



AI IN GASTROENTEROLOGY

March 14, 2024

Workshop
COPENHAGEN, DENMARK



7,5
CME
CREDITS

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7,5 credit hours (CME) have been awarded for Workshop Copenhagen by the European Union of Medical Specialists (UEMS).

PREFACE

Dear friends and colleagues,

It is with immense pleasure and anticipation that we extend a heartfelt welcome to all esteemed participants of the Symposium on “Artificial Intelligence in Endoscopy.” This gathering represents a seminal moment in the convergence of cutting-edge technology and medical practice, where the integration of artificial intelligence (AI) promises to redefine the landscape of endoscopic procedures worldwide.

In recent years, the application of AI algorithms in endoscopy has demonstrated remarkable potential to enhance diagnostic accuracy, optimize therapeutic interventions, and streamline procedural workflows. As experts from diverse corners of the globe come together to share insights, exchange best practices, and explore the frontiers of innovation, this symposium serves as a beacon illuminating the transformative power of AI in advancing patient care.

The breadth and depth of expertise assembled here underscore the global significance of harnessing AI-driven solutions to address complex challenges in endoscopic practice. From computer-aided detection of lesions to real-time image analysis and predictive modeling, the possibilities unleashed by AI are as vast as they are promising.

We commend Falk Foundation for their vision in convening this symposium, which serves as a crucible for collaboration, learning, and discovery. As we embark on this collective journey towards harnessing the full potential of AI in endoscopy, let us seize this opportunity to forge new partnerships, inspire innovation, and chart a course towards a future where technology and human expertise converge to redefine the boundaries of medical excellence.

To all participants, we extend our deepest appreciation for your dedication to advancing the frontiers of medical science. May our deliberations here fuel a wave of transformative breakthroughs, ushering in an era of unprecedented precision, efficiency, and efficacy in endoscopic practice.

With great enthusiasm and optimism, we look forward to the invaluable insights and collaborations that will emerge from this symposium.

Warm regards,

Helmut Messmann, Cesare Hassan, Yuichi Mori, Prateek Sharma

WORKSHOP – AI IN GASTROENTEROLOGY

March 14, 2024

Scientific Organization:

Prof. Dr. Cesare Hassan, Milan (Italy)
Prof. Dr. Helmut Messmann, Augsburg
(Germany)
Yuichi Mori, MD, PhD, Oslo (Norway)
Prateek Sharma, MD, Kansas City (USA)

Start of Registration:

Wednesday, March 13, 2024
16:00 – 20:00 h
at the congress office

Congress Venue:

Tivoli Hotel & Congress Center
Arni Magnussons Gade 2
1577 Copenhagen
Denmark

For admission to scientific events your name badge should be clearly visible.

Accompanying persons are not permitted during the conference at any time.

Thursday, March 14, 2024

08:15 Welcome
*Cesare Hassan, Milan; Helmut Messmann, Augsburg;
Yuichi Mori, Oslo; Prateek Sharma, Kansas City*

SESSION I

Basics of AI from A - Z

Chairs: *Cesare Hassan, Milan; Prateek Sharma, Kansas City*

08:30 Overview of AI and machine learning in gastroenterology
Jakob Nikolas Kather, Dresden

08:50 Concept of uncertainty in machine learning
Christoph Palm, Regensburg

09:10 Data collection and preparation for AI in gastroenterology
Sravanthi Parasa, Seattle

SESSION II A

AI in disease detection, diagnosis and treatment

Chairs: *Michael Byrne, Vancouver; Yuichi Mori, Oslo*

09:30 AI for premalignant and malignant esophageal disorders
(squamous dysplasia, SCC, Barrett's and EAC)
Helmut Messmann, Augsburg

09:50 AI for benign esophageal disorders
(EOE, GERD, Motility disorders with manometry and EndoFlip)
Alanna Ebigbo, Augsburg

10:10 AI for gastric dysplasia and cancer
Carolina Ogawa Matsubayashi, New York

10:30 **Coffee break**

SESSION II B

AI in disease detection, diagnosis and treatment

Chairs: *Helmut Messmann, Augsburg; Marietta Iacucci, Cork*

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- 11:00** AI and IBD endoscopy - current landscape and the road ahead
Raf Bisschops, Leuven
-
- 11:20** AI for detection and characterization of colorectal polyps
Cesare Hassan, Milan
-
- 11:40** AI in colonoscopy - beyond CADe and CADx!
Yuichi Mori, Oslo

SESSION II C

AI in disease detection, diagnosis and treatment

Chairs: *Nasim Parsa, St. Cloud; James East, Oxford*

-
- 12:00** AI in pancreatobiliary disorders (EUS and ERCP)
Dominik Schulz, Augsburg
-
- 12:20** AI to improve workflow and efficiency in practice
Prateek Sharma, Kansas City
-
- 12:40** The role of AI in oncology
Jakob Nikolas Kather, Dresden
-
- 13:00** **Lunch break**
-
- 13:45** **Poster session**

Thursday, March 14, 2024

SESSION III

AI in education, cost reduction and environmental impact

Chairs: *Cesare Hassan, Milan; Prateek Sharma, Kansas City*

14:15 Building AI in GI fellowship training
Nasim Parsa, St. Cloud

14:30 How AI can improve endoscopy research?
Omer Ahmad, London

14:45 Can AI reduce healthcare costs in gastroenterology?
Yuichi Mori, Oslo

15:00 Green Endoscopy! AI to reduce carbon footprint in GI practice
James East, Oxford

15:15 **Panel discussion**

SESSION IV

Ethical and legal considerations of AI in gastroenterology

Chairs: *Alanna Ebigbo, Augsburg; Jakob Nikolas Kather, Dresden*

15:30 Ethical and legal considerations of AI in gastroenterology practice
Omer Ahmad, London

15:45 Trustworthy, fair and safe AI implementation into your practice
Prateek Sharma, Kansas City

16:00 Avoiding bias in AI studies
Cesare Hassan, Milan

16:15 **Panel discussion**

16:30 **Coffee break**

SESSION V

Introduction to Large Language Models (LLMs)

Chairs: *Sravanthi Parasa, Seattle; Michael Byrne, Vancouver*

17:00 Applications of LLMs in gastroenterology research and practice
Sravanthi Parasa, Seattle

17:15 The language of health: LLMs in gastroenterology and medical progress
Markus Vogel, Cologne

17:45 **Poster Award Session**

SESSION VI

State of the art lecture

Chair: *Helmut Messmann, Augsburg*

18:00 Future directions of AI in gastroenterology
Michael Byrne, Vancouver

18:30 **Closing remarks**

LIST OF SPEAKERS, MODERATORS AND SCIENTIFIC ORGANIZERS

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REGISTRATION

You can register for the event via our homepage:

www.falkfoundation.org

Registration is only possible online.



