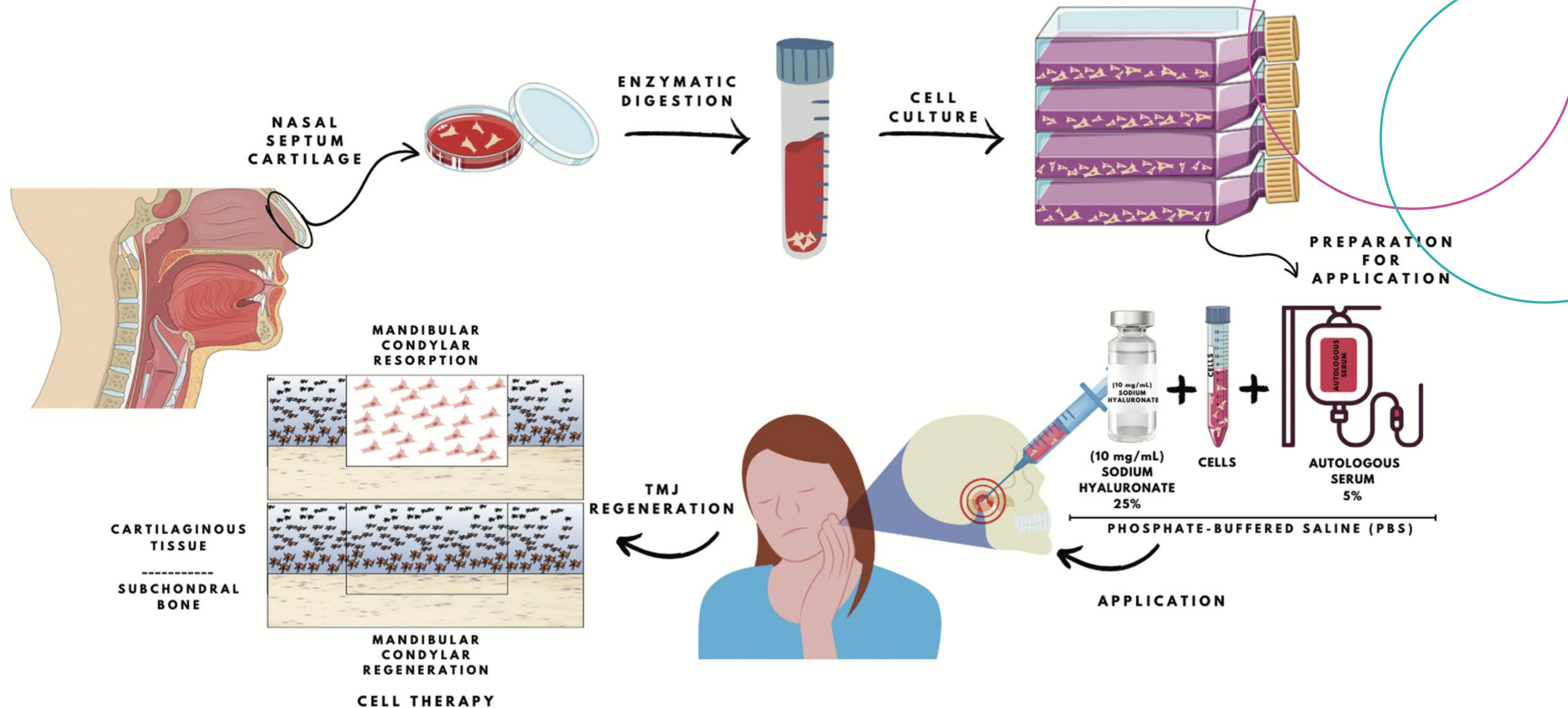
Isolation and characterization of nasal septum cartilage stem cells and their role in the chondrogenic niche.
Jessop et. al. Stem Cell Research and Therapy, 2018.



Fibrocartilage Stem Cells Engraft and Self-Organize into Vascularized Bone.
 Nathan et. al. Journal of Dental Research, 2018.

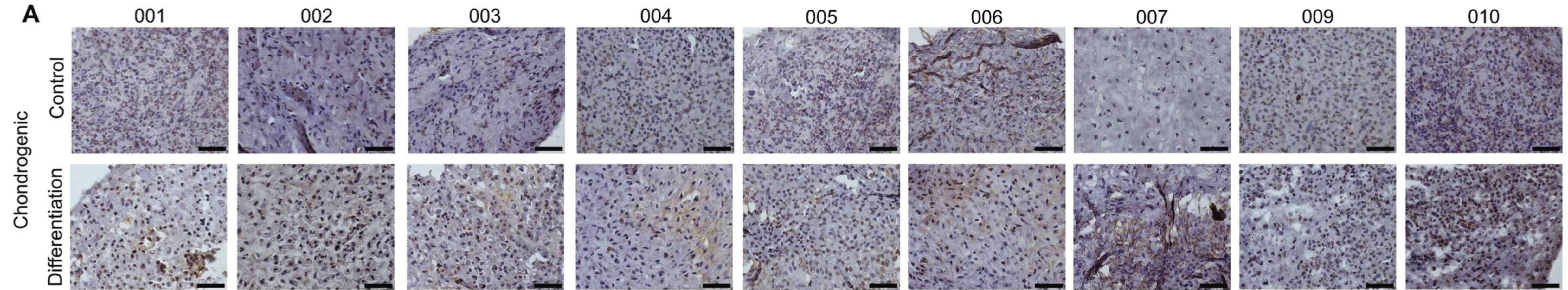


TMJ regeneration: proposal of a novel treatment for condylar resorption after orthognathic surgery using transplantation of autologous nasal septum chondrocytes, and the first human case report. Tesch et al. Stem Cell Research and Therapy, 2018.

