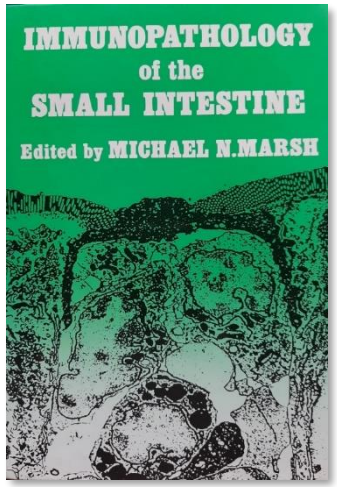
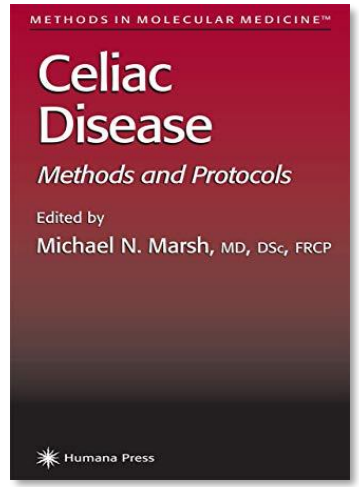
Gastroenterologist and authority on coeliac disease. He was born in Bristol, UK, on May 15, 1937, and died of metastatic prostate cancer in Shilton, UK, on July 12, 2021, aged 84 years.

# Marsh'tan günümüze Çölyak hastalığı

Arzu Ensari, MD, PhD
Ankara Üniversitesi Tıp Fakültesi
Patoloji Anabilim Dalı







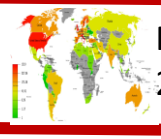

Marsh'ın Medikal kariyeri

- BSc in University of Leeds Medical School, 1959.
- BM, BCh, Magdalen College, Oxford, 1962.
- Chief Res. at London Hammersmith.
- MD in  Oxford Clinical School, 1972.
- Travelling Research Fellow at Boston Mass General, 1972-1974.
- Readership in Medicine at Manchester University, 1974 – 2000.
- Consulting Gastroenterological Physician at Hope Hospital, Salford, 1974 – 2000.
- Honorary Professor of Intestinal Immunopathology at Ankara University Medical School, Turkey, 2004.

# Çölyak hastalığının (d)evrimi

**21st century**

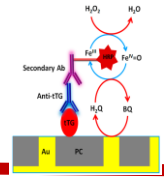
Gluten-related disorders



NCGS 2010

Epidemiology

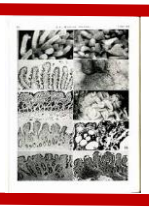
Serology 1980s



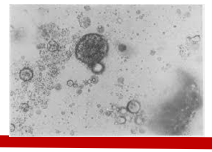
tTG Autoab of CD-1997

1:100 2000s

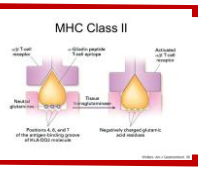
Blood tests



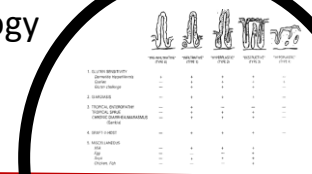
Pathology



Paulley 1954

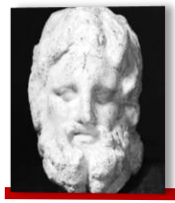



Genetics 1970



Marsh Classification 1992

Laboratory



Aretaeus

**2nd century**

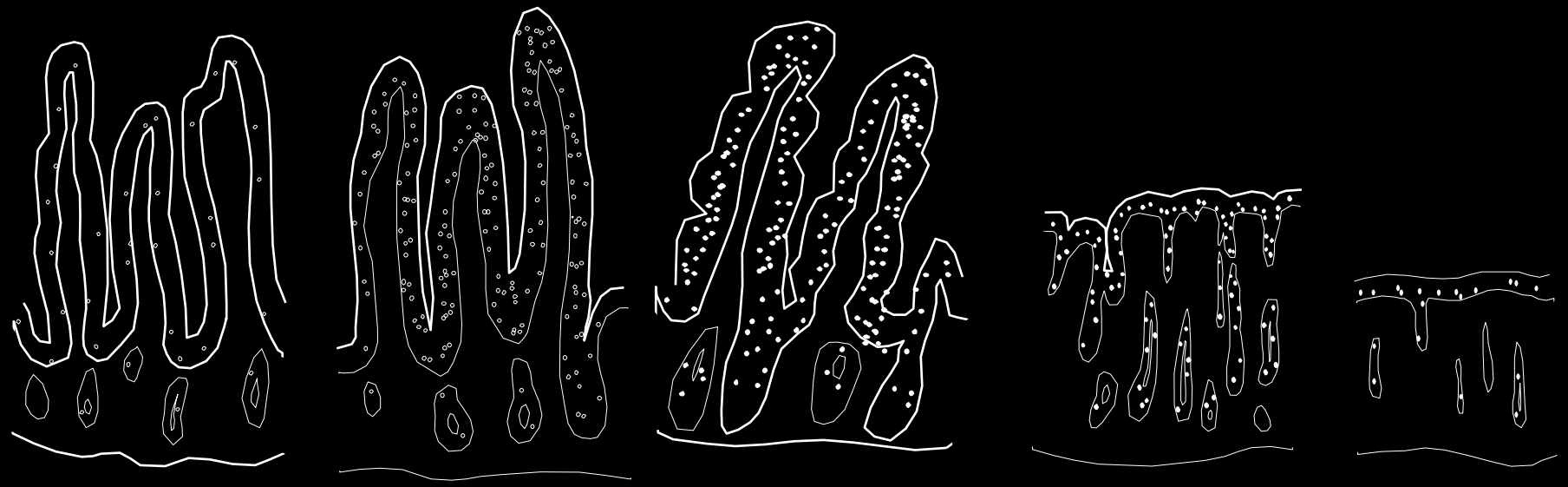
Gee 1888

Dicke 1950

Van De Kamer 1949

Koiliakos

Marsh'ın 1992'deki bu makalesi Gastroenteroloji'de en çok atıf alan yazı olur (>2000). Bilim dünyasına bu katkısından ötürü 2006'da XII International Coeliac Conference, New York Hilton'da 'Distinguished Investigator Award' alır.



| PRE-INFILTRATIVE | INFILTRATIVE | INFILTRATIVE - HYPERPLASTIC | FLAT - DESTRUCTIVE | ATROPHIC - HYPOPLASTIC |
|---|---|---|---|---|
| TYPE 0 | TYPE 1 | TYPE 2 | TYPE 3 | TYPE 4 |

•Marsh MN: Gluten, major histocompatabilitiy complex and the small intestine: a molecular and immunobiologic approach to the spectrum of gluten sensitivity. Gastroenterology 1992; 102: 330-354.

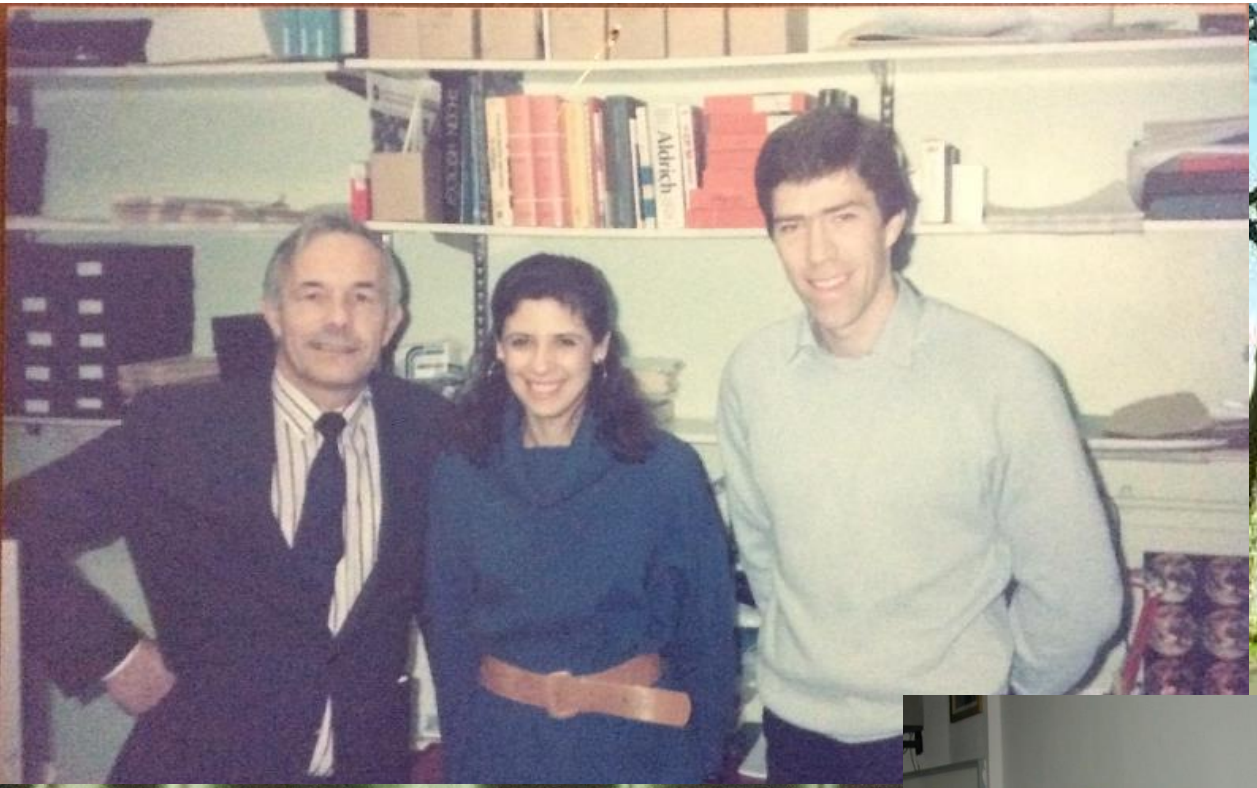

Aldrich

**Table 1.** Histopathological classifications of celiac disease

| Marsh 1992 and Rostami et al. 2015 (5, 8, 16, 17) | Rostami et al 1998, 1999 (9, 10) | Oberhuber et al. 1999 (11) | Corazza & Villanacci 2005 (2) | Ensari 2010 (3) |
|---|---|---|---|---|
| **Type 0:** Microscopic enteritis; normal villi with pathological increase of T lymphocytes, alteration of enterocytes, shortening of microvilli and increased α/β/γ/δ T cell receptors | | | | |
| **Type 1:** Microscopic enteritis: increased IEL count (> 20 IEL/100 enterocytes) | **Marsh I**: normal villous epithelium > 30 IEL per 100 enterocytes | **Type 1** Infiltrative lesion | **Grade A** No atrophy, normal villous architecture with or without crypt hyperplasia and ≥25 IELs/100 enterocytes | **Type 1** Normal villi with IE lymphocytosis |
| **Type 2** Microscopic enteritis increased IEL count (> 20 IEL/100 enterocytes) and crypt hyperplasia) | **Marsh II**: enlarged crypts and influx of inflammatory cells | **Type 2** Crypt hyperplasia | **Grade A** | **Type 1** |
| **Type 3** Villus effacement and crypt hyperplasia | **Marsh IIIa**: (partial VA) shortened blunt villi, infiltration IEL and hyperplastic crypts | **Type 3A: Partial** | **Grade B1** villous-crypt ratio <3:1 IEL count of >25/100 enterocytes** | **Type 2** Shortened villi (<3:1 or <2:1 in bulbus) with IE lymphocytosis and crypt hyperplasia |
| | Marsh IIIb (subtotal VA) Recognizable atrophic villi, inflammatory cells and enlarged crypts | **Type 3B: Subtotal** | **Grade B1** | **Type 2** |
| | **Marsh IIIc** :(total villous atrophy) total absence of villi, severe atrophic, hyperplastic, infiltrative lesion | **Type 3C: Total** | **Grade B2** Completely flat atrophic mucosa, no observable villi and ≥25 IELs/100 enterocytes | **Type 3** Completely flat mucosa with IE lymphocytosis and crypt hyperplasia |
| **Type 4** Destructive lesion | Not considered | **Type 4** Destructive lesion | Not considered | Not considered |

***Peña AS, What is the best histopathological classification for coeliac disease? Does it matter?*** *Gastroenterol Hepatol Bed Bench* ***2015****;8(4):239-243*

**EDITORIAL**

Gastroenterology and Hepatology From Bed to Bench.


EDITORIAL

# Coeliac disease: to classify or not to classify – that is the question!

**Arzu Ensari**

*Department of Pathology, Ankara University Medical School, Sihhiye 06100, Ankara, Turkey*

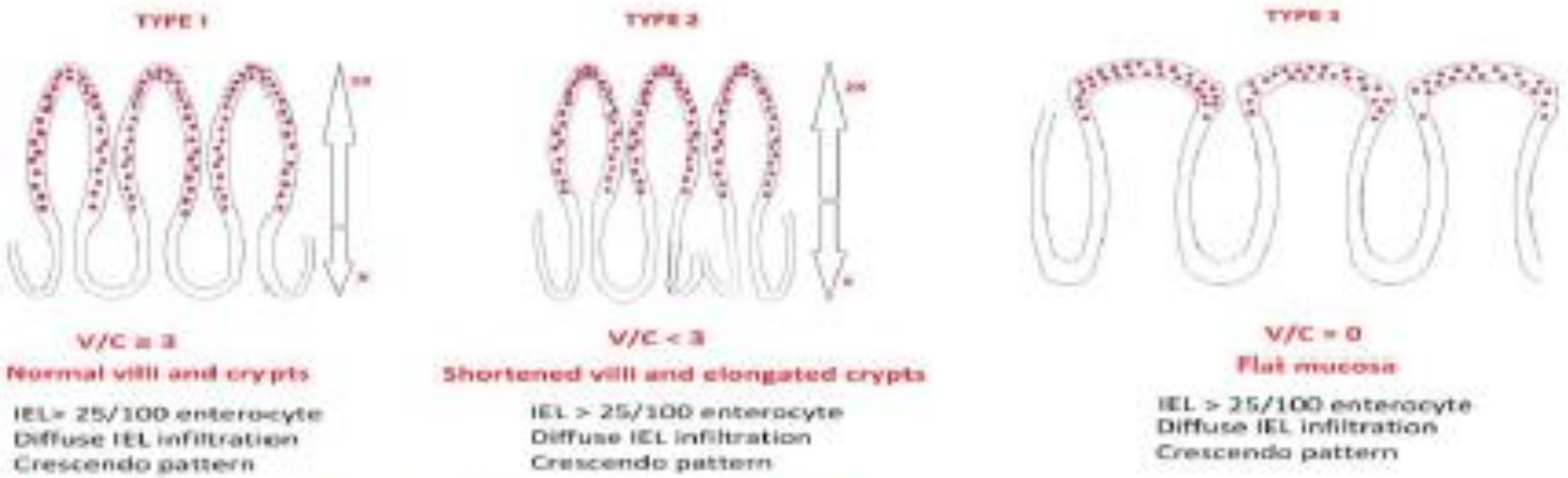
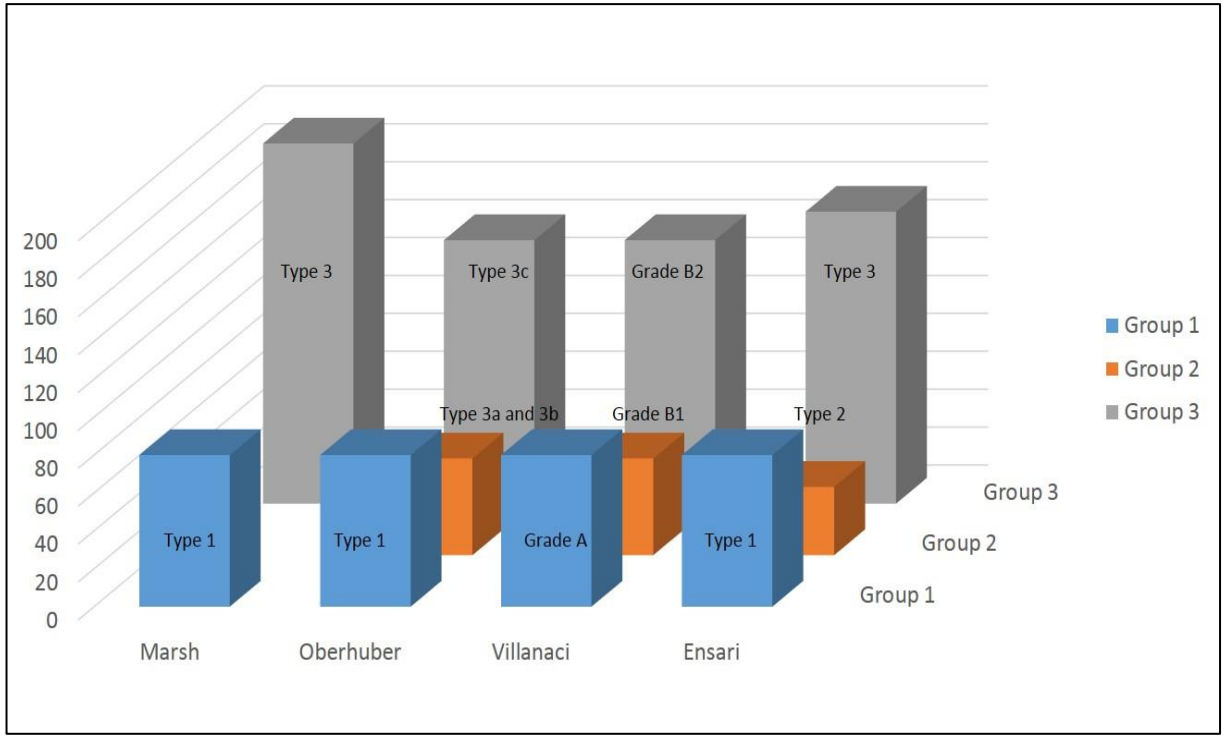