CONGRESS FEES

Scientific Program of Workshop

EUR 150

Students (copy of student ID required)

EUR 75

The congress fees include:

- Pre-Opening and Welcome on Wednesday, March 13, 2024
- Refreshments during coffee breaks
- Lunch on Thursday, March 14, 2024
- A copy of the final program

CONGRESS OFFICE AND REGISTRATION

Opening Hours:

Wednesday, March 13

16:00 - 20:00 h

Thursday, March 14

08:00 - 20:00 h

The Falk Foundation will take pictures during the meeting. Additionally, parts of the meeting might be recorded. By participating all attendees consent and agree with the recording and the photo shoots.

ARRIVAL

From Copenhagen Airport

You can take the train direct from Copenhagen Airport Terminal 3 on track 2 to Copenhagen. Get off at Copenhagen Central Station and walk to the hotel, which is within 8-10 minutes walking distance.

You can also get a train on tracks 11 and 12 at Central Station that will take you to Dybbølsbro Station. Tickets from the airport to Copenhagen Central Station are also valid on the bus, metro and S-train.

Taking a taxi from the airport will cost approx. DKK 280. All taxis are metered and accept all major international credit cards.

Parking

At Tivoli Hotel & Congress Center there is a big, video-monitored carpark in the building with space for 500 vehicles. The parking spaces are available on a first-come-first-served basis - please note that the carpark is for public use so it is not possible for us to book a space for you in advance. Prices: Per day DKK 235, per hour DKK 55.

CONFLICT OF INTEREST

Members of the scientific committee declare the following potential conflicts of interest:

Cesare Hassan: Fujifilm, NEC, Olympus

Helmut Messmann: Olympus, Satisfai, Dr. Falk Pharma, IPSEN, Erbe, Ambu, Boston Scientific, Covidien, Takeda

Yuichi Mori: Olympus Corp., Royalty (Cybernet System Corp.)

Prateek Sharma: Olympus Corporation, Boston Scientific, Salix Pharmaceuticals, Cipla, Medtronic, Takeda, Samsung Bioepis, CDx, Erbe, Fujifilm

POSTER ABSTRACTS

1. Can digital image analysis of histopathological slides differentiate sessile serrated lesions with and without dysplasia – A study protocol
M. Andrea, R. Jepsen, T. Kuhlmann (Herlev, DK)
2. Early esophageal cancer and the generalizability of artificial intelligence
M. Ayoub, A. Ebigbo, D. Rauber, L. Birzle, T. Matsumura, A. Probst, I. Steinbrueck, S. Nagl, C. Roemmele, M. Meinikheim, M. Scheppach, C. Palm, H. Messmann (Augsburg, Regensburg, Freiburg, DE; Chiba, JP)
3. The prediction of mucosal healing in patients with chronic ulcerative colitis by artificial systems
M. Basaranoglu (Istanbul, TR)
4. Large language model Chat GPT-4 can outperform clinicians in endoscopy triage
J. Campion, J. Cudmore, E. Keating, H. Kerr, J. Leyden, B. Kelleher, S. Stewart, J. Mulsow, C. Lahiff, G. Bennett (Dublin, IE)
5. The association between the total calcium, iron and 25-hydroxyvitamin level and the risk of colorectal cancer
C. Deliu, A. Genunche, O. Chirea, D. Neagoe, V. Popescu (Bals, Craiova, RO)
6. The importance of H. pylori infection and body mass index in the development of colorectal cancer
C. Deliu, O. Chirea, A. Genunche, D. Neagoe, V. Popescu (Bals, Craiova, RO)
7. Case report: Nodular lymphoid hyperplasia in the spectrum of post-infectious irritable bowel syndrome
A. Habibovic (Tuzla, BA)
8. Enhancing endoscopic ultrasound pancreatic lesion detection and marking through transformer-based AI segmentation models
T. Konikoff, N. Loebl, A. Magrisso, A. Benson, Z. Levi, I. Dotan, S. Shamah (Petach Tikva, Jerusalem, IL)
9. Validating and enhancing real-time endoscopic disease severity classification in ulcerative colitis: Artificial intelligence as a second opinion trigger
B. Lo, B. Moeller, C. Igel, S. Wildt, I. Vind, F. Bendtsen, J. Burisch, B. Ibragimov (Hvidovre, Copenhagen, DK)
10. The occurrence of BRAF mutations in colorectal serrated lesions
S. Niewiarowska, M. Koda, K. Jakubowska, K. Lomperta, J. Cylwik, L. Kanczuga-Koda (Bialystok, Warsaw, PL)
11. Computer-aided diagnosis for the resect and discard strategy for colorectal polyps: A systematic review and meta-analysis
T. Rizkala, C. Hassan, Y. Mori, M. Spadaccini, M. Misawa, G. Antonelli, P. Bhandari, A. Schiliro, E. Dekker, H. Patel, M. Menini, R. Maselli, P. Sharma, D. Rex, A. Repici (Milan, Rozzano, Rome, IT; Oslo, NO; Yokohama, JP; Portsmouth, GB; Amsterdam, NL; Kansas City, Indianapolis, US)
12. Human-computer interaction: Examining the influence of artificial intelligence on the diagnostic confidence of endoscopists in the evaluation of Barrett's esophagus
D. Roser, M. Meinikheim, R. Mendel, C. Palm, A. Probst, A. Muzalyova, C. Roemmele, D. Rauber, T. Rueckert, T. Matsumura, G. Fernandez Esparrach, N. Parsa, M. Byrne, H. Messmann, A. Ebigbo (Augsburg, Regensburg, DE; Chiba, JP; Barcelona, ES; Scottsdale, US; Vancouver, CA)