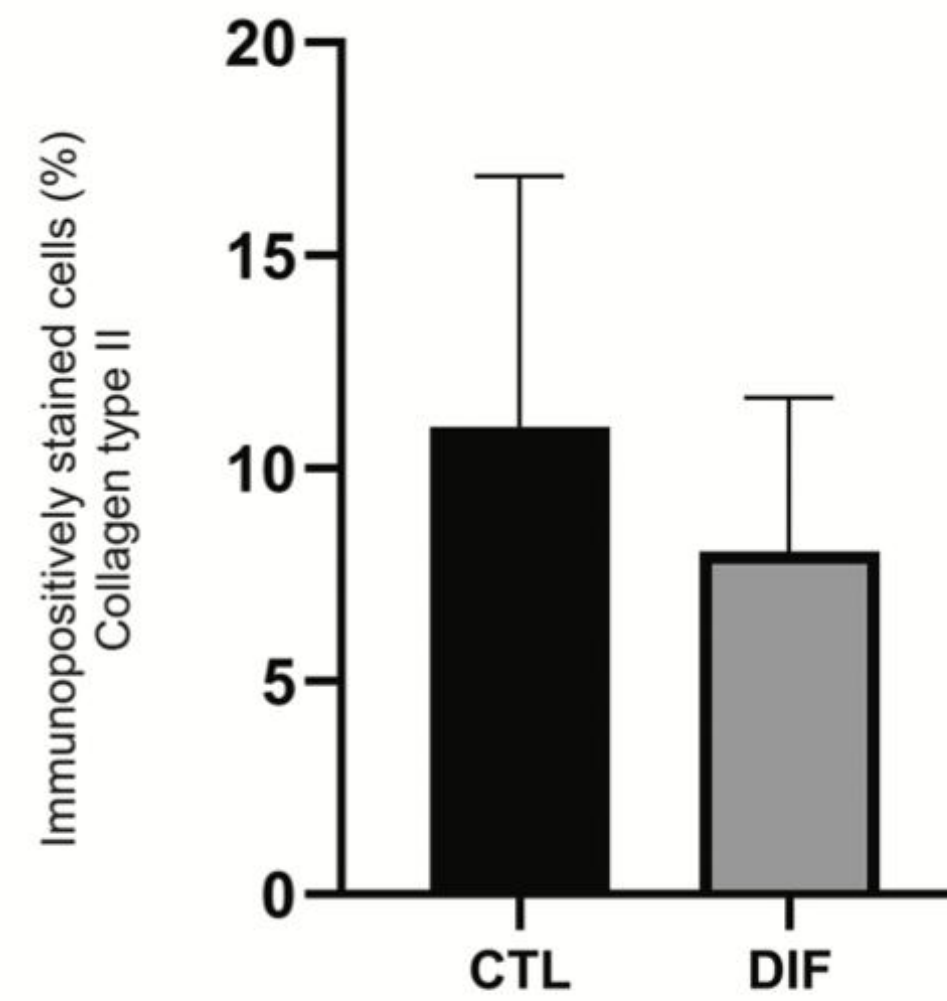


Nasal septum-derived chondroprogenitor cells control mandibular condylar resorption consequent to orthognathic surgery.
 Tesch et al. Stem Cell Translational and Medicine, 2024.

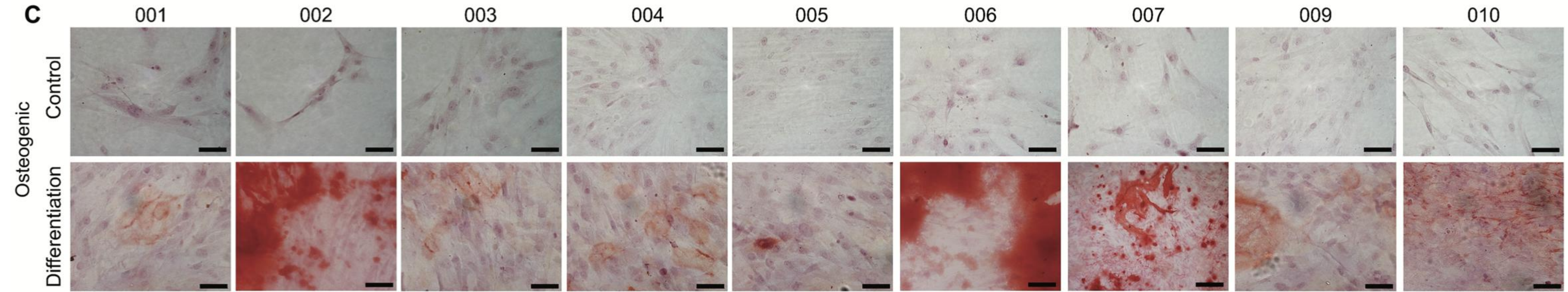
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ID	CD105	CD73	CD90	CD44	CD146	CD14	CD19	CD34	CD45	CD49	CD151
01	65.1	87.2	99.8	82.5	97.6	0.9	0.6	0.3	0.4	95.1	96.8
02	99.3	99.3	100	99.6	99.0	0.4	0.5	0.6	0.9	99.9	99.9
03	99.0	98.6	100	99.1	89.6	0.1	0.2	0.1	0.2	99.0	99.8
04	98.0	99.7	99.9	99.9	91.2	0.2	0.2	0.3	0.1	100	100
05	99.9	100	99.8	99.9	95.1	0.0	0.1	1.6	0.7	99.9	100
06	99.3	99.8	100	99.8	93.1	0.2	0.6	0.9	1.6	100	100
07	99.9	99.9	100	99.6	94.9	0.0	0.4	0.3	0.0	99.8	99.8
09	94.4	98.9	99.4	99.8	50.8	0.2	0.0	0.2	0.1	99.6	99.3
10	98.9	99.9	100	99.8	90.9	0.0	0.6	0.6	0.9	100	99.9