**Figure 1.** Ensari classification of mucosal pathology in coeliac disease.

| Groups | | | |
|---|---|---|---|
| Group 1 | 1 | <0,0001 | 0,94-1,00 |
| Group 2 | 0,53 | <0,0001 | 0,48-0,58 |
| Group 3 | 0,78 | <0,0001 | 0,73-0,82 |
| | Fleiss' kappa | | |
| Overall | 0,80 | <0,0001 | 0,76-0,87 |




**Özakıncı et al, Path Res Pract. 2016 Dec;212(12):1174-1178**

Contents lists available at ScienceDirect

Pathology – Research and Practice

journal homepage: www.elsevier.com/locate/prp

Original article

## Classification chaos in coeliac disease: Does it really matter?

Hilal Özakıncı[a], Ayça Kırmızı[a], Berna Savaş[a], Çağdaş Kalkan[b], İrfan Soykan[b], Hülya Çetinkaya[b], Zarife Kuloğlu[c], Aydan Kansu[c], Ödül Eğritaş Gürkan[d], Buket Dalgıç[d], Zeynep Şentürk[e], Arzu Ensari (MD, Ph.D.)[a,*]

| Study | Marsh | Oberhuber | Corazza-Villanaci | Ensari |
|---|---|---|---|---|
| Douida, 2020 | 1 | 0.37 | 0.50 | |
| Corazza, 2007 | 0.23 | 0.35 | 0.54 | |
| Güreşci, 2012 | 1 | 0.56 | | 1 |
| Mubarek, 2011 | 0.486 | | | |
| Weile,2000 | 0.57 | | | |
| Das, 2019 | 0.48 | 0.28 | 0.43 | 0.43 |

ORIGINAL ARTICLE

# ROC-king onwards: intraepithelial lymphocyte counts, distribution & role in coeliac disease mucosal interpretation

Kamran Rostami,[1] Michael N Marsh,[2,3] Matt W Johnson,[2] Hamid Mohaghegh,[4] Calvin Heal,[5] Geoffrey Holmes,[6] Arzu Ensari,[7] David Aldulaimi,[8] Brigitte Bancel,[9] Gabrio Bassotti,[10] Adrian Bateman,[11] Gabriel Becheanu,[12] Anna Bozzola,[13] Antonio Carroccio,[14] Carlo Catassi,[15] Carolina Ciacci,[16] Alexandra Ciobanu,[12] Mihai Danciu,[17] Mohammad H Derakhshan,[18,19] Luca Elli,[20] Stefano Ferrero,[20] Michelangelo Fiorentino,[21] Marilena Fiorino,[14] Azita Ganji,[22] Kamran Ghaffarzadehgan,[23] James J Going,[24] Sauid Ishaq,[25] Alessandra Mandolesi, Sherly Mathews,[1] Roxana Maxim,[17] Chris J Mulder,[26] Andra Neefjes-Borst,[26] Marie Robert,[27] Ilaria Russo,[16] Mohammad Rostami-Nejad,[4] Angelo Sidoni,[10] Masoud Sotoudeh,[19] Vincenzo Villanacci,[13] Umberto Volta,[21] Mohammad R Zali,[4] Amitabh Srivastava[28]

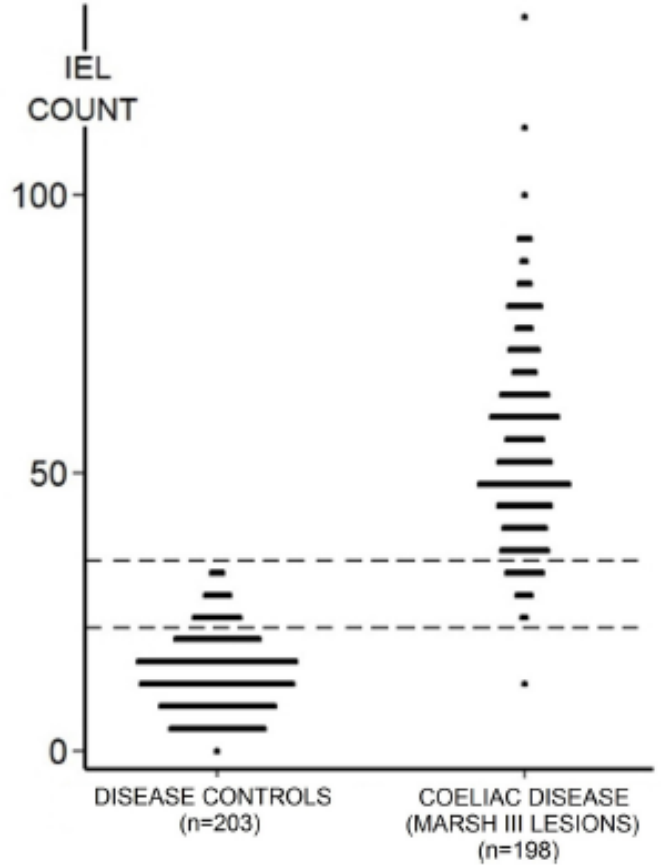


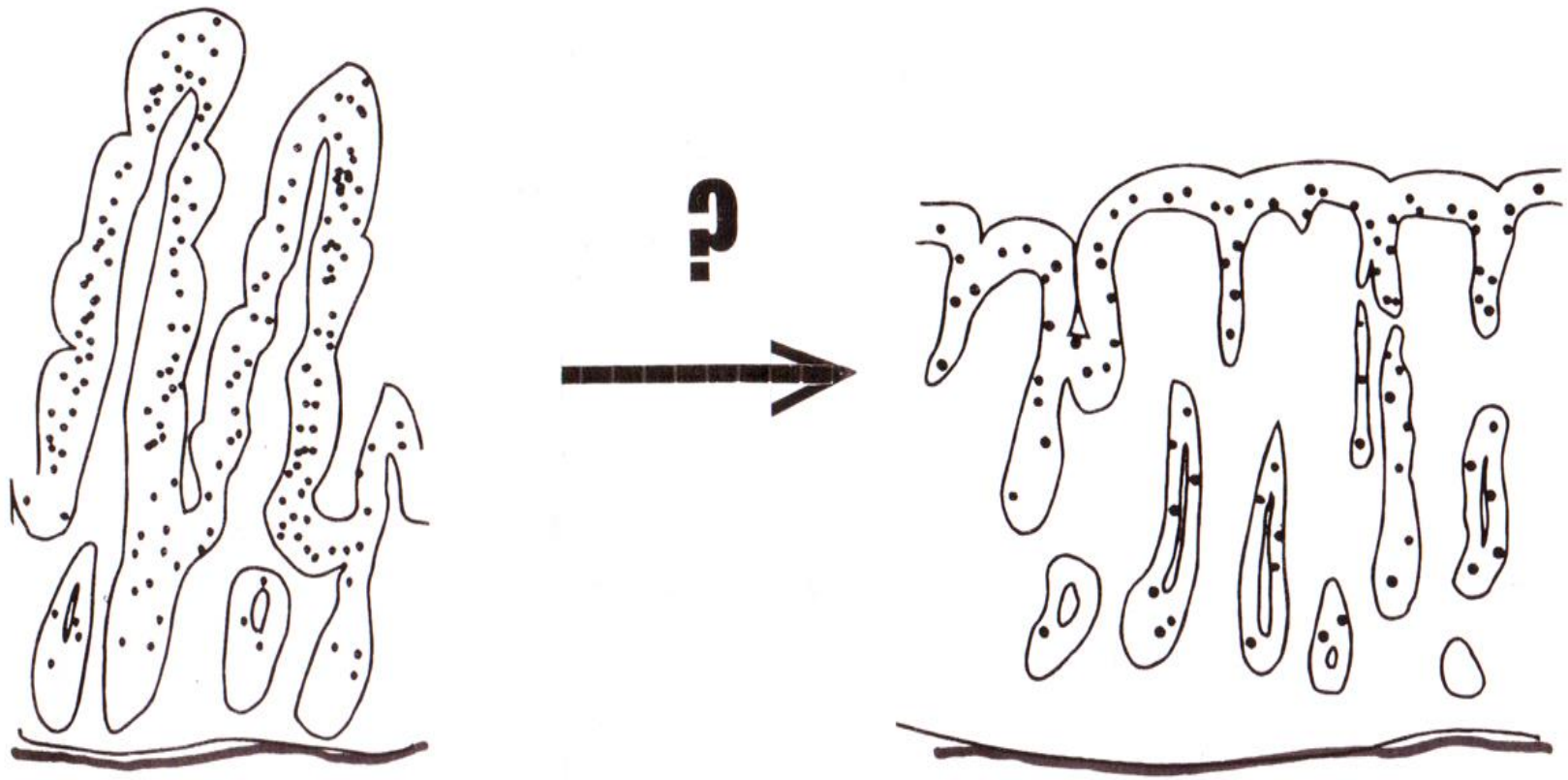

**Table 3** Breakdown of Marsh III mucosal lesions

| Subgroup | Biopsies (n) | H&E IEL (mean±SD) | Biopsies (n) | CD3+ IEL (mean±SD) |
|---|---|---|---|---|
| IIIa | 36 | 54±14 | 10 | 60±11 |
| IIIb | 38 | 52±17 | 12 | 67±19 |
| IIIc | 63 | 55±21 | 14 | 62±31 |
| Total | 137 | 54±18 | 36 | 63±23 |

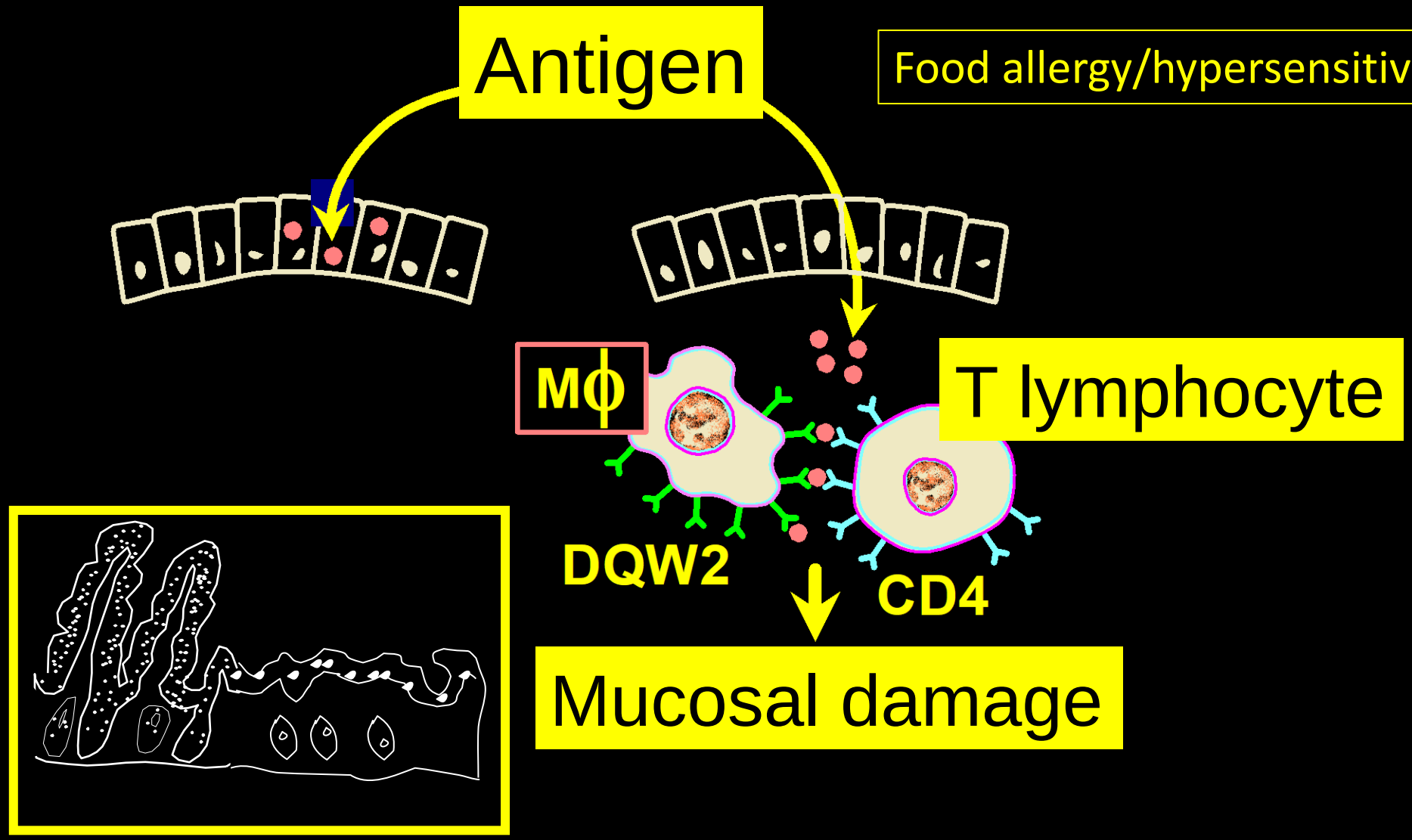
Rostami K, *et al*. *Gut* 2017;**66**:2080–2086. doi:10.1136/gutjnl-2017-314297

Artık Marsh, yalnızca çölyak hastalığının innovatif araştırmalarına öncülük eden bir bilim insanının İSMİ değil,
tüm dünyada patologların ince barsak biopsilerini değerlendirirken kullandıkları KLASİFİKASYONdur!

Son 30 yıldır 'Marsh' ismi, Çölyakla ilgili hemen her konferans, prezantasyon ve yayında değişmez bir olgu olarak yer almıştır.