13. A novel active learning-based digital pathology protocol annotation for histologic assessment in ulcerative colitis using PICaSSO histologic remission index (PHRI)
G. Santacroce, P. Meseguer, I. Zammarchi, R. Del Amor, B. Hayes, R. Crotty, L. Burke, S. Ghosh, E. Grisan, V. Naranjo, M. Iacucci (Cork, IE; Valencia, ES; London, GB)
14. A novel switching-multimodal artificial intelligence to simultaneously convert different endoscopic enhancement modalities for accurate assessment of inflammation and healing in ulcerative colitis
G. Santacroce, I. Zammarchi, U. Chaudhari, K. Bisi Bode, R. Del Amor, P. Meseguer, V. Naranjo, A. Buda, R. Bisschops, S. Ghosh, E. Grisan, M. Iacucci (Cork, IE; London, GB; Valencia, ES; Feltre, IT; Leuven, BE)
15. Natural language processing and named entity recognition in inflammatory bowel disease referrals
M. Stammers, M. Gwiggner, M. George, C. Regas, G. May, C. Davis, W. Knibbs, F. Borca, V. Chandrabalan (Southampton, Lancaster, GB)
16. Can we use non-specialized, non-medical AI solutions in medical practice?
A. Sydorchuk, L. Sydorchuk, R. Knut, R. Sydorchuk, P. Kyfiak, Ig. Sydorchuk, O. Sydorchuk, Ir. Sydorchuk (Neu-Ulm, Siegen, DE; Chernivtsi, Kyiv, UA)
17. Hazards and perspectives of AI use in gastroenterology: The physicians' point of view
L. Sydorchuk, A. Sydorchuk, R. Knut, R. Sydorchuk, I. Plehutsa, Ir. Sydorchuk, I. Hryhorchuk, Ig. Sydorchuk (Chernivtsi, Storozhynets, UA; Neu-Ulm, Siegen, DE)
18. Application of artificial intelligence in GI endoscopy via computer-assisted visual assessment
R. Sydorchuk, L. Sydorchuk, R. Knut, A. Sydorchuk, V. Stepan, Ir. Sydorchuk, N. Stepan, Ig. Sydorchuk (Chernivtsi, UA; Neu-Ulm, Giessen, DE)
19. Endoscopic management of chronic pancreatitis in a tertiary center in Tunisia
M. Yakoubi, S. Nasr, G. Gharbi, A. Ben Mohamed, A. Khsiba, M. Mahmoudi, M. Medhioub, L. Hamzaoui (Nabeul, TN)
20. Neuroendocrine pancreatic tumors: About 13 cases
M. Yakoubi, W. Sallemi, G. Gharbi, A. Ben Mohamed, A. Khsiba, M. Mahmoudi, M. Medhioub, L. Hamzaoui (Nabeul, TN)
21. Endoscopic resection of upper gastrointestinal subepithelial tumours: Our clinical experience
O. Yener (Istanbul, TR)
22. A case of ischaemic pancolitis managed conservatively
A. Zotescu, L. Herath (Gillingham, GB)

FULL CONTENT OF POSTER ABSTRACTS

Poster Numbers 1 - 22

1. Can digital image analysis of histopathological slides differentiate sessile serrated lesions with and without dysplasia – A study protocol

Mille Andrea (Herlev, DK), Rikke Karlin Jepsen (Herlev, DK), Tine Plato Kuhlmann (Herlev, DK)

Introduction: Since 2000 the incidence of colorectal serrated lesions and polyps (SP) in Denmark have risen. A still growing proportion of these are classified as sessile serrated lesions (SSL) and sessile serrated lesions with dysplasia (SSLD). Dysplastic changes can be subtle and hard to identify, particularly the subtype minimal deviation dysplasia.

The histopathological examination is digitalized in Denmark within few years and using AI in decision support could aid the pathologist substantially. The aim of this study is to investigate whether AI can identify dysplasia in SSL.

Methods: We use archived samples of slides initially diagnosed in 2014–2021. The slides were digitalized using a 3dHistech PANNORAMIC 1000 scanner and reevaluated by a senior gastrointestinal (GI) pathologist to ensure that the diagnosis adhere to the current guidelines. SSLD is confirmed by a second GI pathologist. This evaluation will be used as ground truth for the AI. The dataset is divided into training, testing and evaluation. The training cohort is annotated using Qupath 0.5.0. The epithelium is classified as normal, distorted, serrated or dysplastic. Lamina muscularis mucosa, normal colon mucosa and artefacts are annotated.

In collaboration with Department of Pathology, University Hospital Bern, the algorithm will be trained and tested to ensure an algorithm that can separate SSLD from SSL with an accuracy of > 95%. The project is currently in the annotation phase and is planned to be concluded ultimo 2024.

Discussion/Conclusion: Previous studies have investigated the ability of AI in the diagnosis of colon polyps, and several have found that the differentiation between SP and conventional adenomas is possible. But the subtyping of SP is difficult, and the SSLD group is often too small. We seek to develop a robust and functional AI algorithm capable of identifying dysplasia on routine slides, which could support pathologists substantially in their everyday diagnostic work.