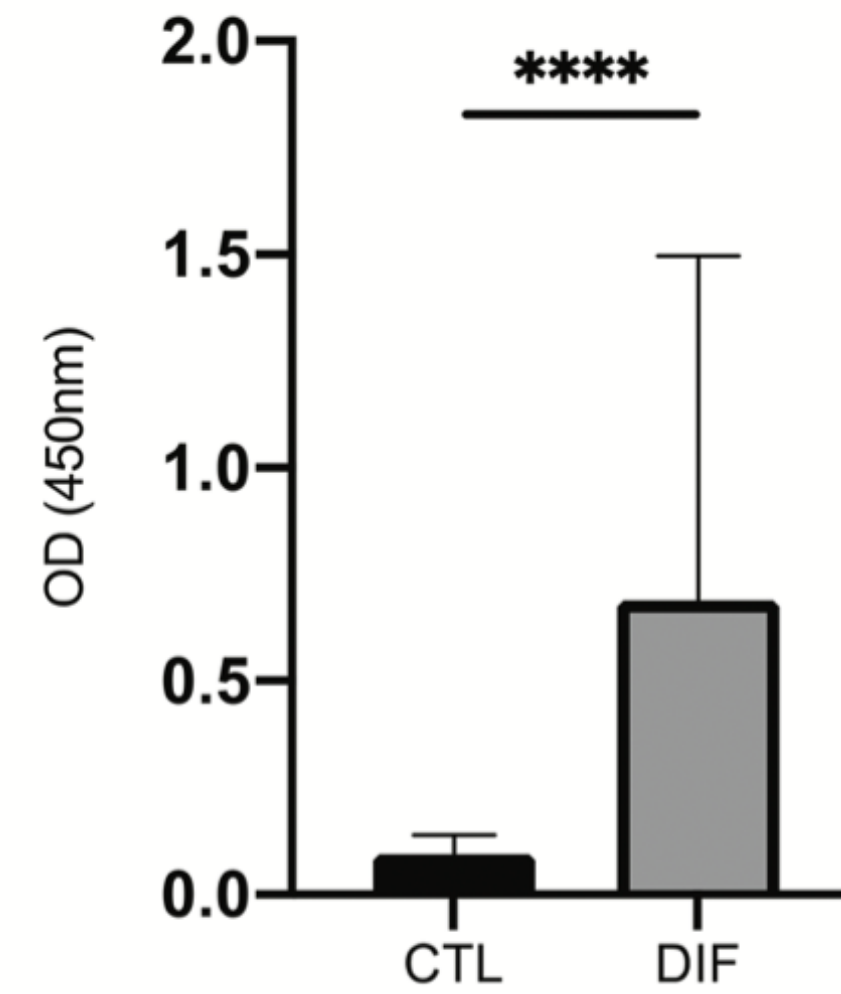
D Type II Collagen Quantification



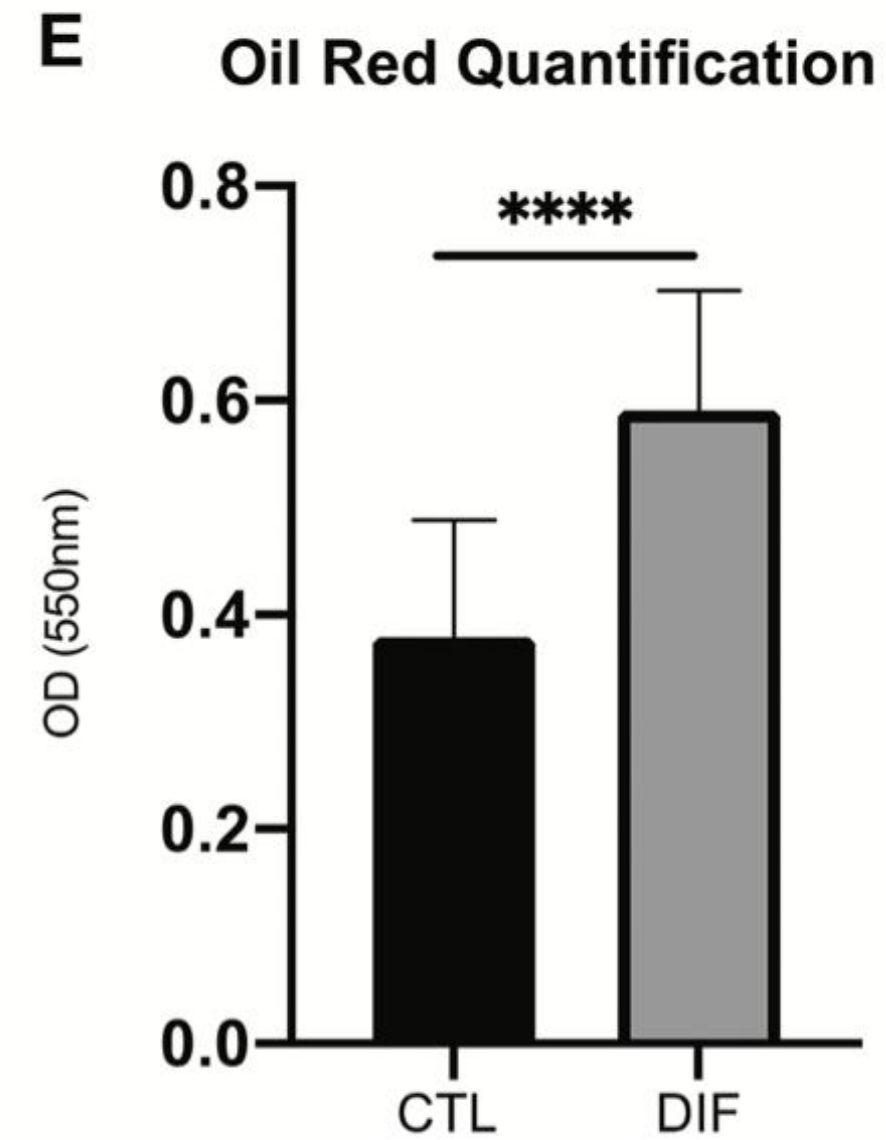
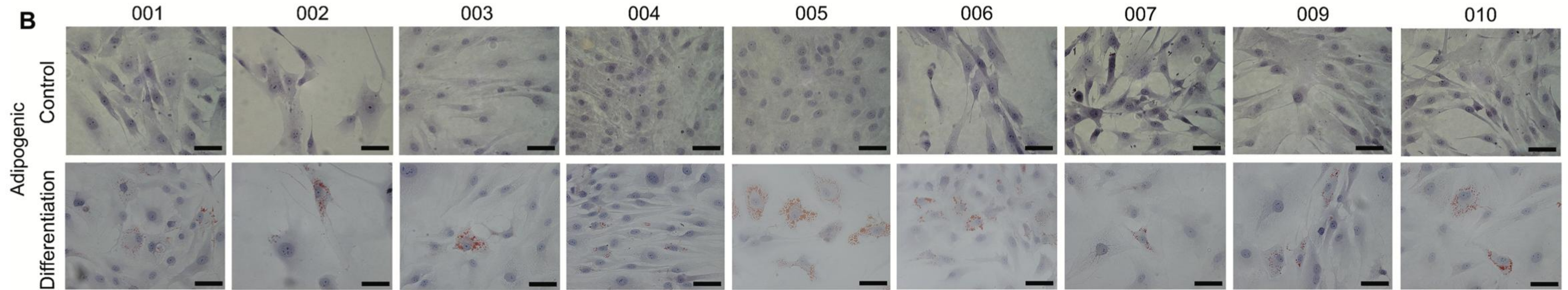
Nasal septum-derived chondroprogenitor cells control mandibular condylar resorption consequent to orthognathic surgery.
 Tesch et al. Stem Cell Translational and Medicine, 2024.



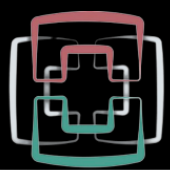
F Alizarin Red Quantification



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 Tesch et al. Stem Cell Translational and Medicine, 2024.