Food allergy/hypersensitivity reaction




1990

Hypersensitivity reaction

Autoimmune disease

Innate immunity

Adaptive immunity

GLIADIN

Dysbiosis

IL-15

tTG

NK

IEL

MΦ

T CELL

Altered permeability

DQW2

CD4

INFγ, IL21
MMPs

MUCOSAL DAMAGE

B cell

Abs: tTG,
EMA, AGA

Plasma cell

2020

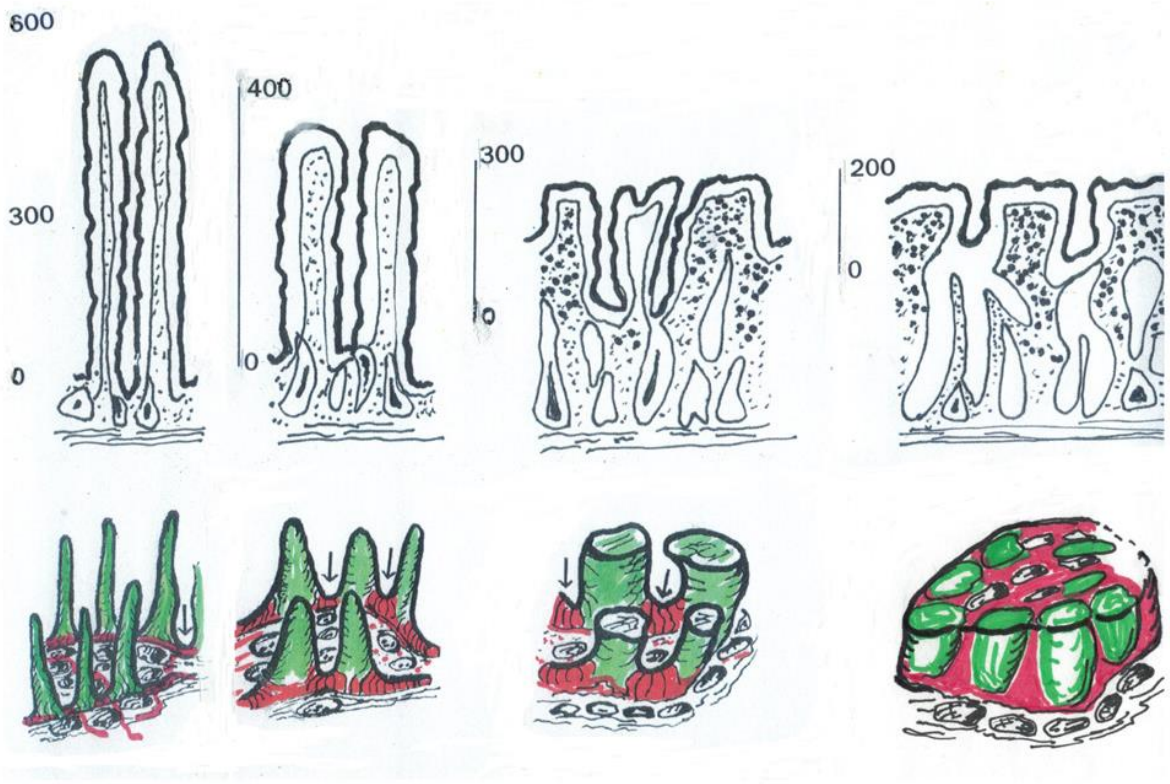
REVIEW

# Diagnosing celiac disease: A critical overview

**Arzu Ensari**[1], **Michael N Marsh**[2]

[1]Department of Pathology, Ankara University School of Medicine, Ankara, Turkey
[2]Wolfson College, University of Oxford, Oxford, UK

**Cite this article as:** Ensari A, Marsh MN. Diagnosing celiac disease: A critical overview. Turk J Gastroenterol 2019; 30(5): 389-97.

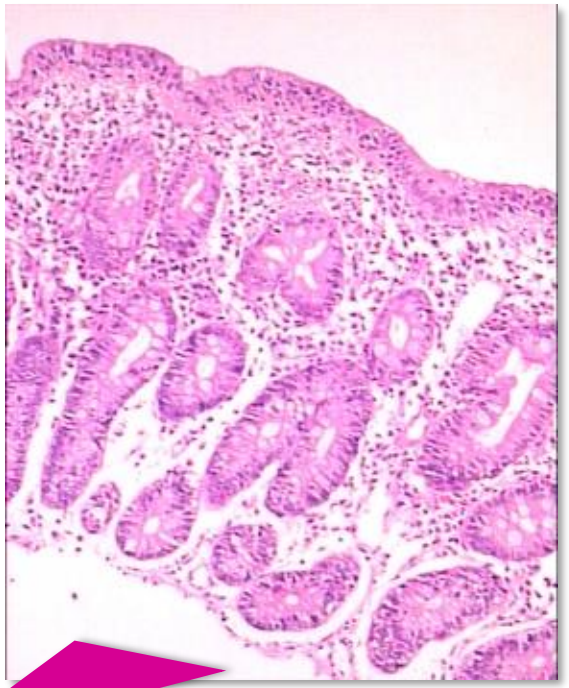


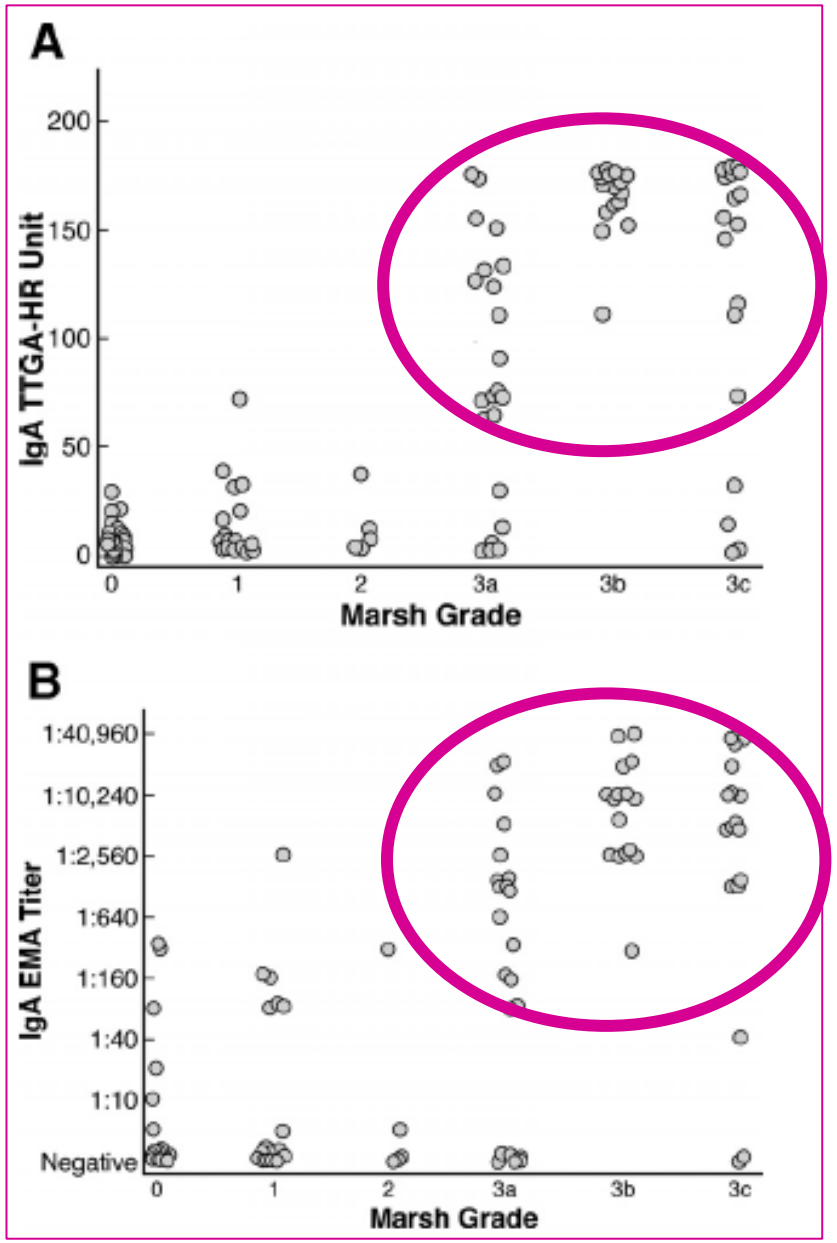


- Crypt zone extends
- Villi amalgamate = mucosal remodelling!
- There is no true atrophy!
- Modified Marsh (subgrouping of Marsh Type 3 into 3a, 3b and 3c) is a waste of time!
- No correlation with serology, clinical presentation, response to GFD…

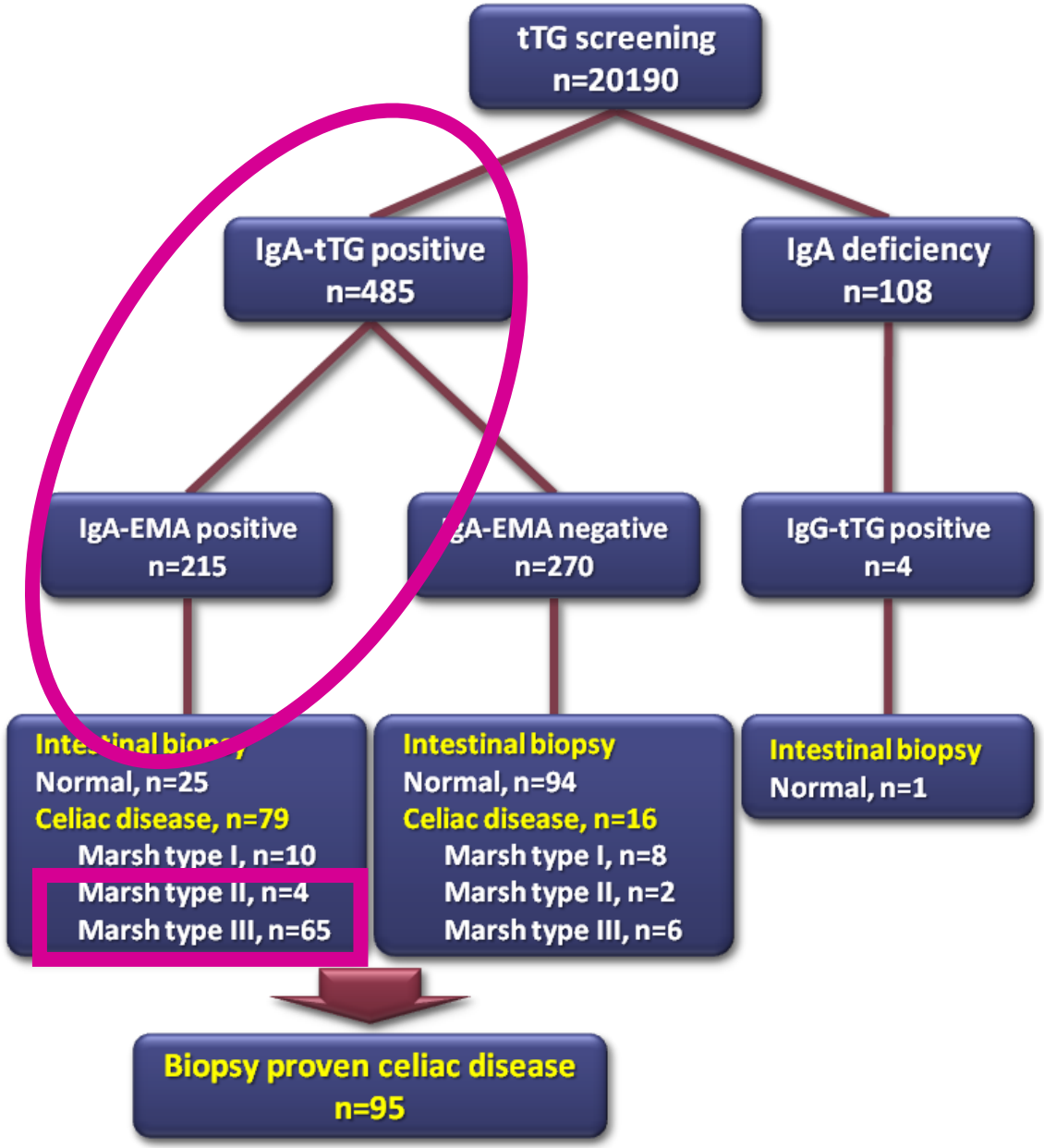
# Seroloji…

| Test | Sensitivity | Specificity |
|---|---|---|
| Anti-deamidated-gliadin peptid antibodies (DGP) | 85% | 90% |
| Anti tissue transglutaminase (tTG) | 77-100% | 91-100% |
| Anti endomysial antibodies (EMA) | 86-100% | 90-100% |
| Anti-gliadin antibodies (AGA) | 57-100% | 47-94% |






Donaldson, 2007 & 2008



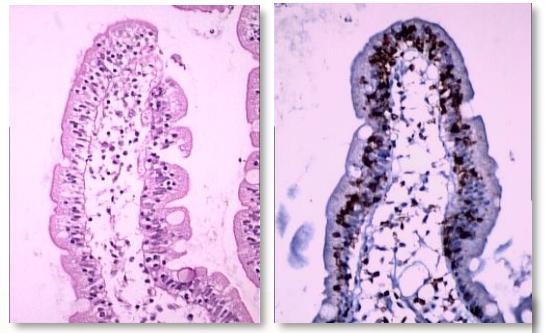

Dalgic B et al, AJG, 106(8):1512-7, 2011

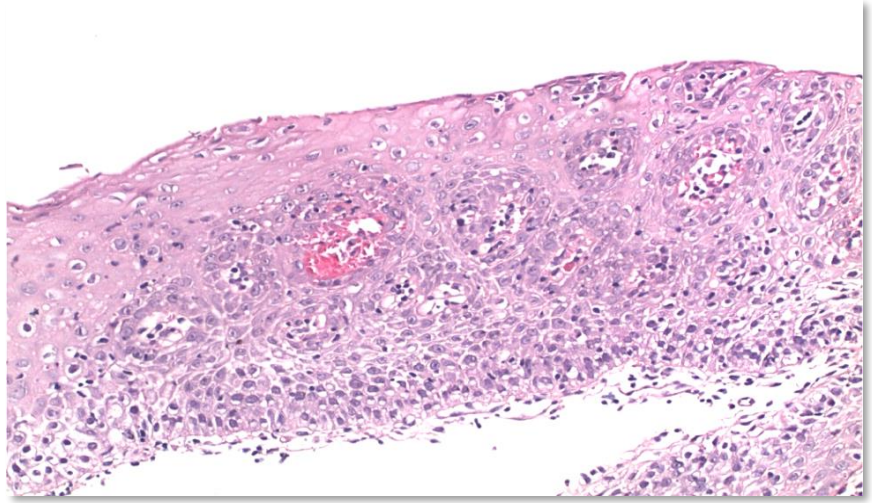
# Tutulum patern(ler)i

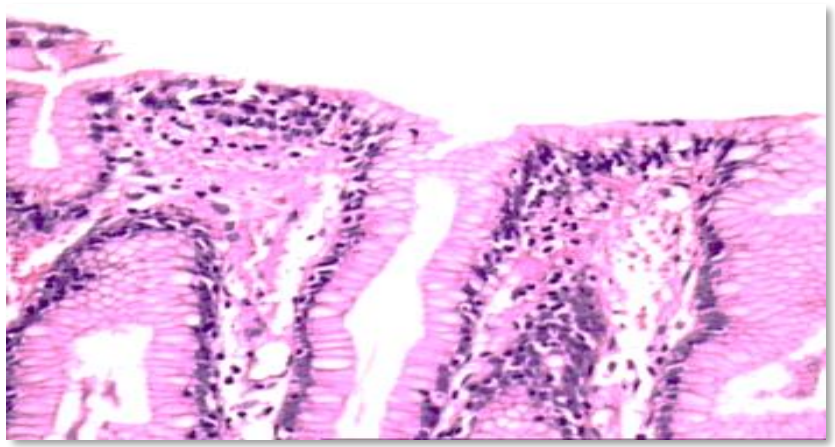
Proksimal duodenumda başlar ve tüm ince barsağı **diffüz** tutarak distale ilerler