2. Early esophageal cancer and the generalizability of artificial intelligence

Mousa Ayoub (Augsburg, DE), Alanna Ebigbo (Augsburg, DE), David Rauber (Regensburg, DE), Lisa Birzle (Augsburg, DE), Tomoaki Matsumura (Chiba, JP), Andreas Probst (Augsburg, DE), Ingo Steinbrueck (Freiburg, DE), Sandra Nagl (Augsburg, DE), Christoph Roemmele (Augsburg, DE), Michael Meinikheim (Augsburg, DE), Markus Scheppach (Augsburg, DE), Christoph Palm (Regensburg, DE), Helmut Messmann (Augsburg, DE)

Introduction: Artificial Intelligence (AI) systems in gastrointestinal endoscopy are narrow because they are trained to solve only one specific task. Unlike Narrow-AI, general AI systems may be able to solve multiple and unrelated tasks. We aimed to understand whether an AI system trained to detect, characterize, and segment early Barrett's neoplasia (Barrett's AI) is only capable of detecting this pathology or can also detect and segment other diseases like early squamous cell cancer (SCC).

Methods: 120 white light (WL) and narrow-band endoscopic images (NBI) from 60 patients (1 WL and 1 NBI image per patient) were extracted from the endoscopic database of the University Hospital Augsburg. Images were annotated by three expert endoscopists with extensive experience in the diagnosis and endoscopic resection of early esophageal neoplasias. An AI system based on DeepLabV3+ architecture dedicated to early Barrett's neoplasia was tested on these images. The AI system was neither trained with SCC images nor had it seen the test images prior to evaluation. The overlap between the three expert annotations („expert-agreement“) was the ground truth for evaluating AI performance.

Results: Barrett's AI detected early SCC with a mean intersection over reference (IoR) of 92% when at least 1 pixel of the AI prediction overlapped with the expert-agreement. When the threshold was increased to 5%, 10%, and 20% overlap with the expert-agreement, the IoR was 88%, 85% and 82%, respectively. The mean Intersection Over Union (IoU) – a metric according to segmentation quality between the AI prediction and the expert-agreement – was 0.45. The mean expert IoU as a measure of agreement between the three experts was 0.60.

Discussion/Conclusion: In the context of this pilot study, the predictions of SCC by a Barrett's dedicated AI showed some overlap to the expert-agreement. Therefore, features learned from Barrett's cancer-related training might be helpful also for SCC prediction. Our results allow different possible explanations. On the one hand, some Barrett's cancer features generalize toward the related task of assessing early SCC. On the other hand, the Barrett's AI is less specific to Barrett's cancer than a general predictor of pathological tissue. However, we expect to enhance the detection quality significantly by extending the training to SCC-specific data. The insight of this study opens the way towards a transfer learning approach for more efficient training of AI to solve tasks in other domains.

3. The prediction of mucosal healing in patients with chronic ulcerative colitis by artificial systems

Metin Basaranoglu (Istanbul, TR)

Introduction: We aimed to assess the mucosal healing in patients with chronic ulcerative colitis (cuc). Artificial neural networks were applied to cuc data for predicting mucosal remission.

Methods: Two thousand seven hundred patients with IBD were evaluated. According to the computer-based study, data of 129 patients with IBD were used. Artificial neural networks were performed and tested.

Results: According to this study, the cascade-forward neural network study provides 79.1% correct results. In addition to a 0.16033 training error, mean square error (MSE) was taken at the 16th epoch from the feed-forward back-propagation neural network.

Discussion/Conclusion: Analyzing all parameters were shown that which parameters gave better healing were determined by statistical, and for the most weighted six input parameters, artificial neural network structures were constructed.

4. Large language model Chat GPT-4 can outperform clinicians in endoscopy triage

John Champion (Dublin, IE), Jane Cudmore (Dublin, IE), Eoin Keating (Dublin, IE), Hilary Kerr (Dublin, IE), Jan Leyden (Dublin, IE), Barry Kelleher (Dublin, IE), Stephen Stewart (Dublin, IE), Jurgén Mulsow (Dublin, IE), Conor Lahiff (Dublin, IE), Gayle Bennett (Dublin, IE)

Introduction: Large language models (LLMs) such as Chat GPT-4 utilise machine learning techniques to generate answers to queries, and could be harnessed to assist with the clerical

burden that takes clinical staff away from front line duties. We sought to compare adherence to current national and international guidelines on triage and surveillance endoscopy between Chat GPT-4 and gastroenterology staff.

Methods: 64 fictional patient cases were generated by referencing national and international guidelines. The cases were divided across five categories: lower gastrointestinal symptomatic (LGI), upper GI symptomatic (UGI), family history of colorectal carcinoma (FHCC), polyp surveillance (PS) and Barrett's oesophagus surveillance (BS). Clinicians (doctors and nurses) and Chat GPT-4 were asked to triage the cases from memory (attempt 1), and again when given the relevant guideline for reference (attempt 2).

Results: 20 clinicians and one LLM participated in the study. In attempt 1, the LLM median (IQR) score was higher than clinician in LGI (70 [60,70] vs. 50 [37,5,60], $p = 0.008$) and FHCC (82 [73,82] vs. 36 [27,65], $p = 0.003$) while there was no statistically significant difference in BS (71 [64,71] vs. 57 [43,64], $p = 0.37$), PS (31 [23,46] vs. 31 [21,48], $p = 0.84$) or UGI (50 [50,62.5] vs. 53 [50,57], $p = 0.81$). In attempt 2, median clinician scores improved to LGI (80% [70,80]), FHCC (78% [52,91]), BS (79% [67,86]), PS (62% [42,71]) and UGI (75% [74,81]).

Discussion/Conclusion: LLMs may prove a useful tool for specific healthcare tasks but unsupervised decision-making cannot yet be delegated to LLMs. Specific models trained only on discrete inputs such as relevant guidelines may improve performance and become a reliable adjunct to conventional healthcare processes in the future.