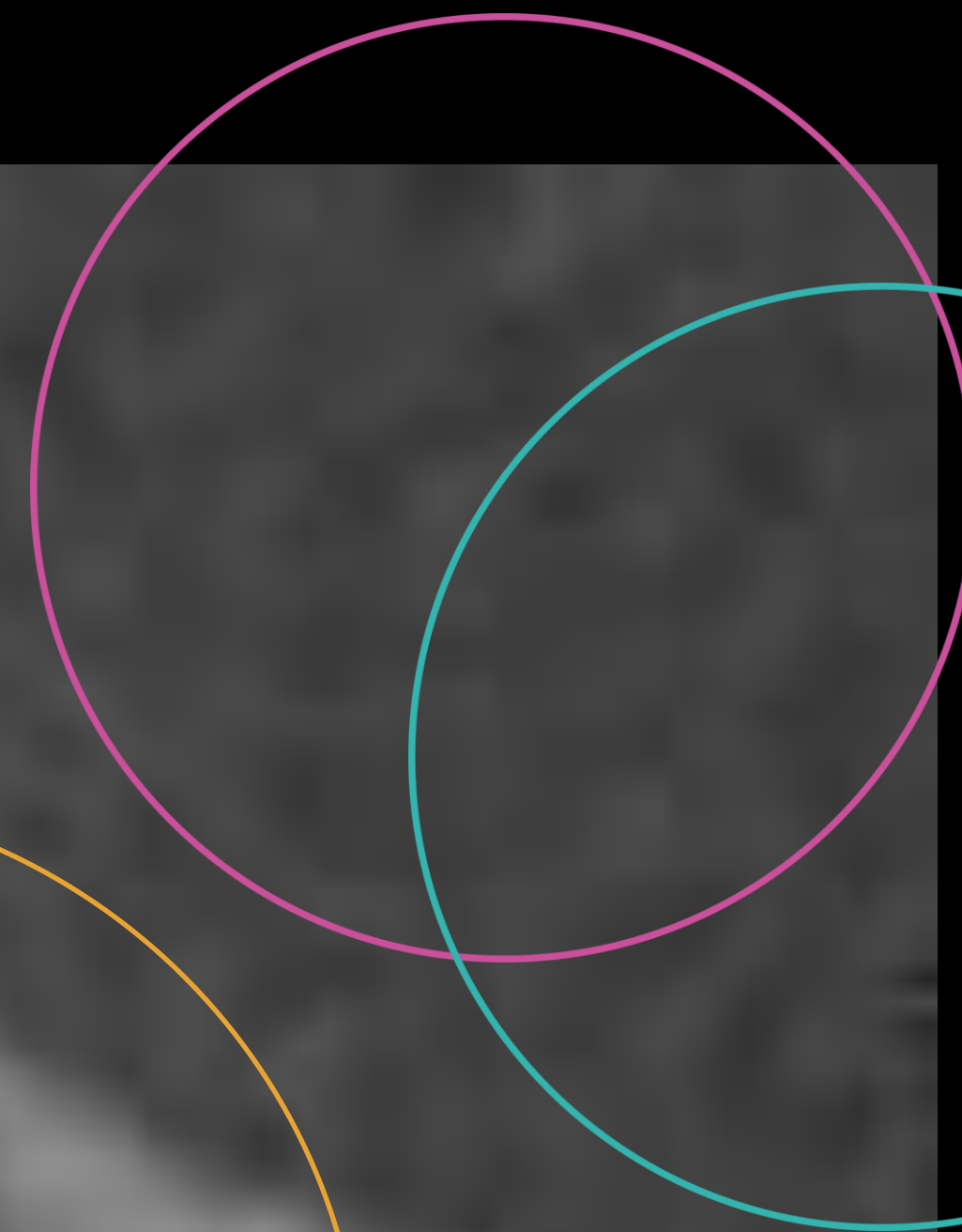
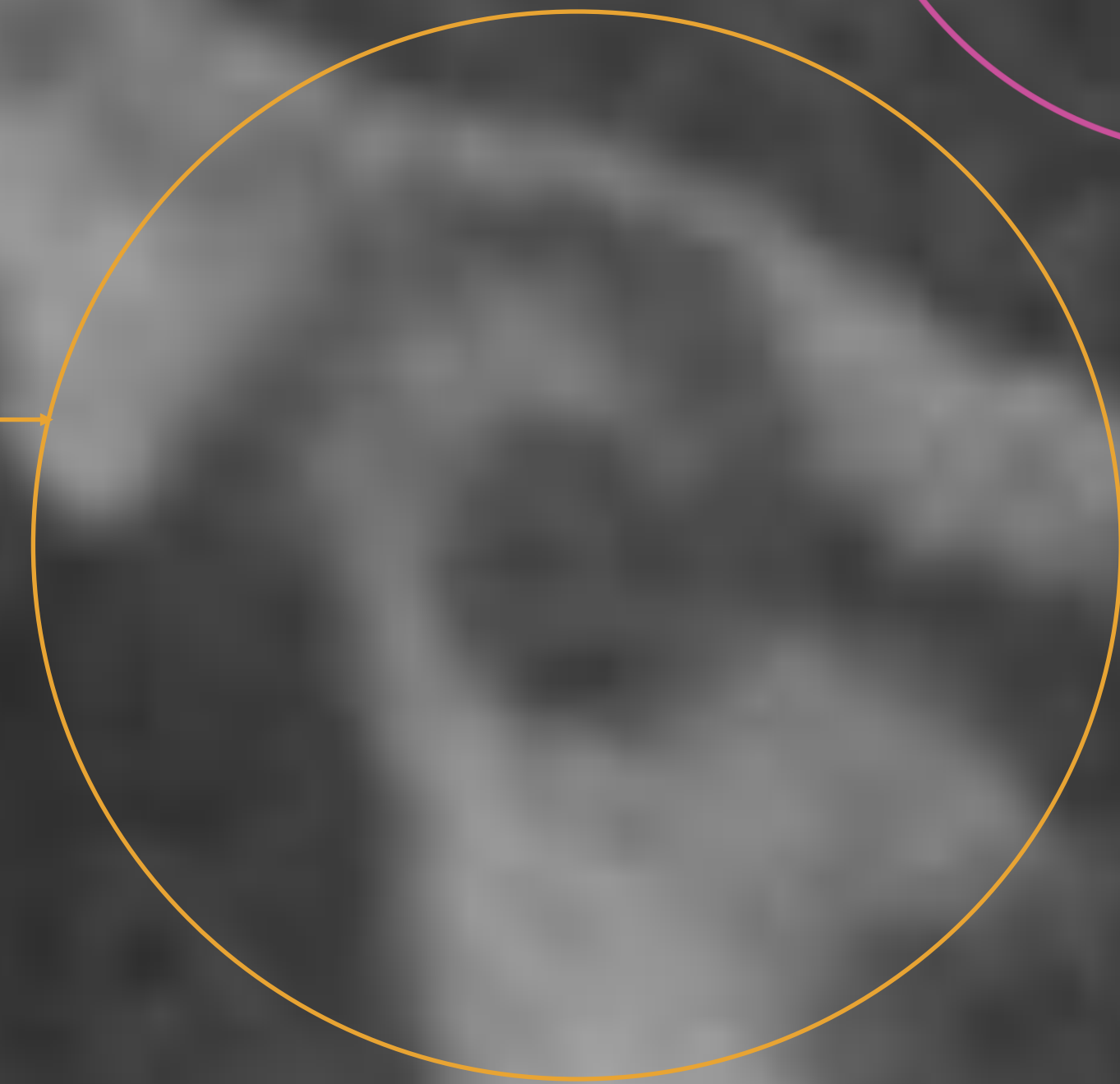
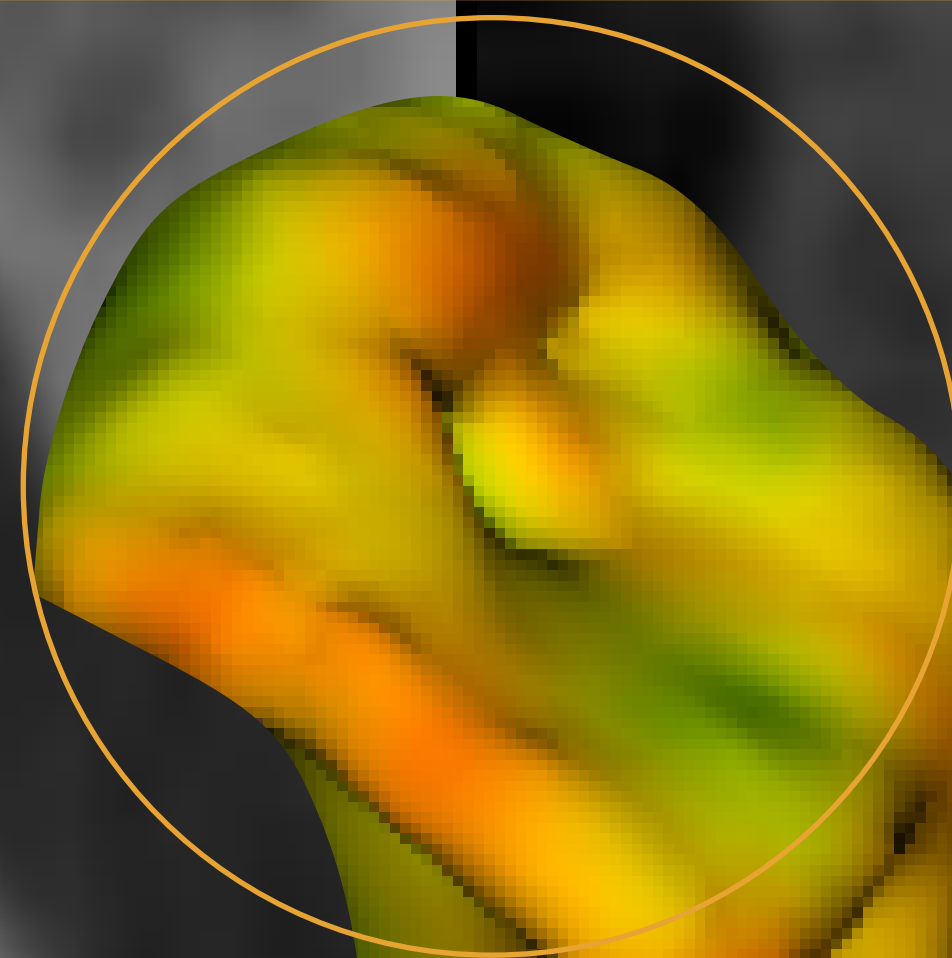