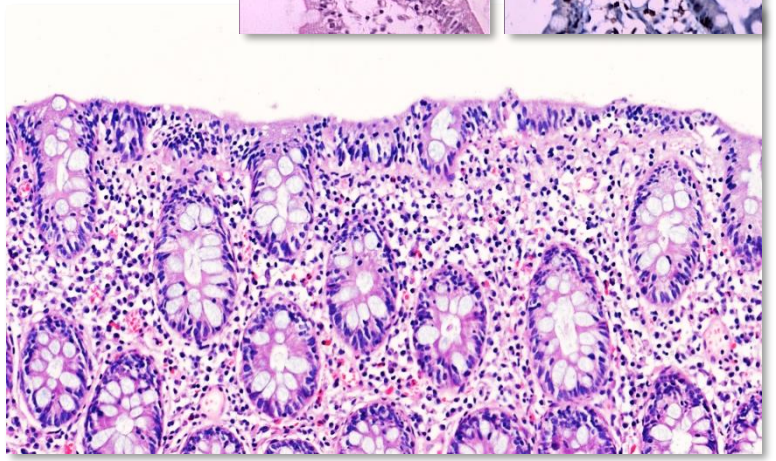
Proksimal duodenumda başlar ve ince barsağı **«patchy»** tutar

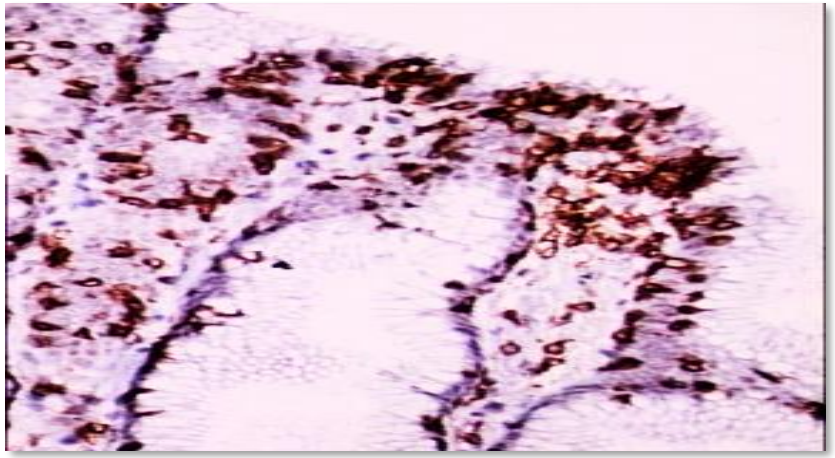
# Çölyak hastalığında 'full house' patern (2020)

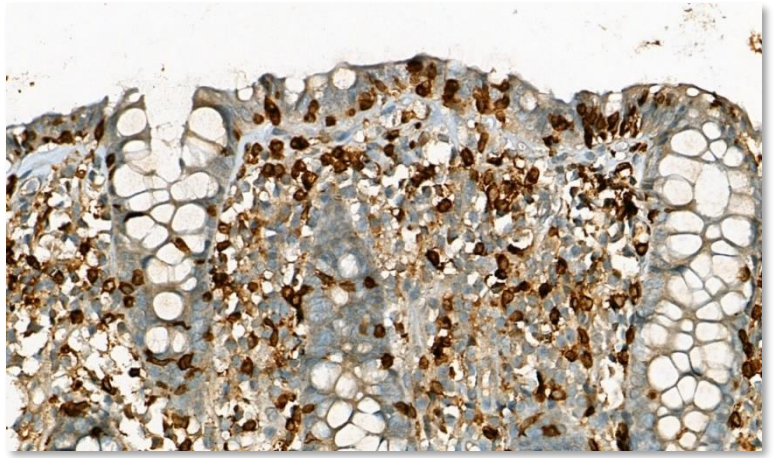












Lenfositik özofajit

Lenfositik gastrit

Lenfositik kolit

# Biopsi…

Jejunal biopsi

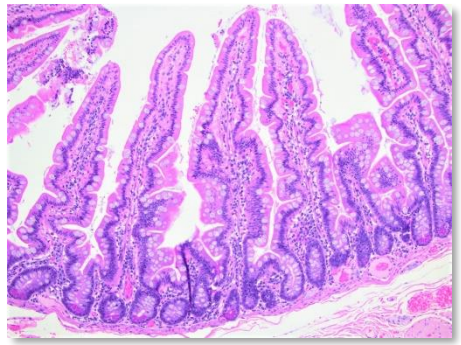
Gluten challenge

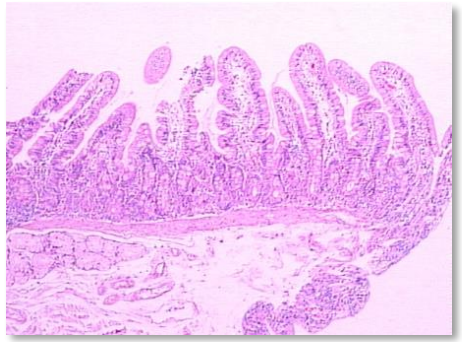
Duodenal biopsi

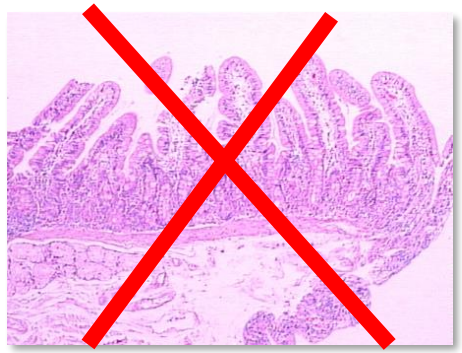
No biopsy!
Seroloji

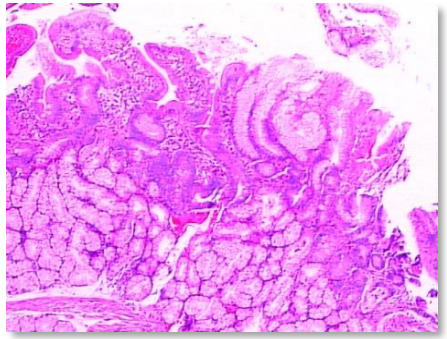
Bulbus biopsisi

2D1 + 2D2





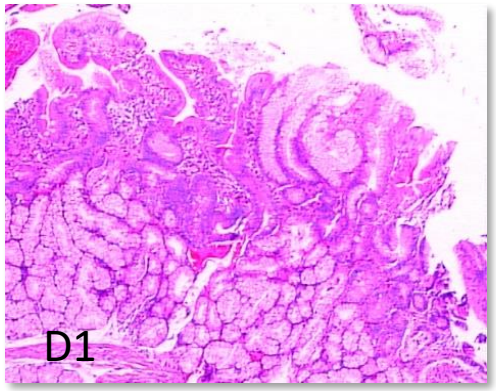




1990

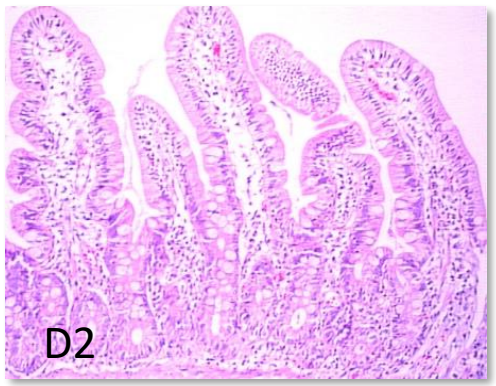
2020

97% abnormal




85%

87% abnormal




Of 24 cases with patchy disease,
16 (66%) were pediatric patients,
15 (93%) with only D1 involvement.

Virchows Archiv (2020) 477:507–515
https://doi.org/10.1007/s00428-020-02832-6

ORIGINAL ARTICLE

Check for updates

# Duodenal bulb biopsy in the diagnostic work-up of coeliac disease

Hilal Özakıncı[1] · Ayça Kırmızı[1] · Merve Tural[1] · Saba Kiremitçi[1] · Berna Savaş[1] · Zarife Kuloğlu[2] · Aydan Kansu[2] · Arzu Ensari[1]

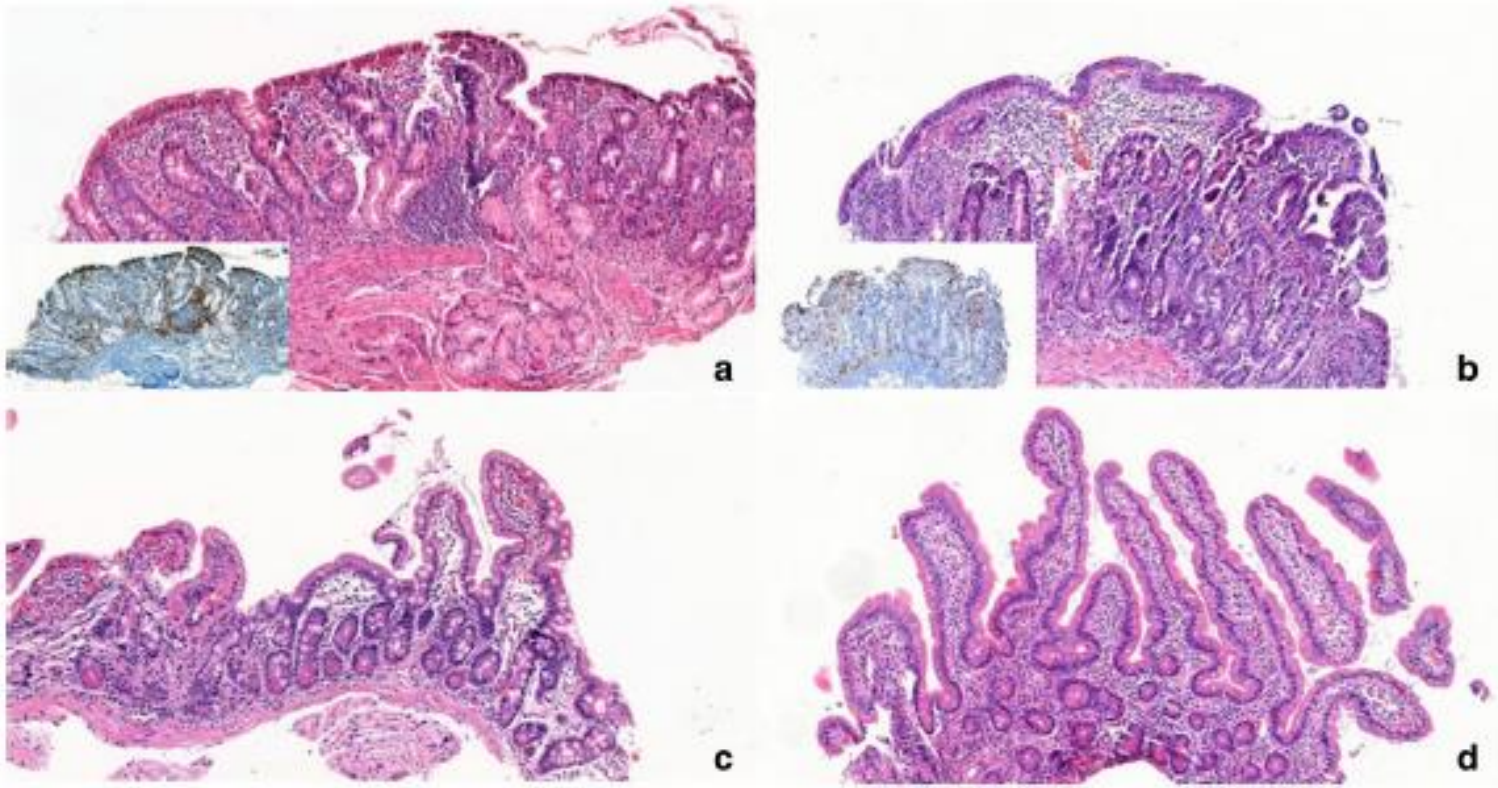


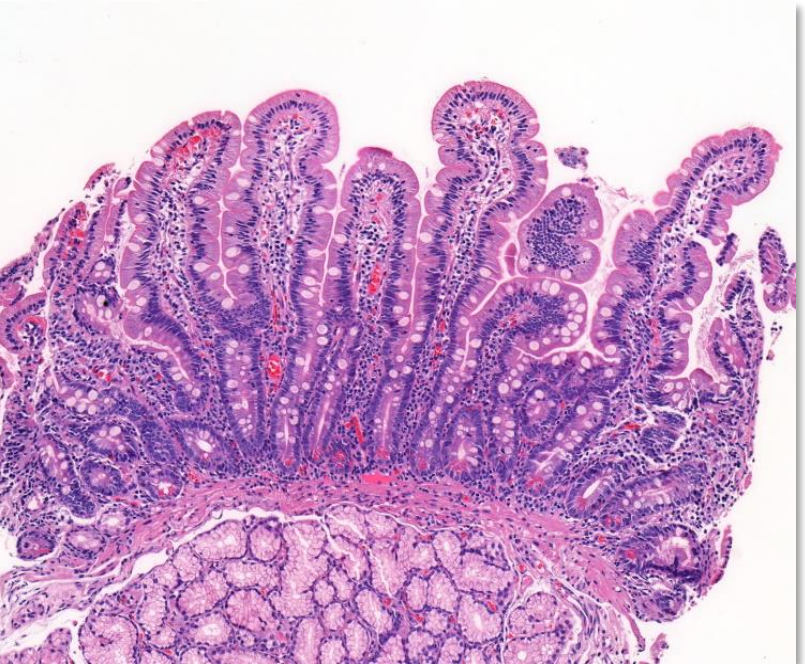

**Fig. 1** Examples of patchy mucosal involvement in a pediatric (**a** and **c**, a 5-year-old boy suffering from short stature) and an adult (**b** and **d**, a 44-year-old female with unexplained anemia) patient. Flat duodenal bulb mucosa (**a** and **b**) and unaffected distal duodenal mucosa (**c** and **d**; H&E ×100). Insets in **a** and **b** represent CD3 immunohistochemistry (×100)

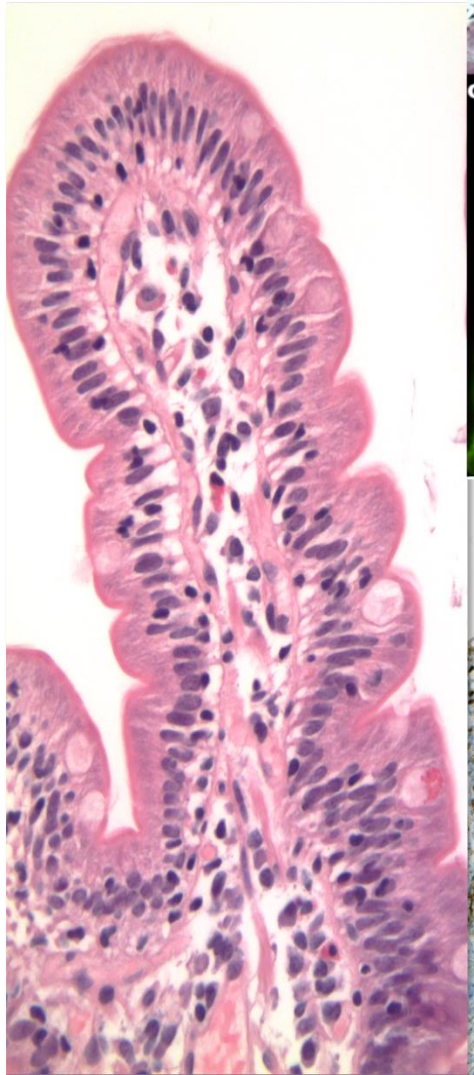
**Table 3** Literature summary on the patchiness of newly diagnosed CD