5. The association between the total calcium, iron and 25-hydroxyvitamin level and the risk of colorectal cancer

Cristina Deliu (Bals, RO), **Amelia Genunche** (Craiova, RO), **Oana Chirea** (Craiova, RO), **Daniela Neagoe** (Craiova, RO), **Veronica Popescu** (Craiova, RO)

Introduction: The role of total calcium and 25-hydroxyvitamin D in the prevention of early-onset colorectal cancer in young adults is uncertain. This study represents an analysis of patients before age 55 years diagnosed with colorectal cancer associated with low systemic iron levels, total calcium and 25-hydroxyvitamin D.

Methods: We performed a retrospective study of 94 patients who were diagnosed with colorectal carcinoma from 2019–2021. We reviewed the discharge charts and recorded the following data: gender, age, tumor site, complete blood counts, serum iron, total calcium and 25-hydroxyvitamin D.

Results: A total of 94 patients, with a mean age of 48.3 years, were enrolled; 49 patients were female. Their mean hemoglobin was 11.7 g/dl. 43 patients (45.7%) were found to have anemia. Multivariate logistic regression analysis showed that male gender, tumor in the right colon (cecum, ascending colon, hepatic flexure) were risk factors of anemia in patients with colon carcinoma. Total calcium had been measured in 64 patients, and low total calcium level (< 8.5 mg/dl) was found in 37 (57.8%) of them. Among the 71 patients with ascending localization, 56 [78.8%] had 25-hydroxyvitamin D deficiency. 25-hydroxyvitamin D was significantly higher in patients with the descending cancer compared with those with ascending localization.

Discussion/Conclusion: Most patients diagnosed with colorectal cancer have iron and total calcium deficiency throughout the disease. Serum 25-hydroxyvitamin D levels may have beneficial associations with the risk of developing colorectal cancer for both early-onset and late-onset disease.

6. The importance of *H. pylori* infection and body mass index in the development of colorectal cancer

Cristina Deliu (Bals, RO), Oana Chirea (Craiova, RO), Amelia Genunche (Craiova, RO), Daniela Neagoe (Craiova, RO), Veronica Popescu (Craiova, RO)

Introduction: There is substantial evidence that obesity plays a crucial role in the development of colorectal cancer. The purpose of this study is to explore the association between patients with increased body mass index, *H. pylori* infection and the risk of developing colorectal cancer.

Methods: We performed a retrospective study of 155 patients who were diagnosed with colorectal carcinoma. We reviewed the discharge charts and recorded the following data: gender, age, tumor site, body mass index, *H. pylori* infection. A meta-analysis was then performed to calculate pooled odds ratios (ORs) with corresponding 95% confidence intervals (CIs) using a random effects model.

Results: The mean age was 52.3 ± 12.0 years, and mean BMI was 23.9 ± 3.8 kg/m². In men, a 5 kg/m² increase in body mass index was associated with an increased risk of colon cancer, including both right and left subsites, and rectal cancer. In women, an increased risk of colorectal cancer death with increasing body mass index was found for colon cancer. We observed that *H. pylori* infection was associated with an increased risk of colorectal cancer in men patients (OR = 1.47, 95% CI: 1.10–1.99, I² = 71%).

Discussion/Conclusion: Men of all ages have an increased risk of colorectal cancer with increasing body mass index, with the highest risk for right-sided colon cancer. This analysis identified a positive association between *H. pylori* infection and men colorectal cancer risk.

7. Case report: Nodular lymphoid hyperplasia in the spectrum of post-infectious irritable bowel syndrome

Amar Habibovic (Tuzla, BA)

Introduction: Post-infectious irritable bowel syndrome (PI-IBS) emerges after episode of acute gastroenteritis, with unclear mechanisms such as sub-clinical inflammation, intestinal permeability changes, and gut flora alterations.

Nodular lymphoid hyperplasia (NLH) is characterized by the presence of one or more nodules on intestinal mucosae and it poses diagnostic challenges, potentially leading to misdiagnosis and unnecessary surgery. The rarity of NLH in the terminal ileum hinders comprehensive understanding, emphasizing the need to explore its connection with functional gastrointestinal conditions.

Methods: A 30-year-old male, with a recent history of antibiotic usage, was tested positive for *Clostridium difficile* colitis. Few months after a successful antibiotics treatment, his symptoms have recurred. Infectious causes were promptly excluded. His laboratory tests were remarkable in exception for significant elevation of fecal calprotectin. Colonoscopy revealed NLH in the terminal ileum and MRI was consistent with terminal ileitis. Histopathology revealed low-grade chronic inflammation. While waiting on histopathology results, the patient was managed with supplements of butyric acid, fructooligosaccharide, and probiotics.

Results: Given the patient's history *C. difficile* colitis, abdominal symptoms, remarkable laboratory results, the Rome IV criteria for PI-IBS was applied and the patient responded well to treatment, becoming asymptomatic after 14 days. Follow-ups at four months showed an

asymptomatic patient with remarkable laboratory results and decline in fecal calprotectin levels, although nodules persisted in the terminal ileum.

Discussion/Conclusion: Diagnosing PI-IBS relies on clinical presentation and excluding other organic diseases. In this case, post colitis NLH in the terminal ileum, with symptoms of PI-IBS, prompted consideration of terminal ileitis, which endoscopically manifested as NLH. Due to the rarity of NLH in this location and the limited data connecting it to PI-IBS, further research and thorough clinical assessment is essential for a comprehensive understanding of their potential relationship.

8. Enhancing endoscopic ultrasound pancreatic lesion detection and marking through transformer-based AI segmentation models

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Introduction: The pancreas is subject to various lesions that have differing clinical management pathways, ranging from immediate surgical intervention to ongoing surveillance. Endoscopic ultrasound (EUS) is the most sensitive method for the diagnosis and evaluation of pancreatic lesions. However, current diagnostic reliance on EUS is limited by its operator-dependent nature. This is especially important in early detection of pancreatic cancer as recent studies show unacceptable post EUS pancreatic cancer rates. Recent advancements in artificial intelligence (AI) offer a promising avenue to augment the accuracy of EUS and reduce its operator dependency. We previously presented a proof of concept for using AI for segmentation tasks in pancreatic EUS. In this study we aimed to develop a computer-aided detection (CADe) system for the detection and segmentation of pancreatic lesions during EUS using cutting edge AI models.