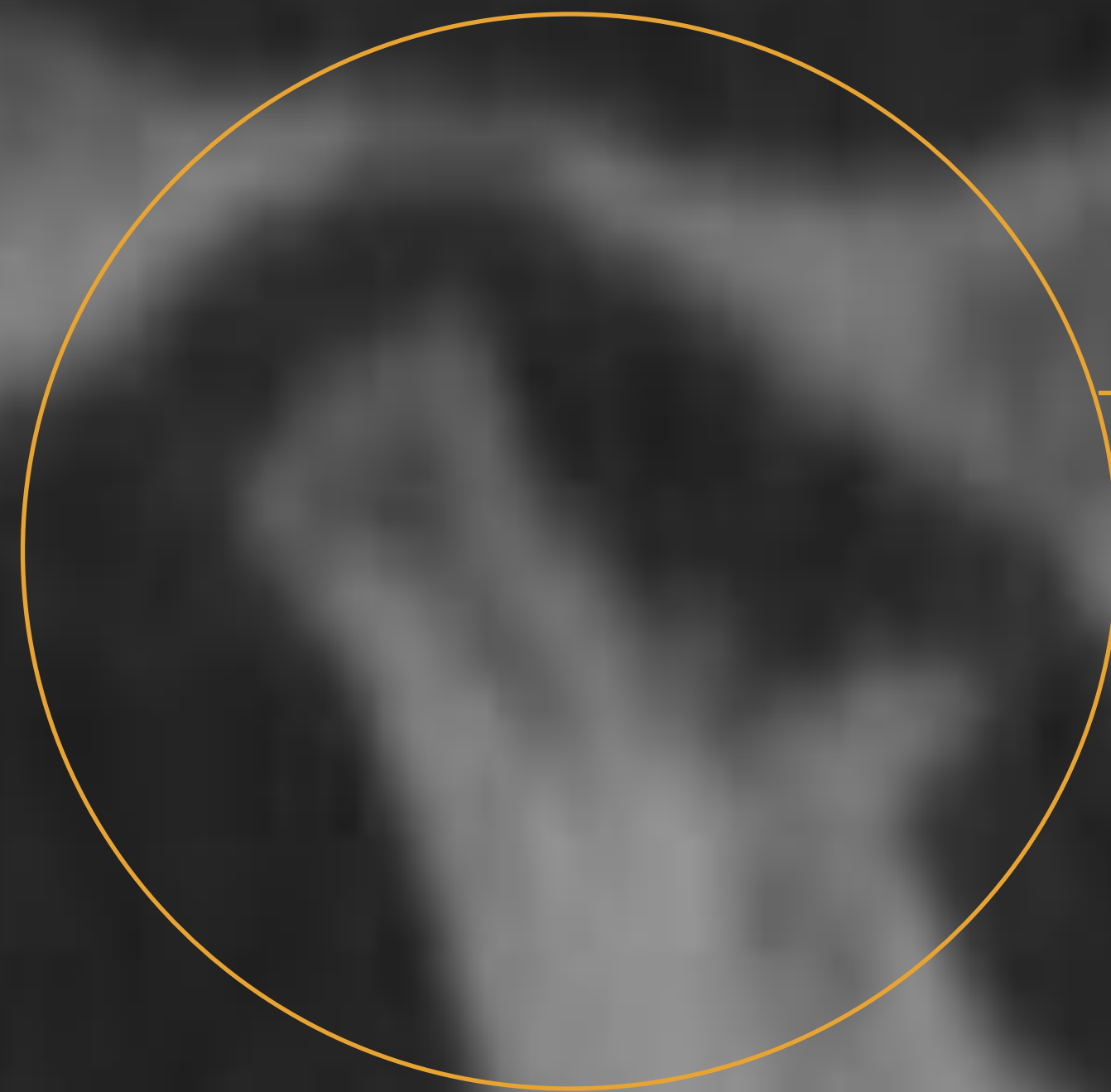
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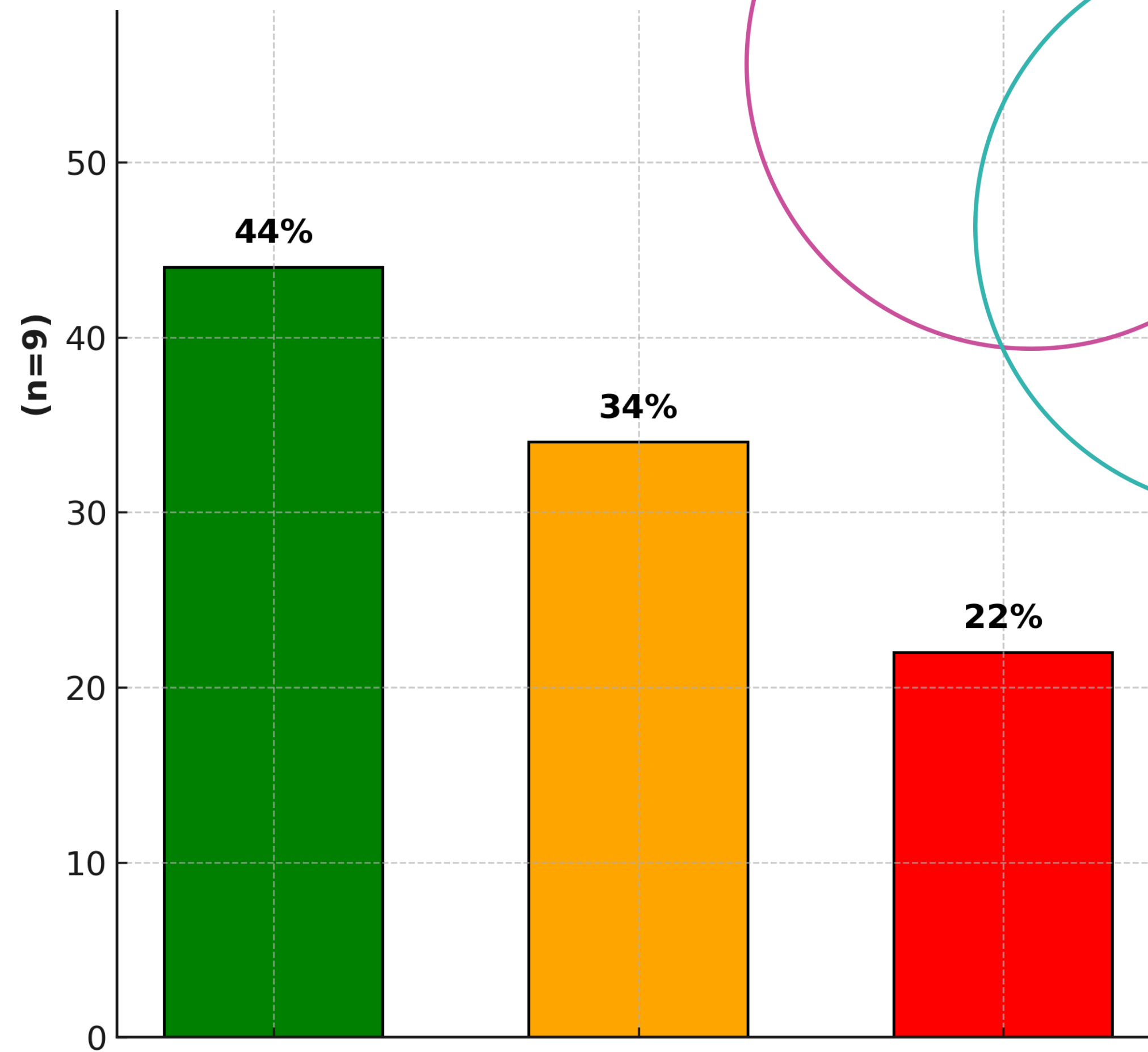