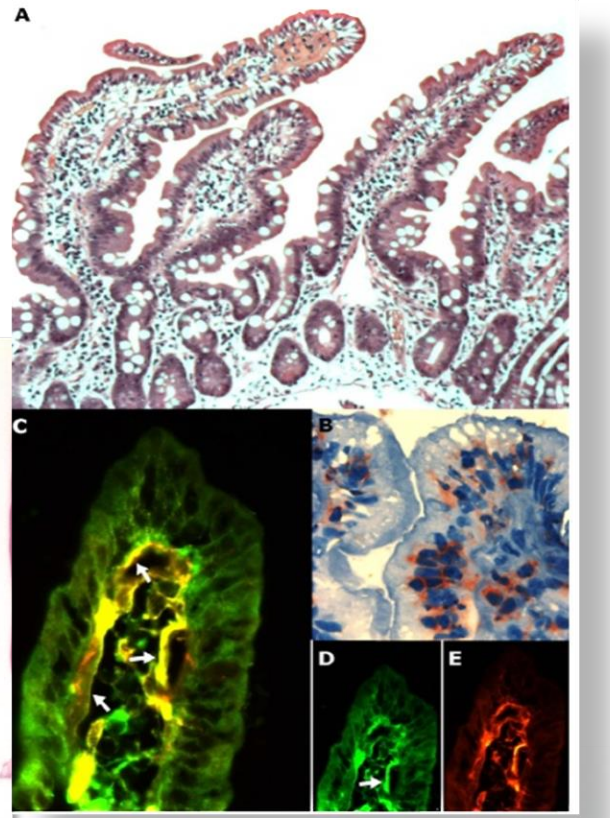
| | Patients *n* | Patchy involvement (only D1 or D2) (*n*, %) | Patchy involvement (only D1) (*n*, %) |
|---|---|---|---|
| Bonamico et al., 2004 [1] | 95 P | 13 (14%) | 4 (4%) |
| Ravelli et al., 2005 [32] | 112 P | 0 (0%) | 0 (0%) |
| Bonamico et al., 2008 [2] | 665 P | 20 (3%) | 16 (2%) |
| Hopper et al., 2007 [12] | 53 A | 10 (18%) | 1 (2%) |
| Rashid et al., 2009 [31] | 35 P | 6 (17%) | 4 (11%) |
| Prasad et al., 2009 [30] | 52 P | 0 (0%) | 0 (0%) |
| Gonzalez et al., 2010 [11] | 15 A | - | 4 (26%) |
| Mangiavillano et al., 2010 [21] | 47 P | 5 (11%) | 5 (11%) |
| Weir et al., 2010 [43] | 101 P | 16 (16%) | 7 (7%) |
| | | | 11 (9%) |
| | | | 6 (7%) |
| | | | 1 (1%) |
| Kurien et al.,2012 [17] | 28 A | 7 (25%) | 5 (17%) |
| Nenna et al.,2012 [27] | 43 A | - | 1 (2%) |
| Nenna et al., 2013 [28] | 345 A+ P | - | 21 (6%) |
| Sharma et al., 2013 [36] | 101 P | 10 (10%) | 8 (8%) |
| Caruso et al., 2013 [3] | 25 A | 0 (0%) | 0 (0%) |
| Mansfield-Smith et al., 2014 [22] | 60 P | - | 12 (20%) |
| Valitutti et al. 2014 [40] | 41 P | 7 (17%) | 0 (0%) |
| Mooney et al., 2016 [25] | 268 A | - | 7 (3%) |
| Stoven et al., 2016 [37] | 16 A | 3 (18%) | 1 (6%) |
| Dhandhu et al., 2018 [4] | 98 A + P | 0 (0%) | 0 (0%) |
| Doyev et al., 2019 [6] | 648 P | 82 (13%) | 71 (10%) |
| The present study | 153 A + P | 24 (15%) | 20 (13%) |

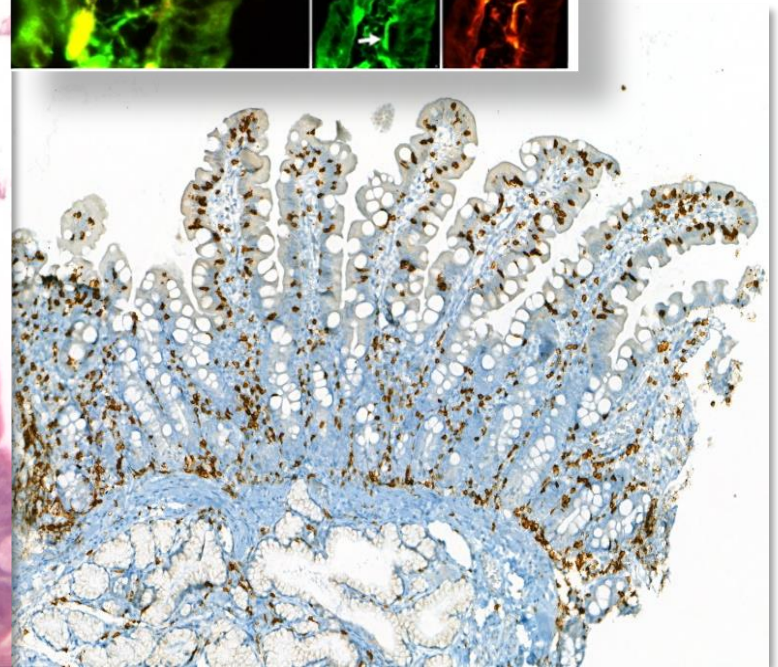
Olguların %13'ünde bulbus biopsisi alınmasaydı tanı verilemeyecekti!
İzole bulbus tutulumu 0-%26 arasında değişiyor!