Methods: Conducted at Rabin Medical Center, this single-center study compiled a prospectively collected, retrospectively analyzed dataset from adult patients who underwent EUS with subsequent tissue acquisition. Lesions were marked by two experienced endoscopists, and two state-of-the-art pre-trained transformer-based segmentation models (Segformer and Beit) were employed to distinguish between normal and abnormal pancreatic tissues. The performance of the models was evaluated using the per-pixel intersection over union (IoU) metric

Results: A total of 165 cases were included in the study (including adenocarcinomas, Malignant IPMNs, PanINs grade 3, metastasis and lymphoma, neuroendocrine tumors, benign cysts [IPMN, serous cysts, mucinous cysts] and benign lesions [pancreatitis, walled off necrosis, fibrosis]). The final dataset consisted of 1284 training images, 151 validation images, and 76 test images. The Segformer and Beit models demonstrated high accuracy per pixel, of 94.7% (95% CI: 88.2–99.1%) and 95.6% (95% CI: 91–100%) respectively. The Segformer achieved an IoU of 0.634 (95% CI: 0.47–0.691) for positive cases and 0.943 (95% CI: 0.873–0.988) for negative cases, while Beit achieved an IoU of 0.690 (95% CI: 0.586–0.794) for positive and 0.951 (95% CI: 0.903–1) for negative cases.

Discussion/Conclusion: The implementation of Segformer and Beit models in CADe systems for EUS of the pancreas shows significant promise in enhancing the detection and segmentation of a wide range of different pancreatic lesions. These findings suggest a potential for AI to mitigate the variability of operator-dependent EUS, thereby improving diagnostic precision and patient outcomes in the management of pancreatic lesions.

9. Validating and enhancing real-time endoscopic disease severity classification in ulcerative colitis: Artificial intelligence as a second opinion trigger

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Introduction: Endoscopic ulcerative colitis (UC) severity classification shows high interobserver variance. Our prior study proved AI matches central reading scoring still images. To be clinically useful, assessing longer segments is vital. Our aim: a new model for real-time or video-based severity evaluation and demonstrate the supporting value.

Methods: Data was Mayo Endoscopic Subscore (MES)-scored using 2561 images and 53 videos from 645 patients to train a convolutional neural network. Through open-set-recognition, the model differentiated scoreable from unscoreable endoscopy sections. The validation included 140 videoclips from 44 UC patients. Six IBD-experts and 16 non-IBD experts independently rated these clips, with the majority IBD-expert score as ground truth. Furthermore, we simulated the use of the AI model as a trigger for a second opinion for non-IBD experts. The second opinion was all possible combinations of a doctor of the same seniority or higher (including the IBD experts). Lastly, we conducted an alpha test with real-time endoscopic support on a real-world patient.

Results: The model achieved an overall accuracy of 0.82. No significant distinction between individual experts or ground truth vs. the AI model was observed.

When employed as a trigger for second opinions, non-IBD experts' performance improved by 10%. On average, 26–32% of the time, the AI model disagreed with the primary physician. In those cases, the model was correct on an average of 57–59%, and the second physician was correct on an average of 64–70% of the time according to the ground truth.

The alpha test successfully integrated the model into the endoscopic column for real-time classification. It accurately discerned MES 0 and MES 1 frames, aligning with the endoscopist's assessment.

Discussion/Conclusion: Our innovative AI model exhibits significant potential for enhancing UC severity classification, rivalling IBD-experts, and notably improving non-specialists' proficiency. It is designed for clinical implementation and has demonstrated clinical feasibility.

10. The occurrence of BRAF mutations in colorectal serrated lesions

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Introduction: Thirty percentage of CRC arises on serrated lesions. WHO classification divides serrated lesions into four categories: hyperplastic polyp (HP), sessile serrated lesion (SSL), traditional serrated adenoma (TSA), and unclassified serrated adenoma. SSL and TSA with dysplasia are the most common precursors of CRC. Therefore, the objective of the present investigation is to analyze histological features and BRAF gene mutations in serrated lesions of the colon.

Methods: The retrospective analysis of morphological features was done in archive slides stained with hematoxylin-eosin (H-E) by two pathologists and categorized in the basis of WHO Classification of Tumors, 5th Edition (2019). The degree of dysplasia and co-existence

with CRC were also explored. Endoscopic examination was included: Paris' classification, morphology, color and type of lesion growth, the presence of mucin. The study group consists of 25 hyperplastic polyps, 50 sessile serrated lesions and 25 traditional serrated adenomas. BRAF mutation was performed by in vitro diagnostic tests based on real-time PCR amplification in formalin-fixed, paraffin-embedded (FFPE) tissue sections.

Results: The study group consists of 48 female and 52 male. SSLs were mainly localized in the right side colon while HP and TSA were found in the left side colon. Most of colorectal serrated lesions had stage I according to Paris' classification. Morphologically, serrated lesions had a flat growth pattern, with normal color appearance and lack of mucin. Analysis of the tested material showed that somatic mutations in the BRAF gene (codon 600) occur in 80% of HPs, 82% SSL, 41% TSA. Presence of BRAF-mutated cases was observed in youngsters with HP ($p = 0.010$; $R = -0.513$). BRAF gene abnormalities in SSL were more frequently observed in women ($p = 0.041$; $R = -0.277$), in younger patients ($p = 0.013$; $R = -0.349$) and protruded growth pattern ($p = 0.046$; 0.393).

Discussion/Conclusion: According to our study, BRAF-mutated serrated lesions can progress to colorectal cancer via this genetic pathway.