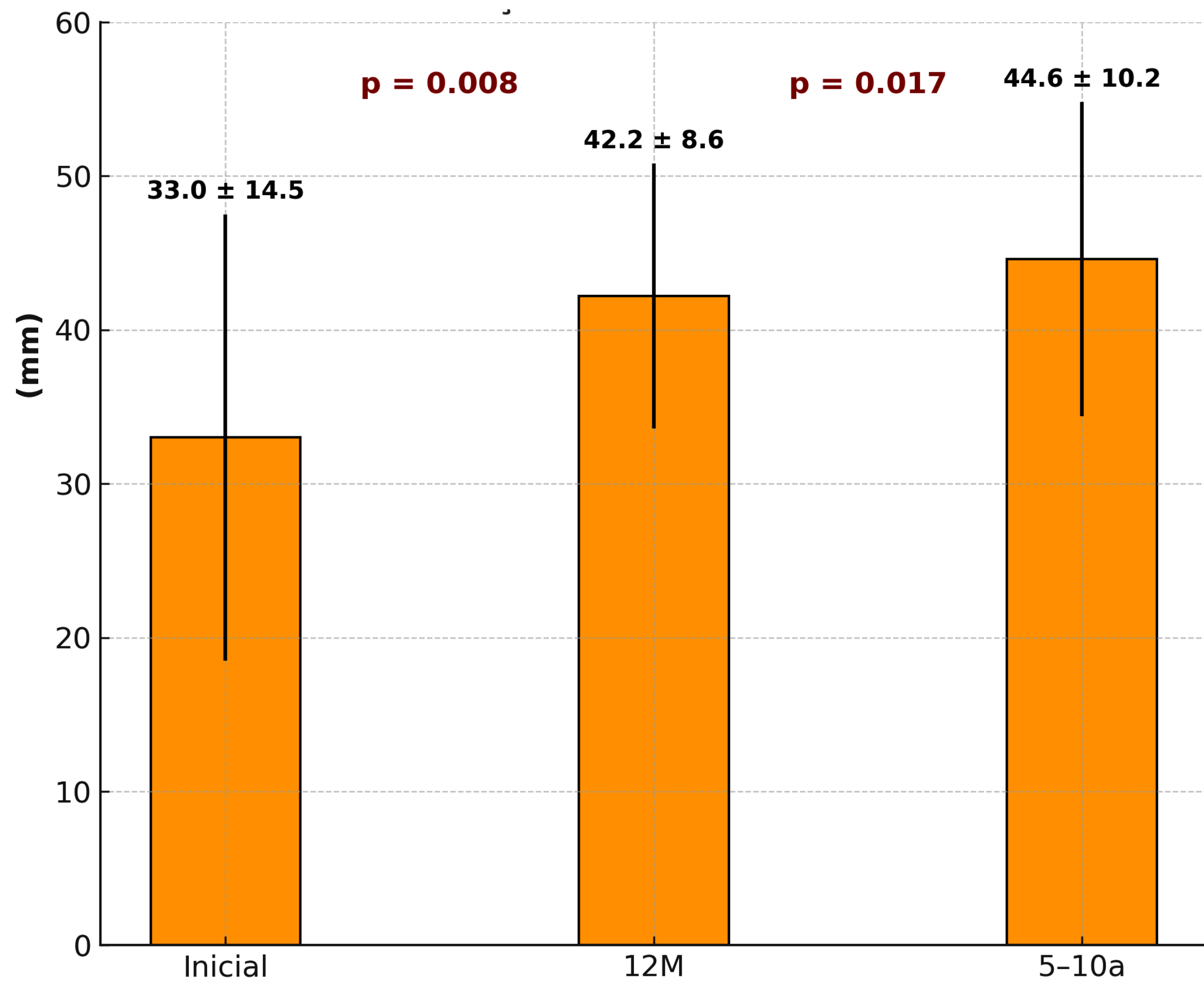
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CENTRO DE INOVAÇÃO
PESQUISA E ATUALIZAÇÃO
CIRÚRGICA