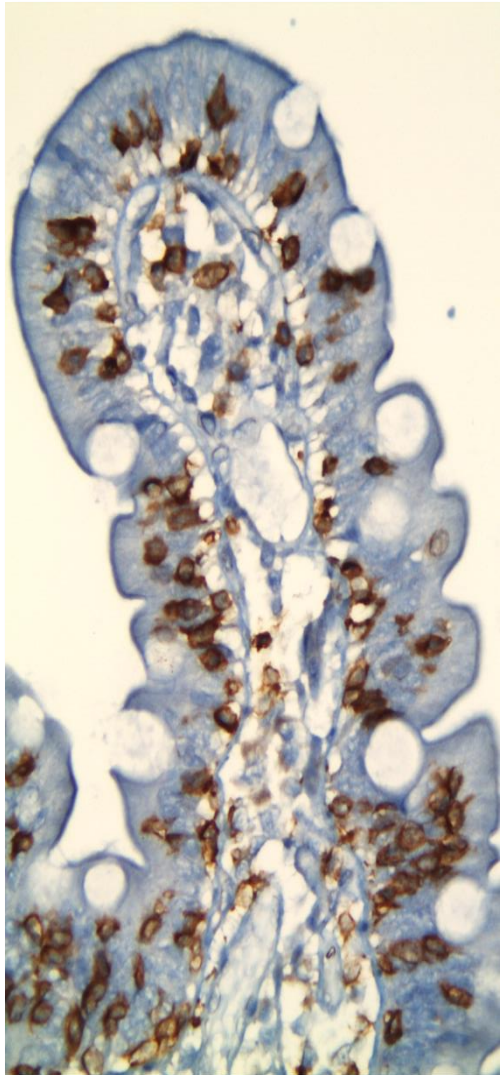
# Marsh 0: Normal mukoza



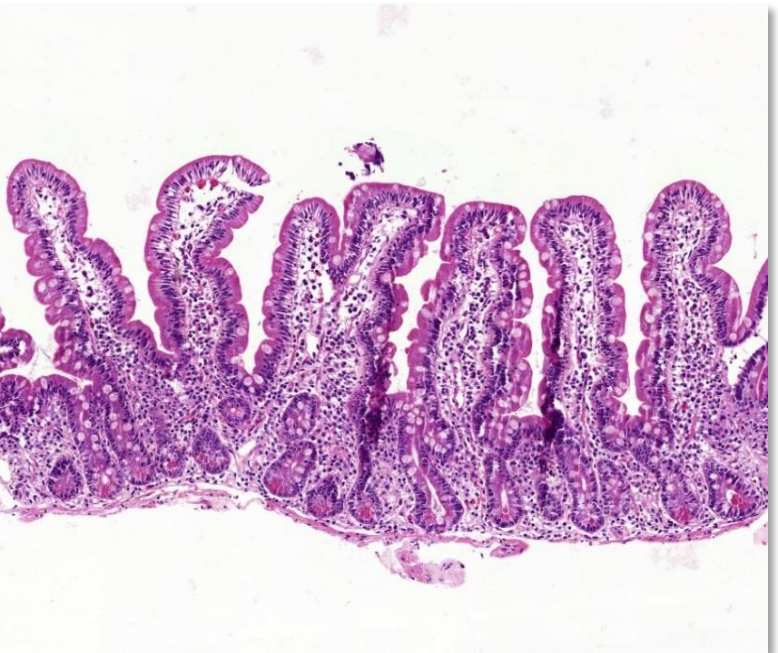


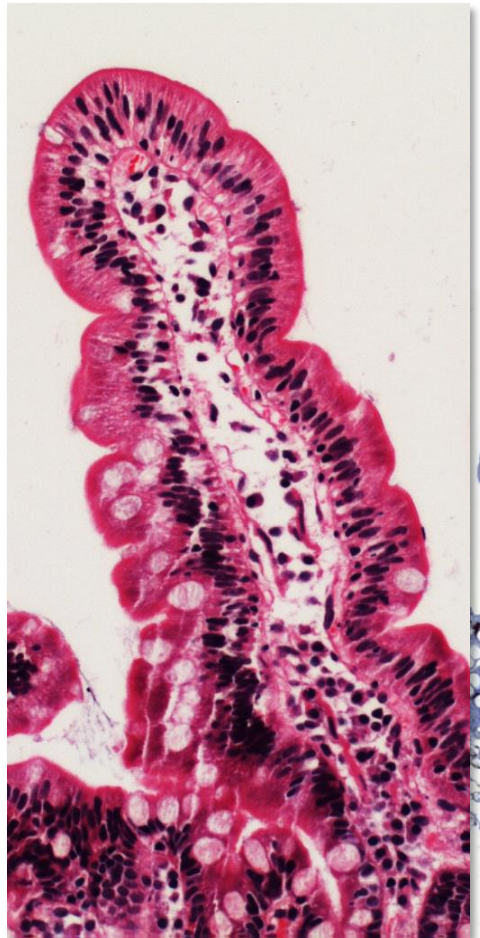


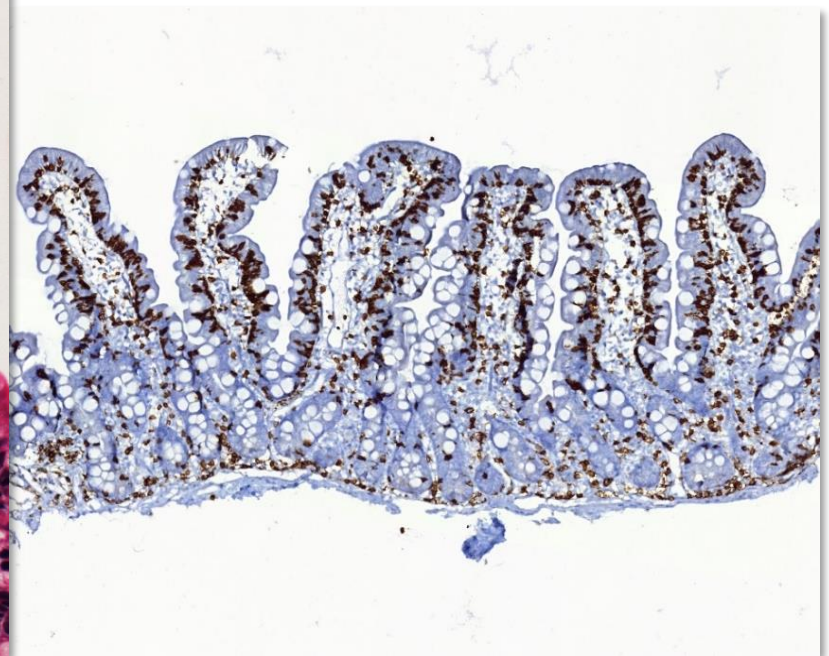



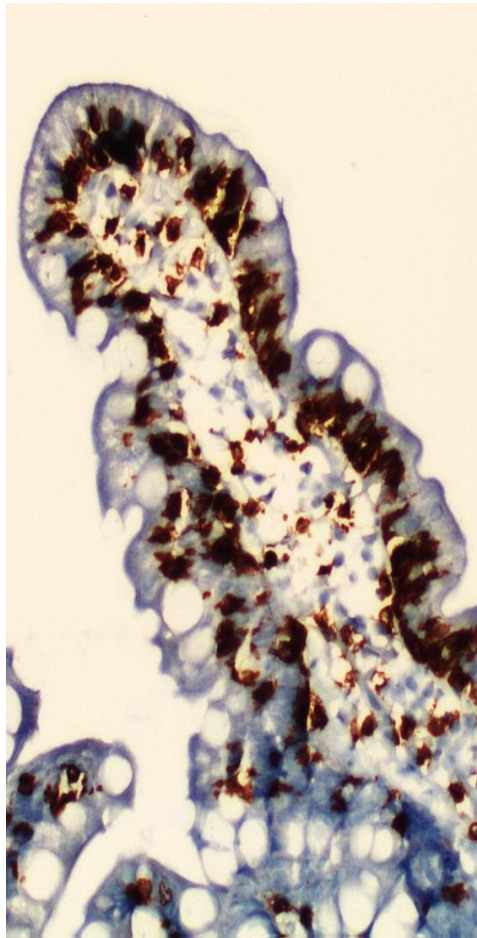


# Marsh 1: İntraepitelyal lenfositozis

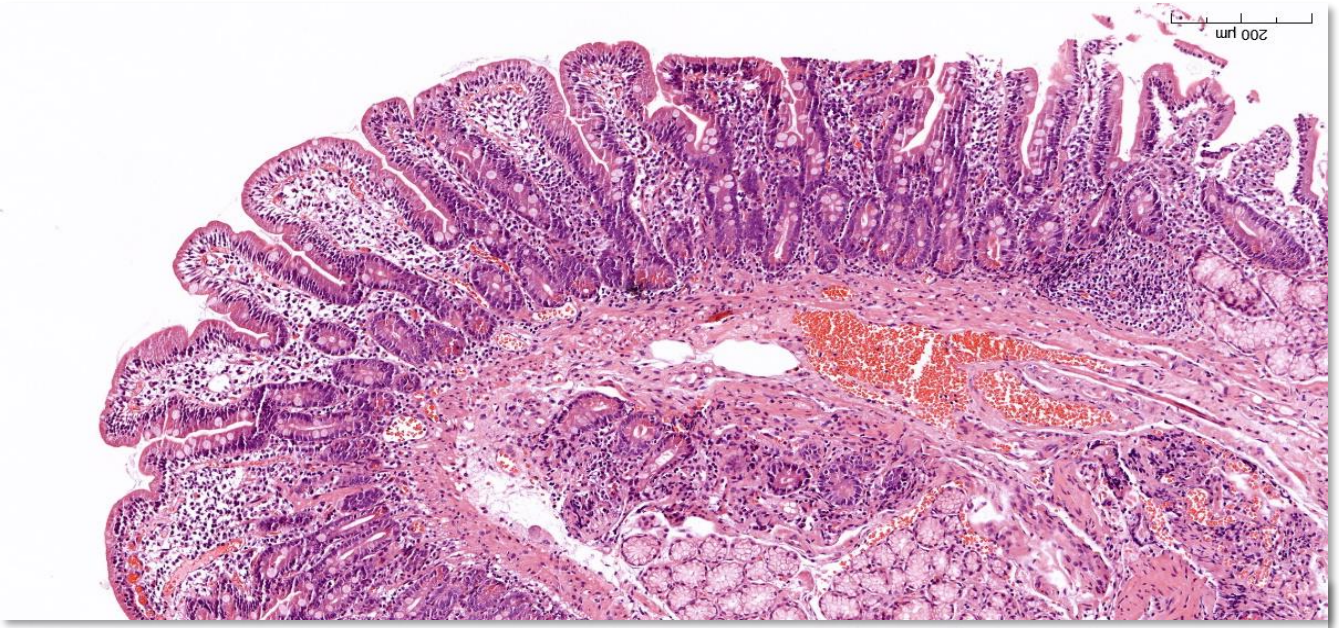


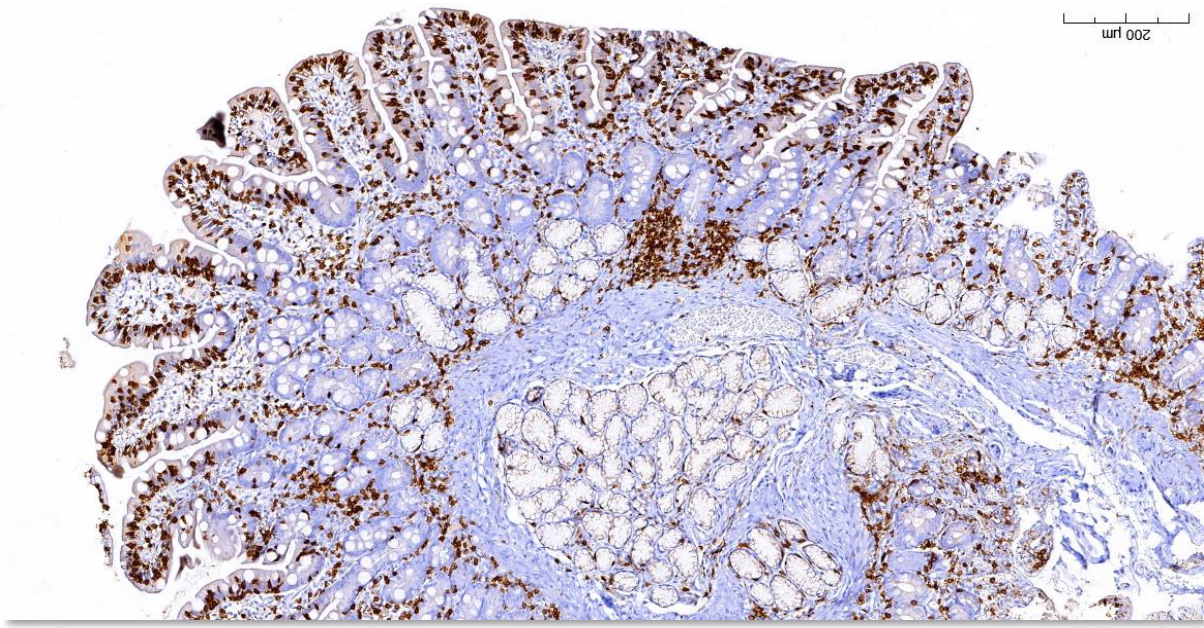


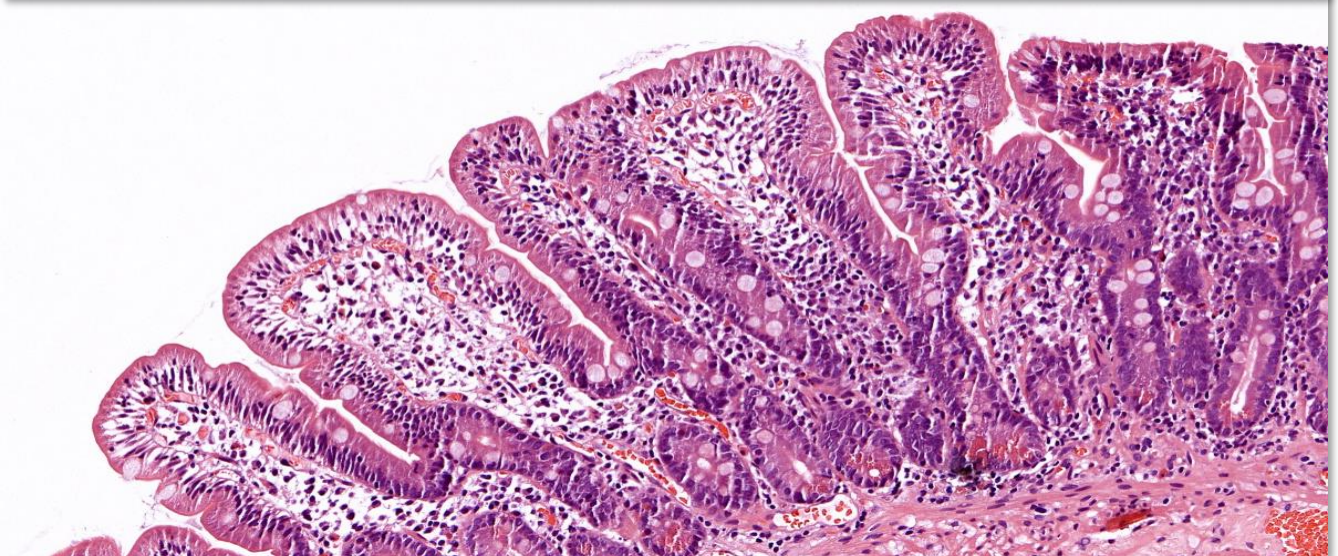


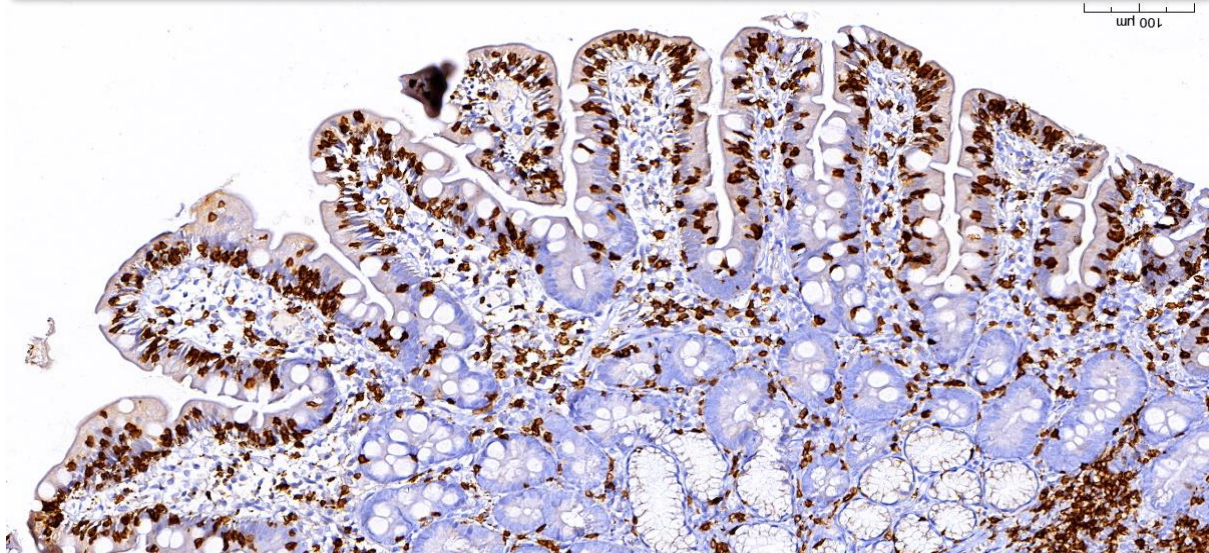


# Marsh 2: Kript hiperplazisi + İELozis

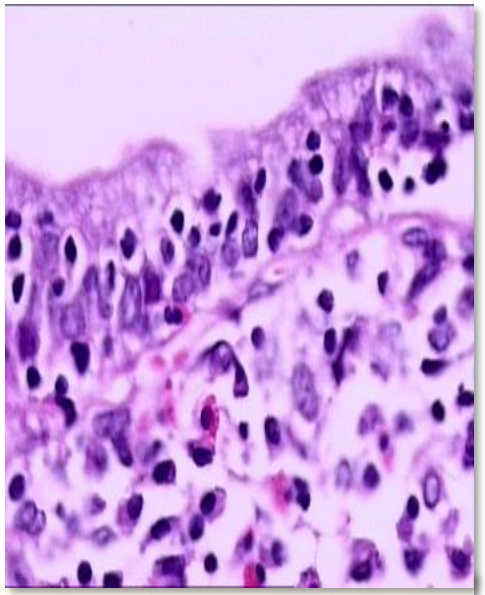


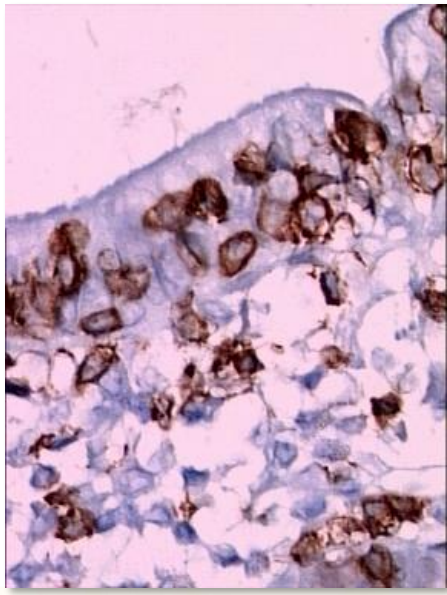



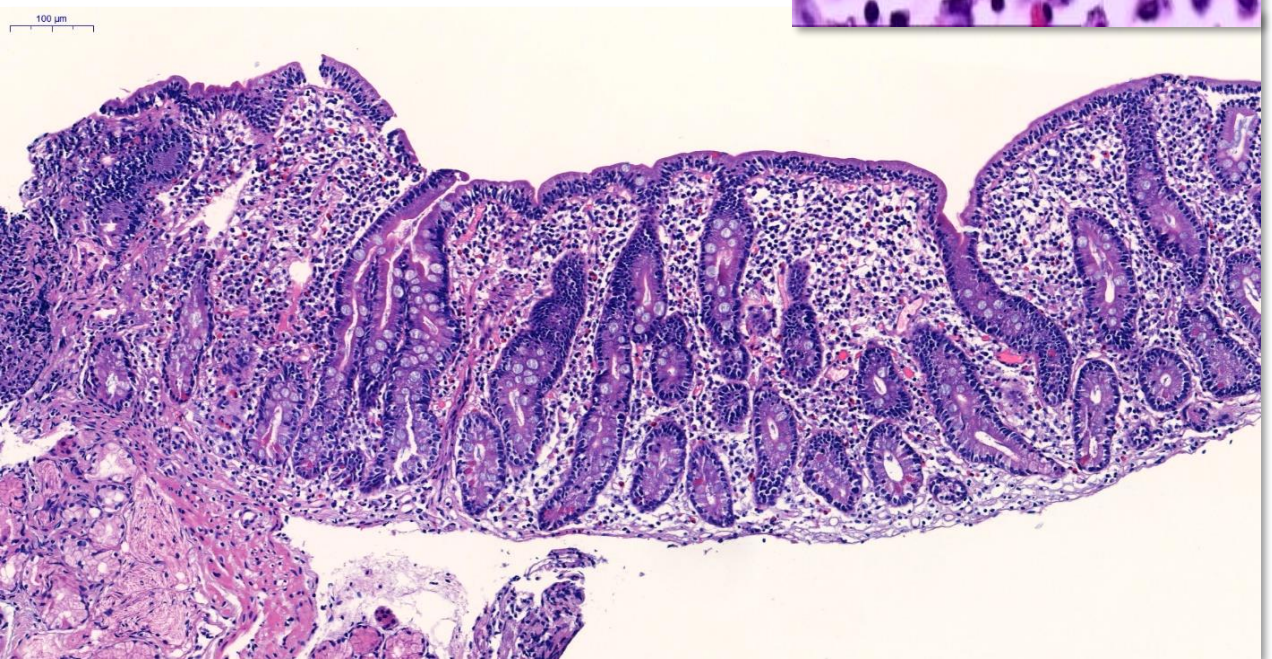



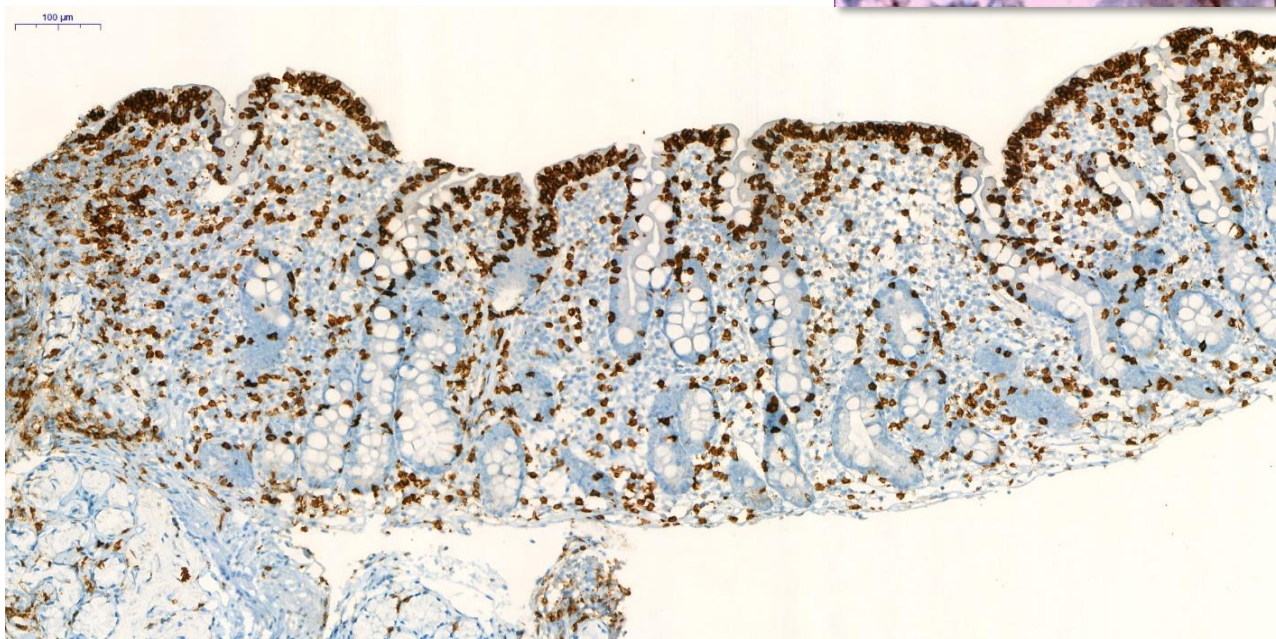


# Marsh 3: Düzleşmiş mukoza +intraepitelyal lenfositozis

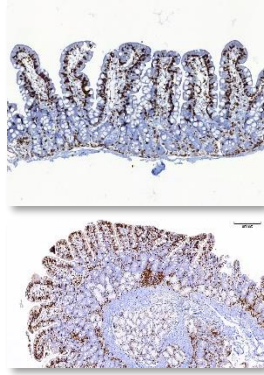






# Mikroskopik enteritis (2012) / Lenfositik duodenitis



İDİOPATİK

Seroloji
Genetik

## GLUTEN (+)

- Çölyak hastalığı
- Non-çölyak gluten sensitivitesi
- Buğday allerjisi
- IBS

## GLUTEN (-)

- Infeksiyonlar (H. Pylori, Giardiasis, …)
- İlaçlar (NSAIDs, Sartans..)
- Immün/otoimmün hastalıklar
- IBH
- Besin allerjisi