11. Computer-aided diagnosis for the resect and discard strategy for colorectal polyps: A systematic review and meta-analysis

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Introduction: According to the Resect and Discard strategy, endoscopists can replace post-polypectomy pathology with real-time prediction (optical diagnosis) of polyp histology during colonoscopy. This strategy is only applicable to small polyps ≤ 5 mm and if the endoscopist prediction was made with high confidence. The variability in real-time optical diagnosis among different endoscopists can be standardized by the high accuracy expected from computer-aided diagnosis systems (CADx). The aim of this meta-analysis is to assess the added value of CADx-assistance in the endoscopist optical diagnosis accuracy.

Methods: We conducted a search of MEDLINE, EMBASE, and Scopus databases, covering studies published from inception to January 12, 2024. We included histologically verified accuracy diagnostic studies that evaluated the real-time optical diagnosis performance of endoscopists for polyps ≤ 5 mm in the entire colon. The aim was to measure the diagnostic performance of the CADx-alone strategy and to estimate the potential benefits and harms associated with integrating CADx assistance into the endoscopist optical diagnosis, both before and after its implementation. The benefit outcome was assessed by the proportion of pathological assessment that can be avoided. The harm outcomes were assessed by the proportion of false-negative incorrectly predicted neoplastic polyps and proportion of false-positive incorrectly predicted non-neoplastic polyps that lead to incorrect-post-polypectomy surveillance interval agreement. Pathology served as the reference standard for all the calculated outcomes.

Results: In total, 10 studies were eligible to be added in our analysis. The CADx-alone diagnostic performance (10 studies; 7595 polyps) yielded a pooled sensitivity of 87% (95% CI: 0.82–0.91) and a pooled specificity of 77% (95% CI: 0.70–0.84). Three studies (2503 polyps) compared the endoscopist optical diagnosis performance before and after the CADx assis-

tance. There was no significant difference between the CADx-unassisted and CADx-assisted strategies, for the proportion of pathological assessment that can be avoided (90% vs. 90% risk ratio = 1.01; 95% CI: 0.99–1.04; I² = 53.49%; moderate certainty evidence) and in the proportion of false-negative incorrectly predicted neoplastic polyps strategies (7% vs. 6%; risk ratio = 0.85; 95% CI: 0.67–1.07; I² = 0%; moderate certainty evidence). A significant difference was observed in the proportion of false-positive incorrectly predicted non-neoplastic polyps (20.1% vs. 18.6%; risk ratio = 0.88; 95% CI: 0.78–0.98; I² = 0%; moderate certainty evidence)

Discussion/Conclusion: The assistance of CADx did not affect the benefits and harms associated with implementation of the resect and discard strategy, when applied to small polyps in the whole colon.

12. Human-computer interaction: Examining the influence of artificial intelligence on the diagnostic confidence of endoscopists in the evaluation of Barrett's esophagus

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Introduction: Human-computer interactions (HCI) can substantially influence the performance of Artificial Intelligence (AI). Studies indicate that although endoscopists, when assisted by AI, demonstrate significant improvements in assessing Barrett's esophagus (BE), their performance does not reach the stand-alone level achieved by AI. A critical aspect of HCI is the impact of AI on the certainty and confidence exhibited by endoscopists. Indirectly, diagnostic confidence when utilizing AI may be associated with the trust and acceptance of AI. In a study focusing on BE videos, our objective was to examine the influence of AI on endoscopists' diagnostic confidence and explore potential correlations with diagnostic performance.

Methods: Twenty-two endoscopists from twelve centers, with varying levels of BE experience, reviewed ninety-six standardized endoscopy videos. The endoscopists were categorized as experts and non-experts and were randomly assigned to evaluate the videos with and without AI. Participants were divided into two arms: Arm A assessed videos initially without AI and then with AI, while Arm B followed the opposite order. Evaluators were tasked with identifying BE-related neoplasia and providing confidence ratings both with and without AI on a scale from 0 to 9.

Results: In Arm A (without AI first, with AI second), the use of AI significantly increased confidence levels for both experts and non-experts (7.1 to 8.0 and 6.1 to 6.6, respectively). Notably, only non-experts experienced a significant improvement in accuracy (68.6% to 75.5%) with the assistance of AI. While experts exhibited higher confidence levels without AI compared to non-experts with AI, there was no significant difference in accuracy between these two groups (71.3% vs. 75.5%). In Arm B (with AI first, without AI second), experts and non-experts demonstrated a significant reduction in confidence (7.6 to 7.1 and 6.4 to 6.2, respectively), while maintaining consistent accuracy levels (71.8% to 71.8% and 67.5% to 67.1%, respectively).

Discussion/Conclusion: AI significantly boosted confidence levels for both expert and non-expert endoscopists. Endoscopists felt notably more uncertain in their assessments without AI. Furthermore, experts consistently displayed higher confidence levels, with or

without AI, compared to non-experts with AI, despite comparable outcomes. These findings highlight the potential role of AI in enhancing diagnostic confidence during endoscopic assessments.

13.A novel active learning-based digital pathology protocol annotation for histologic assessment in ulcerative colitis using PICaSSO histologic remission index (PHRI)

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Introduction: Histologic remission (HR) is a critical treatment target in Ulcerative Colitis (UC). Among several scoring systems, the PICaSSO Histologic Remission Index (PHRI) simplifies HR assessment by evaluating the presence of neutrophils in the bowel tissue. Our artificial intelligence (AI) system built upon PHRI showed remarkable accuracy in HR assessment. PHRI assess neutrophils in four different regions of interest, so segmentation of these compartments is crucial to predict PHRI automatically. However, creating labelled histopathological datasets to train fully-supervised segmentation models takes time and effort. Hence, this study explores the impact of an active learning (AL) algorithm on enhancing image segmentation to alleviate the burden of detailed pathologists' annotation and to standardise protocol annotation.