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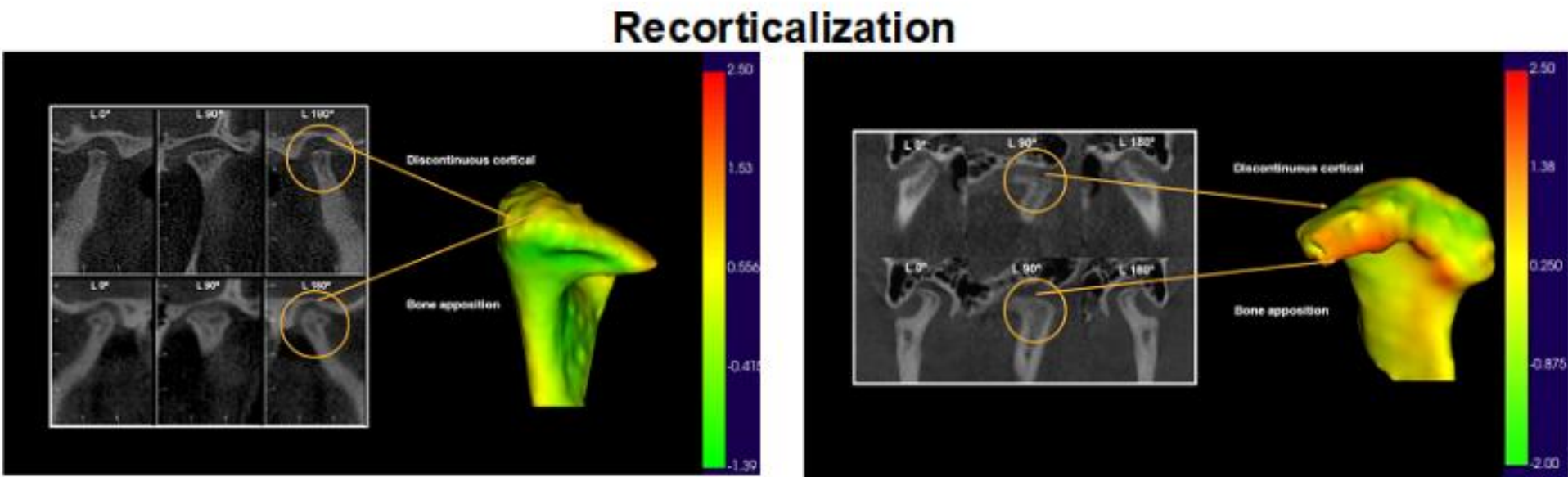
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Tesch et al. Stem Cell Translational and Medicine, 2024.