Çölyak (27%) → NCGS (22%)

Tip 1 lezyon → Tip 3 (%50)

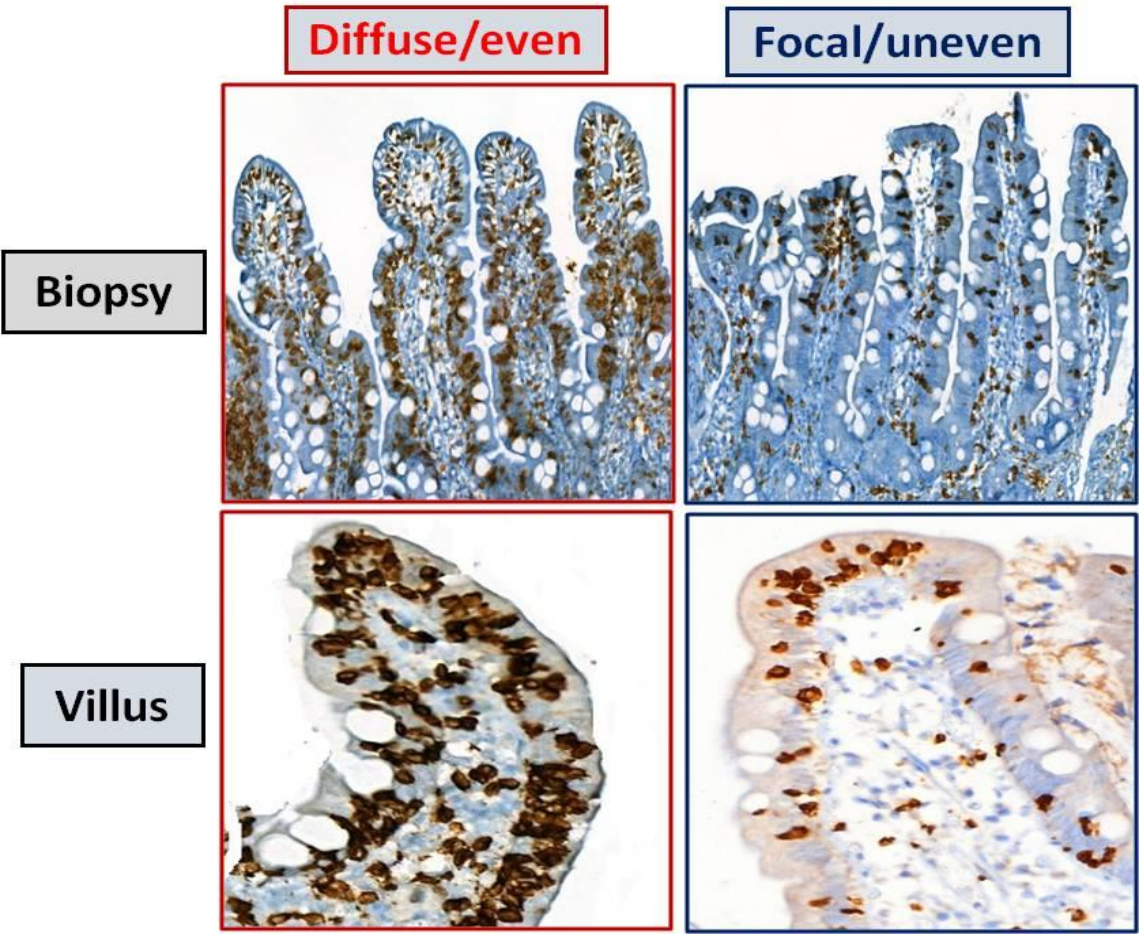
- Aile öyküsü
- HLA DQ
- tTG x3
- Mukozal tTG & γINF

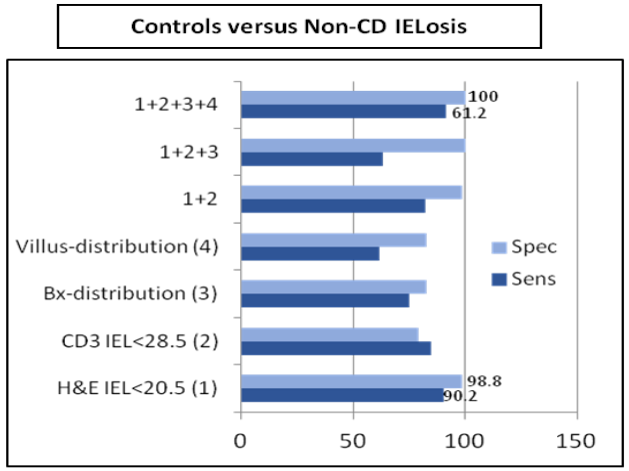
Virchows Archiv (2018) 473:551–558
https://doi.org/10.1007/s00428-018-2430-1

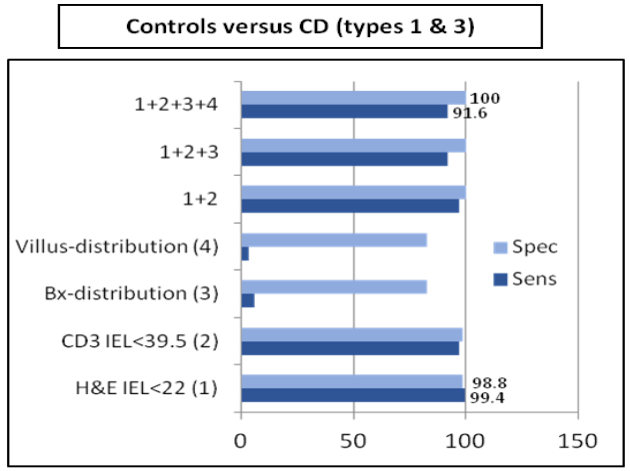
ORIGINAL ARTICLE

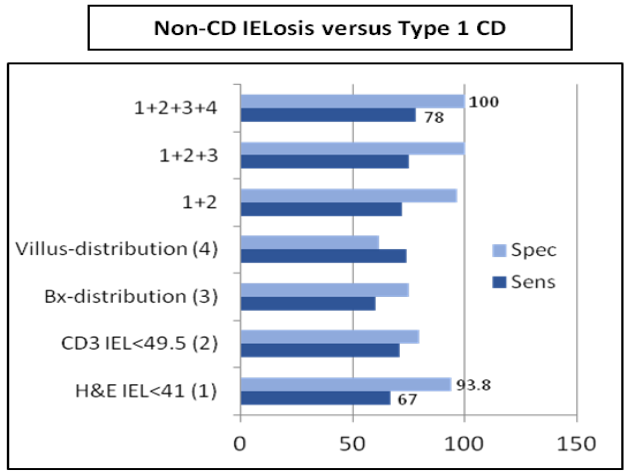
# Discriminant value of IEL counts and distribution pattern through the spectrum of gluten sensitivity: a simple diagnostic approach

Ayca Kirmizi[1] · Cagdas Kalkan[2] · Seher Yuksel[1] · Zeynep Gencturk[3] · Bema Savas[1] · İrfan Soykan[2] · Hulya Cetinkaya[2] · Arzu Ensari[1]



# Diagnostic value of gamma delta intraepithelial lymphocytes in gluten sensitivity: Any better than H&E or CD3?

Ayca KIRMIZI[1], Cagdas Kalkan[2], Cevriye Cansiz Ersöz[1], Berna Savas[1], Hulya Cetinkaya[2], Zeynep Gencturk[3], Arzu Ensari[1]
Pathology Department[1], Gastroenterology Department[2], Biostatistics Department[3]
Ankara University Faculty of Medicine, Turkey

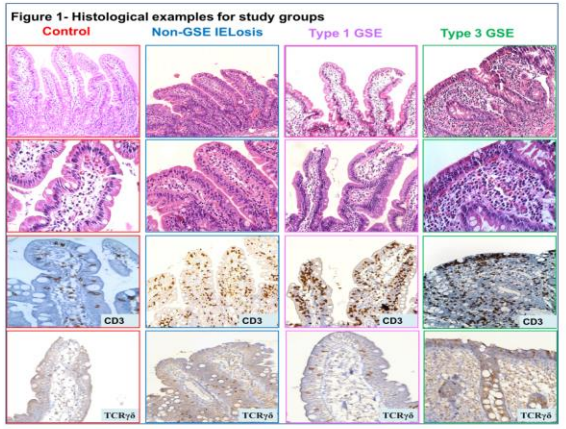
**Objective:**
The large majority of intraepithelial lymphoyctes (IELs) express the αβ T cell receptor (TCR); only a minor fraction have the γδ TCR on the surface. It is the latter fraction of γδ IELs that is known to expand in gluten-sensitive enteropathy (GSE). As there are many entities presenting with intraepithelial lymphocytosis including GSE, the number of IELs expressing γδ TCR becomes significant in the differential diagnosis. We, therefore, aimed to evaluate the number of γδ IELs in comparison to H&E and CD3 counts, within the spectrum of gluten sensitivity.

**Methods:**
The study group comprised of controls, non-GSE IELosis, Type 1 and Type 3 GSE cases. Study groups were defined according to the presence of clinical symptoms, endoscopic and laboratory abnormalities, serology and histology (Table 1). IEL counts were recorded on H&E, CD3 (Cell Marque, clone:103A) and TCRγδ (Thermo scientific, clone: gamma 3.20) immunostained sections using streptavidin biotin-px at Ventana automatic stainer. For IEL counting "villous-tip method" (5 well-oriented villi, 20 enterocytes at the tip of each) was used in control, non-GSE and Type 1 GSE cases whereas, IELs were counted per 100 enterocytes in flat mucosa of Type 3 GSE cases. Histological examples for each study group are shown in Figure 1. Chi square test, Kruskal-Wallis test and Roc analysis were used for statistics.

**Table 1- Study groups**

| | Control group | Non-GSE IELosis | Type 1 GSE | Type 3 GSE |
|---|---|---|---|---|
| Number of patients (n) | 40 | 40 | 40 | 40 |
| Clinical Symptom | No symptom, dyspepsia | No symptom, dyspepsia | No symptom, dyspepsia, anaemia, diarrhoea | Anaemia, diarrhoea, steatorrhea |
| Endoscopy | Normal | Normal | Normal | Mosaic pattern, flat villi |
| Laboratory | Normal | Normal | Normal /low Fe and Folate | Low Fe, Folate, vit D, vit B12 |
| Serology | Negative | Negative | Positive | Positive |
| Histology | Normal | Focal or diffuse, mildly increased IELs | Diffusely increased IELs | Flat mucosa with diffuse IEL infiltration |

**Figure 1- Histological examples for study groups**




**Results:**

**Table 2- Demographic data of groups**

| | Control group | Non-GSE IELosis | Type 1 GSE | Type 3 GSE |
|---|---|---|---|---|
| Female (n)(%) | 51 (62,2%) | 71(63,4%) | 64 (72,7%) | 61 (66,3%) |
| Male (n)(%) | 31(37,8%) | 41 (36,6%) | 24 (27,3%) | 31 (33,7%) |
| Age (mean±SD) | 42,22 ± 18,94 | 47,85 ± 16,59 | 44,86 ± 15,38 | 38,30 ± 18,37 |

**Table 3- IEL cut-off values**

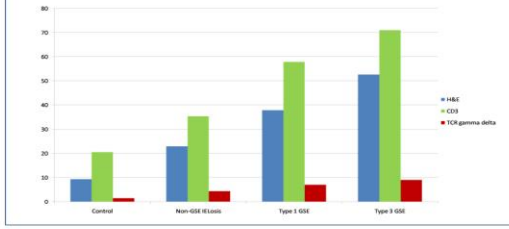
| IEL count | Sensitivity (%) | Specificity (%) | PPV (%) | NPV (%) |
|---|---|---|---|---|
| H&E ≥ 28.5 | 91.30 | 97.50 | 97,33 | 91,76 |
| CD3 ≥ 44.5 | 83.80 | 91.30 | 90,54 | 84,88 |
| TCR γδ ≥ 3.87 | 85.00 | 68.80 | 73,12 | 82,09 |

IELs increased significantly through the spectrum on H&E, CD3, and TCR γδ immunostains respectively (p<0,001) (Table 4, Figure 3).

**Table 4- IEL counts on H&E, CD3 and TCR γδ immunostained slides**

| | Control group | Non-GSE IELosis | Type 1 GSE | Type 3 GSE |
|---|---|---|---|---|
| IEL counts (H&E) (mean ± SD) | 9,35 ± 2,90 | 22,95 ± 4,12 | 37,90 ± 9,07 | 52,67 ± 17,77 |
| IEL counts (CD3) (mean ± SD) | 20,55 ± 6,93 | 35,37 ± 8,78 | 57,87 ± 13,67 | 71,05 ± 20,46 |
| IEL counts (TCR γδ) (mean ± SD) | 1,50 ± 2,02 | 4,37 ± 5,19 | 7,00 ± 5,75 | 8,47 ± 3,23 |

**Figure 3- The diagram of IEL counts on H&E, CD3 and TCR γδ immunostained slides**




**Conclusion:**
Diagnosis of GSE requires a combination of clinical, serological, genetic and histological findings. There are many conditions causing IELosis other than GSE, making the differantial diagnosis more complicated. We therefore need additional tools to increase the diagnostic accuracy in the interpretation of small intestinal biopsies taken from patients with suspected GSE. On these grounds, CD3 IHC is commonly employed to enumerate IELs which bear either αβ or γδ TCR, the minor fraction that increases specifically in GSE. However, γδ TCR antibodies available so far work on unfixed frozen tissue. Recently, several groups have succeeded to run these antibodies to evaluate γδ IELs in various sites.
Despite, our attempt of using γδ TCR antibody resulted in suboptimal staining, it still revealed a significant difference in γδ IELs between the study groups, in correlation with CD3 counts. We therefore believe that IEL cutoffs determined on H&E and CD3 remain the standard procedure at present.

**References:**
1. Lonardi S, Villanacci V, Lorenzi L, et al. Anti-TCR gamma antibody in celiac disease: the value of count on formalin-fixed paraffin-embedded biopsies. Virchows Arch (2013); 463:409–413.
2. Remes-Troche JM, Adames K, Castillo-Rodal AI, et al. Intraepithelial gammadelta+ lymphocytes: a comparative study between celiac disease, small intestinal bacterial overgrowth, and irritable bowel syndrome. J Clin Gastroenterol (2007); 41(7):671-6.
3. Bardellini E, Amadori F, Ravelli A, et al. Histopathological findings in the oral mucosa of celiac patients. Rev Esp Enferm Dig (2014); 106(2):86-91.

Digestive Diseases and Sciences (2021) 66:3352–3358
https://doi.org/10.1007/s10620-020-06680-x

ORIGINAL ARTICLE

## A New Intraepithelial γδ T-Lymphocyte Marker for Celiac Disease Classification in Formalin-Fixed Paraffin-Embedded (FFPE) Duodenal Biopsies

Alina Popp[1,2] · Juha Taavela[1] · Paolo Graziano[3] · Paola Parente[3] · Claudia Covelli[3] · Carmela Lamacchia[4] · Angelo Andriulli[3] · Markku Mäki[1] · Jorma Isola[1,5]

γδ IEL sayısı
Çölyak vs diğer İELozis/malabsorpsiyon nedenlerinin ayrımında kullanılabilir mi?
Preliminary data EVET diyor!

Piscaglia et al. J Transl Med (2015) 13:220
DOI 10.1186/s12967-015-0591-0

JOURNAL OF TRANSLATIONAL MEDICINE

RESEARCH Open Access

# Circulating hematopoietic stem cells and putative intestinal stem cells in coeliac disease

Anna Chiara Piscaglia[1,2], Sergio Rutella[3*], Lucrezia Laterza[2], Valentina Cesario[1,2], Mariachiara Campanale[2], Immacolata Alessia Cazzato[4], Gianluca Ianiro[2], Federico Barbaro[2], Luca Di Maurizio[2], Giuseppina Bonanno[5], Tonia Cenci[6], Giovanni Cammarota[2], Luigi Maria Larocca[6] and Antonio Gasbarrini[2]

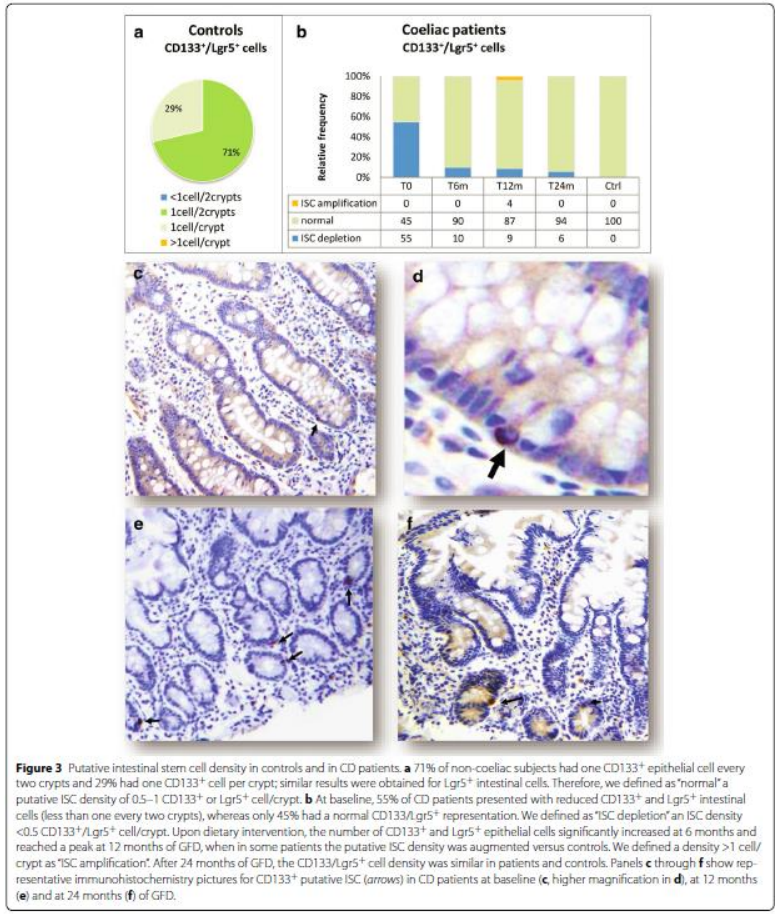
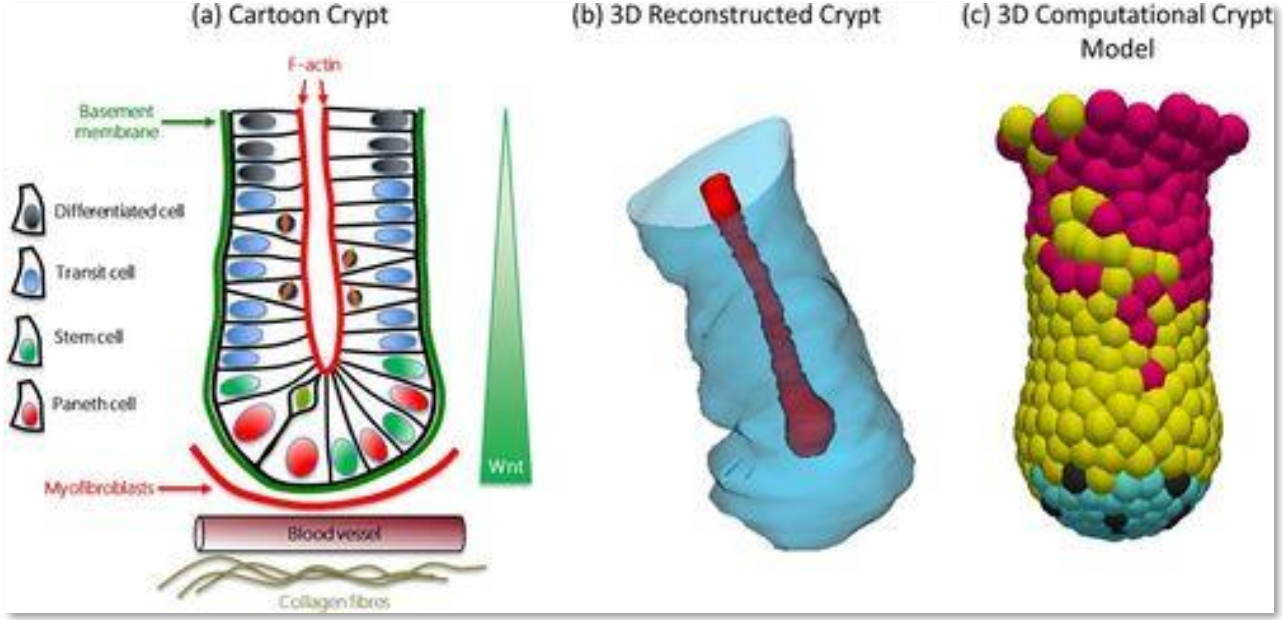



**Figure 3** Putative intestinal stem cell density in controls and in CD patients. **a** 71% of non-coeliac subjects had one CD133+ epithelial cell every two crypts and 29% had one CD133+ cell per crypt; similar results were obtained for Lgr5+ intestinal cells. Therefore, we defined as "normal" a putative ISC density of 0.5–1 CD133+ or Lgr5+ cell/crypt. **b** At baseline, 55% of CD patients presented with reduced CD133+ and Lgr5+ intestinal cells (less than one every two crypts), whereas only 45% had a normal CD133/Lgr5+ representation. We defined as "ISC depletion" an ISC density <0.5 CD133+/Lgr5+ cell/crypt. Upon dietary intervention, the number of CD133+ and Lgr5+ epithelial cells significantly increased at 6 months and reached a peak at 12 months of GFD, when in some patients the putative ISC density was augmented versus controls. We defined a density >1 cell/crypt as "ISC amplification". After 24 months of GFD, the CD133/Lgr5+ cell density was similar in patients and controls. Panels **c** through **f** show representative immunohistochemistry pictures for CD133+ putative ISC (*arrows*) in CD patients at baseline (**c**, higher magnification in **d**), at 12 months (**e**) and at 24 months (**f**) of GFD.



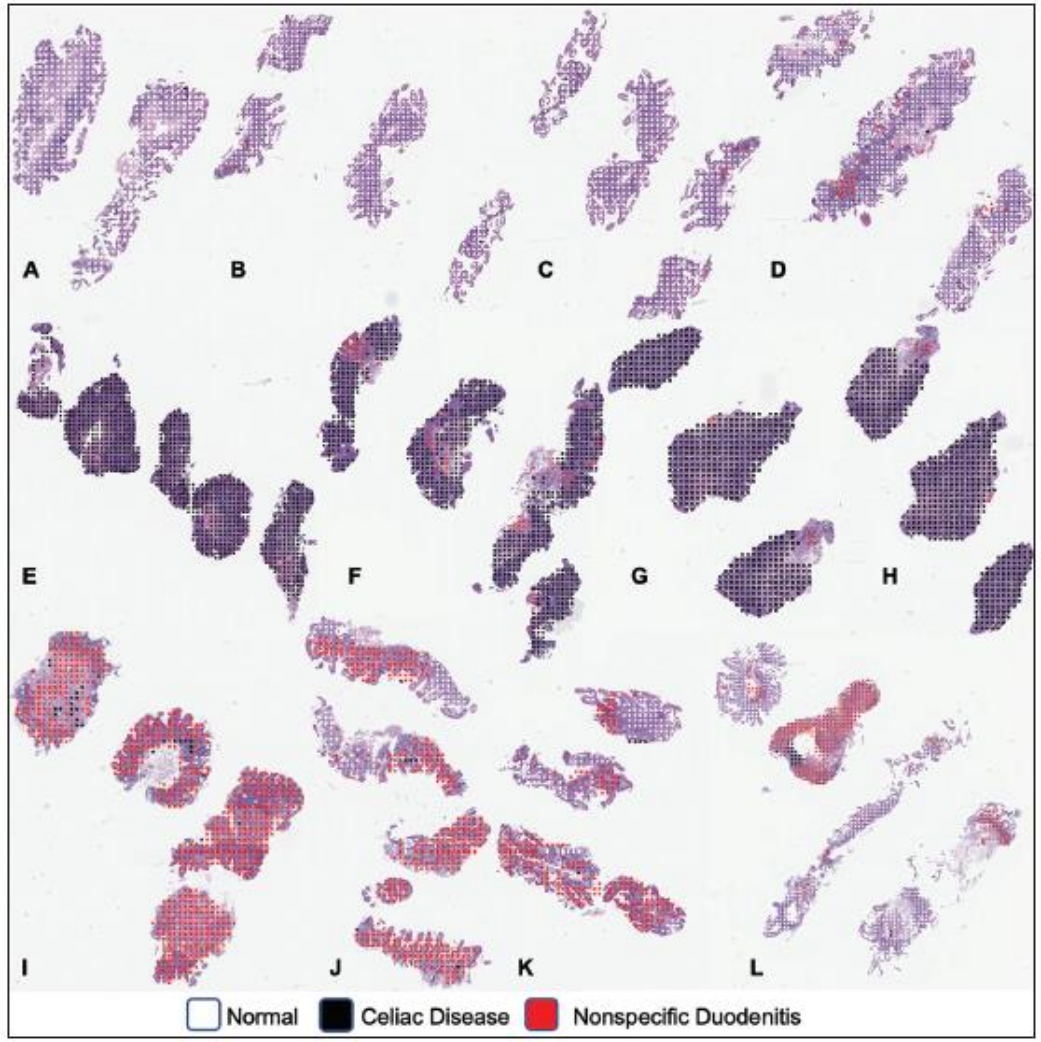

İntestinal kök hücrelerinin kriptlerdeki dağılımı ve 3D rekonstrüksiyonu
Çölyak vs diğer İELozis/malabsorpsiyon nedenlerinin ayrımında kullanılabilir mi?
Preliminary data BELKİ diyor!

# Automated Detection of Celiac Disease on Duodenal Biopsy Slides: A Deep Learning Approach

Jason W. Wei[1,2], Jerry W. Wei[1], Christopher R. Jackson[3], Bing Ren[3], Arief A. Suriawinata[3], Saeed Hassanpour[1,2,4]

Departments of [1]Biomedical Data Science and [2]Computer Science, Dartmouth College, Hanover, [3]Department of Pathology and Laboratory Medicine, Dartmouth-Hitchcock Medical Center, Lebanon, [4]Department of Epidemiology, Dartmouth College, Hanover, New Hampshire, USA

Received: 15 November 2018 Accepted: 31 January 2019 Published: 08 March 2019




J Pathol Inform 2019, 1:7

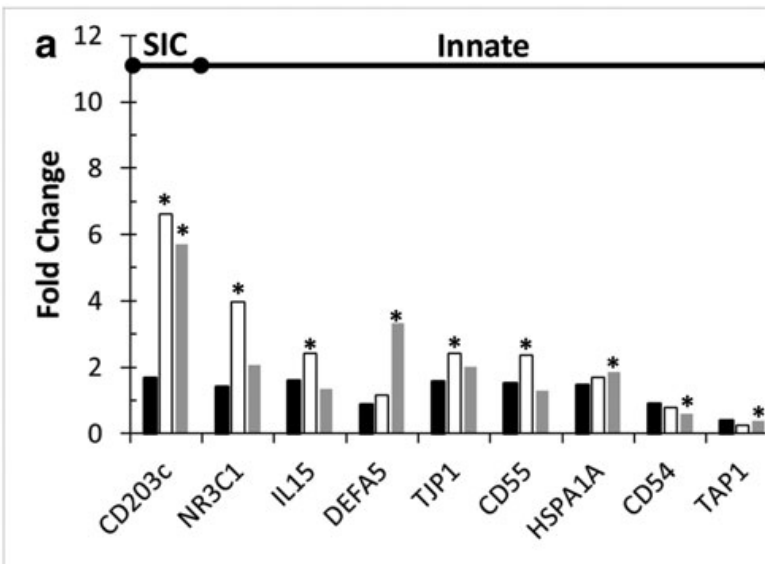
JGH Journal of Gastroenterology and Hepatology JGHF

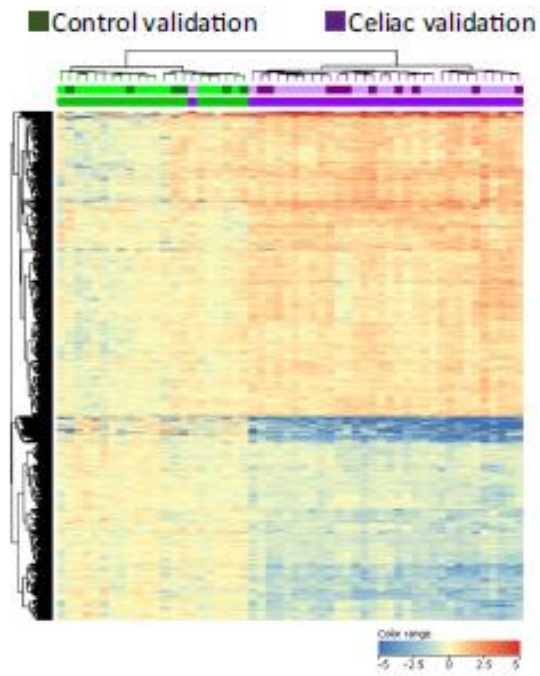
doi:10.1111/jgh.14369

GASTROENTEROLOGY

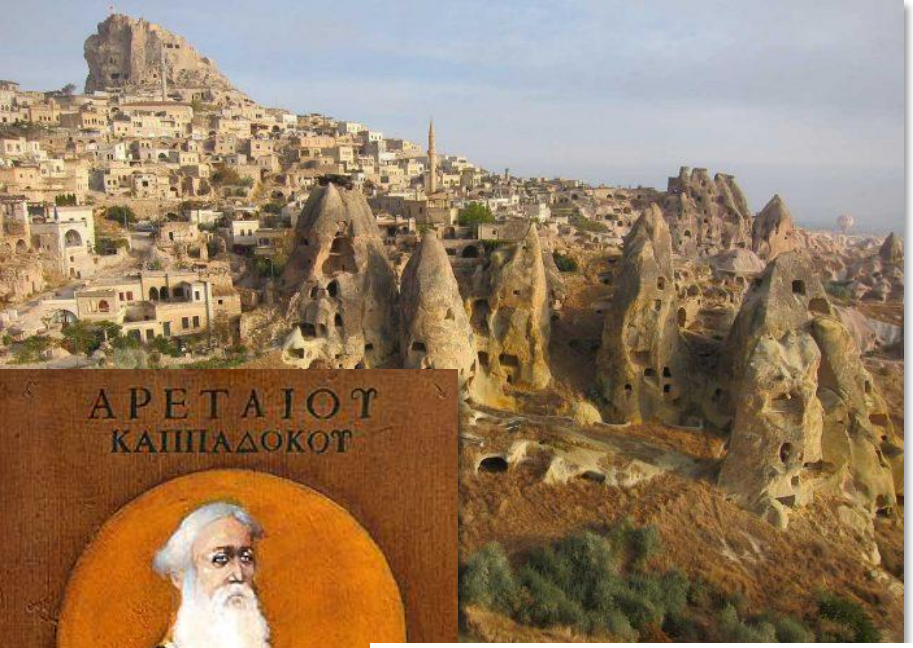
# Celiac disease gene expression data can be used to classify biopsies along the Marsh score severity scale

Richard P G Charlesworth,* Linda L Agnew,* David R Scott† and Nicholas M Andronicos*




Journal of Gastroenterology and Hepatology 34 (2019) 169–177




Aretaeus of Cappadocia

Marsh (of) in Cappadocia