SELEÇÃO PÚBLICA MCTI/FINEP/FNDCT - MAIS INOVAÇÃO BRASIL – SAÚDE - ICTs - PESQUISA, DESENVOLVIMENTO E INOVAÇÃO PARA REDUZIR AS VULNERABILIDADES DO SUS E AMPLIAR O ACESSO À SAÚDE

2ª Etapa – Mérito: Divulgação do resultado preliminar

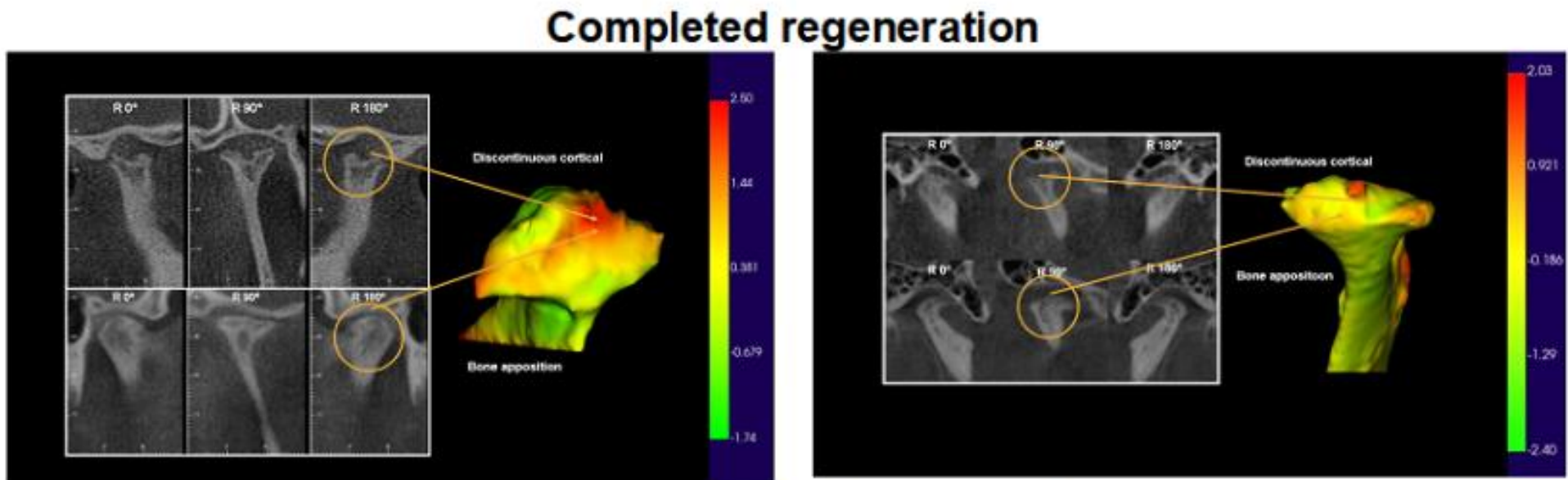
Linha Temática II – Terapias Avançadas

Ref.	Protocolo	Proponente	1. Grau de Inovação	2. Risco Tecnológico	3. Relevância da Inovação	4. Viabilidade Execução	5. Equipe do Projeto	6. Parcerias	Nota Preliminar	2a Etapa - Mérito Resultado Preliminar	Valor Recomendado (R\$)
0402/24	64EE1F7D-B77C-464A-8054-233365758B2B	Fundação Octacílio Gualberto	4	3	4	5	5	3	3,93	APROVADA	12.409.054,69
0320/24	4E2039D4-9815-49BC-85CF-50411BEB8560	EMPRESA BRASILEIRA DE SERVIÇOS HOSPITALARES	4	4	4	4	4	3	3,87	APROVADA	12.048.963,11
0384/24	5DDF3A73-AEA0-40FD-8DAF-04A72ACB718F	Fundação de Apoio ao IPT	4	5	4	2	3	4	3,80	APROVADA	5.680.927,00
0415/24	59E30240-9332-4007-A7CB-5B1C40BAE771	Instituto D'Or de Pesquisa e Ensino	5	5	3	3	4	2	3,80	APROVADA	19.999.625,16
0396/24	B2EE58DA-5B62-44AA-A29B-5500A1C2695F	FUNDAÇÃO PARA O DESENVOLVIMENTO CIENTÍFICO E TECNOLÓGICO EM SAÚDE	4	4	5	3	5	0	3,67	APROVADA	49.904.350,51



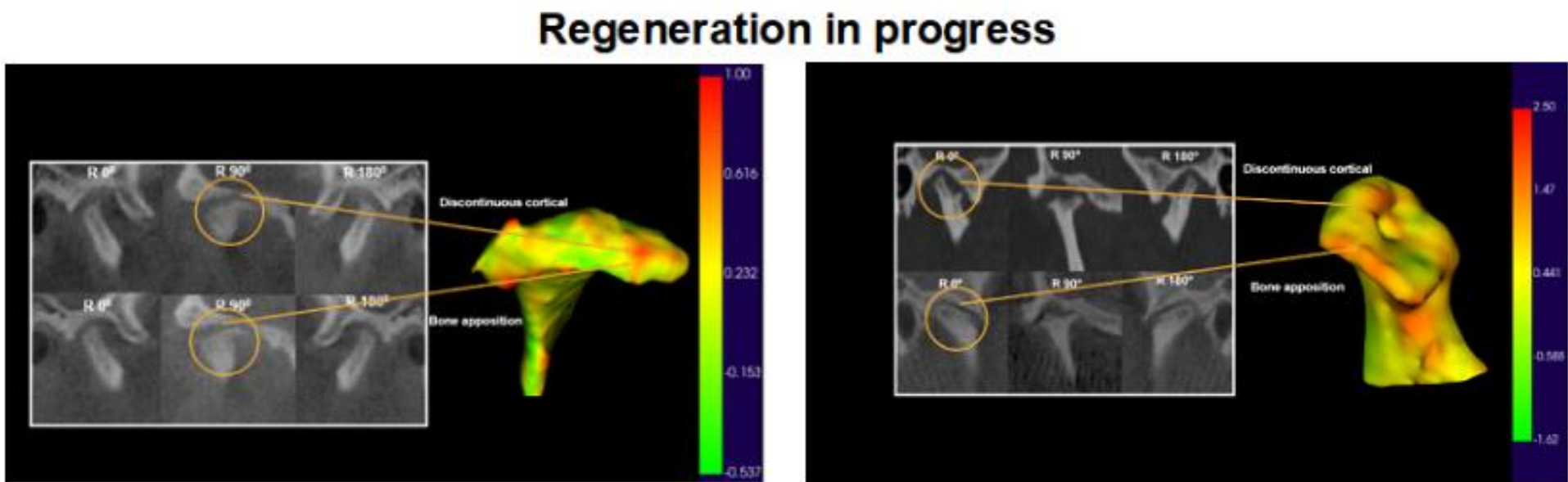
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Participant ID 7 (Left)



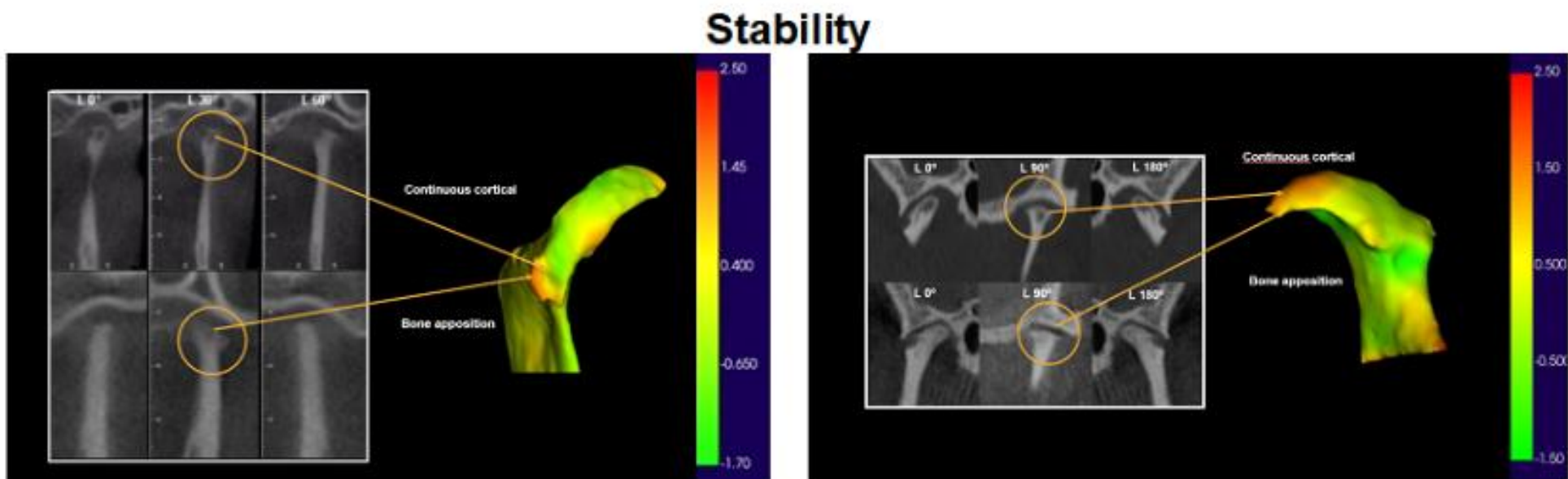
Participant ID 1 (Right)

Participant ID 7 (Right)



Participant ID 2 (Right)

Participant ID 9 (Right)



Participant ID 1 (Left)

Participant ID 7 (Left)

Bucharest 2-4 October
2025



Ultrasound-Guided Chondroprogenitor Cell Therapy for TMJ Osteoarthritis: Translational Approach Toward Tissue Regeneration.

Ricardo Tesch, DDS, MS, PhD

Vice-Dean for Research and Innovation

Director of the Regenerative Medicine Laboratory

Coordinator of the Chronic Pain Center

UNIFASE – Petrópolis School of Medicine