Methods: Biopsy samples from an international real-life prospective UC study were digitised into whole slide images (WSI). Initial annotations of superficial epithelium, lumen and epithelium of crypts and lamina propria for 33 WSI were employed to train a U-Net segmentation model at baseline. An AL framework was employed to iteratively select and annotate 15 unannotated images while selecting those with the highest uncertainty. Uncertainty was calculated using Least confidence sampling, Margin Sampling, and Shannon Entropy. The most informative samples, based on the average of the three uncertainty measure, were selected in consecutive batches of 5 images, and pathologists were enlisted in a human-in-the-loop process to refine annotations. Subsequently, the segmentation model was retrained by incorporating the newly refined annotated samples, and its performance was assessed using a fully annotated test set of 19 WSI.

Results: Following the baseline model training, the model's segmentation performance assessed by the Dice score and Intersection over Union (IoU) was 0.622 and 0.386, respectively. Applying the AL algorithm with newly annotated images notably improved model performance, especially with 10 images (Dice = 0.651, IoU = 0.415). However, training the model with an additional 5 newly annotated images, which exhibited lower uncertainty, did not yield further improvement (Dice = 0.651, IoU = 0.415). Thus, the 10 annotated WSI demonstrating more uncertainty resulted crucial for the AL framework.

Discussion/Conclusion: This novel AL-based iterative framework exhibits promise in standardising digital tissue annotation by our PHRI-based AI model. It offers a novel approach for both clinical trial and clinical practice, aiming to alleviate the burden of WSI labelling and reduce the bias of annotation, thereby improving histological assessment in UC.

14. A novel switching-multimodal artificial intelligence to simultaneously convert different endoscopic enhancement modalities for accurate assessment of inflammation and healing in ulcerative colitis

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Introduction: Virtual chromoendoscopy (VCE) has proven effective in predicting disease activity in ulcerative colitis (UC), although challenges persist regarding local availability and expertise. Artificial intelligence (AI) models applied to VCE have demonstrated a remarkable ability to rapidly, objectively, and accurately predict inflammation. Nonetheless, training machine algorithms across different enhancement modalities remains challenging. Hence, this study pioneers a novel machine model designed to simultaneously detect different VCE enhancement modalities and facilitate the transition between images to improve and standardise AI-based assessment of inflammation in UC.

Methods: Endoscopic videos from 302 UC patients recruited in the international real-life prospective PiCaSSO study were analysed. The endoscopic assessment of the rectum and sigmoid colon was performed using WLE, iScan 2 and iScan 3 modalities (Pentax, Japan). In the study's first phase, a switching AI model that detects and converts images across different modalities was developed. A neural network (NN) to identify the acquisition modality of each frame was trained and tested with 1531 (510 WLE, 518 iScan 2, and 503 iScan 3) and 321 (103 WLE, 109 iScan 2, 109 iScan 3) randomly extracted frames, respectively. Subsequently, a CycleGAN model was trained with 900 images per modality to allow inter-modality image switching. In the second phase, 240 annotated videos (4605 frames) were selected, with endoscopic activity graded by experts using UCEIS for WLE and PiCaSSO for VCE. Videos were switched to missing modalities and used to train a previously developed deep-learning model for inflammation assessment. Four models were trained: three using a single modality as input and one combining all modalities. Model performance in predicting inflammation was assessed by computing accuracy, sensibility, specificity and AUC.

Results: The switching model showed a remarkable ability to classify and convert images across different endoscopic modalities, achieving a 92% NN classifier accuracy on the test set. The deep learning model showed a sensitivity of 80% (95% CI: 59–93%), specificity of 94% (95% CI: 82–99%), accuracy of 89% (95% CI: 79–95%) and AUC of 0.91 in predicting inflammation when combining images obtained through the switching model. This multimodal approach improved the performance of single-modality models.

Discussion/Conclusion: This study introduces an innovative multimodal “AI-switching” model capable of accurately detecting and simultaneously switching between different endoscopic enhancement modalities. Combining the images obtained through this model enables precise assessment of inflammation in UC patients, exhibiting promising potential for application in clinical trials and clinical practice.

15. Natural language processing and named entity recognition in inflammatory bowel disease referrals

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Introduction: Clinical natural language processing (NLP) techniques are evolving, such that over the next few years they will start to support clinicians to interpret clinical information. Named entity recognition and linkage (NER+L) to standard ontologies with millions of concepts, such as The Unified Medical Language System (UMLS) add value to otherwise unstructured textual data. However, little research has been done in the field of Inflammatory Bowel Disease (IBD).

Methods: Anonymised GP referral letters triaged between 1st January 2017 to 31st March 2021 using an agreed protocol by a panel of Gastroenterologists as likely new or recurrent IBD were randomly extracted. NLP in python was applied to referral free text using MedCAT, a model trained on the UMLS database.

Manual validation was performed to determine sensitivity vs ground truth for finding positive mentions of four cardinal clinical signs and symptoms. Sensitivity = TP/(TP + FN) was the outcome of greatest interest. Chi2 was used for statistical comparison at the p < 0.05 level.

Results: 125 referral letters were included in this study. Median age: 39 (IQR, 30–50), 51.2% Male [95% CI: 42.4–60.1]. 22.4% (n = 28) of the cohort had pre-existing IBD.

The following data summarises the performance of the algorithm against the correct human validations:

Measure	Diarrhoea	Abdominal Pain	Rectal Bleeding	Weight Loss
Ground Truth	63.2%	53.6%	40.8%	12.8%
	(95% CI: 54.7–71.7)	(95% CI: 44.8–62.4)	(95% CI: 32.1–49.5)	(95% CI: 6.9–18.7)
	(n = 79)	(n = 67)	(n = 51)	(n = 16)
Algorithm	53.6%	57.6%	24.0%	17.6%
Detected (%)	(95% CI: 44.7–62.4)	(95% CI:48.9–66.4)	(95% CI: 16.4–31.6)	(95% CI: 10.9–24.3)
	(n = 67)	(n = 72)	(n = 30)	(n = 22)
p-value	0.0000	0.0000	0.0004	0.0000
Sensitivity	0.772	0.925	0.412	0.625
	(95% CI: 0.680–0.865)	(95% CI: 0.862–0.988)	(95% CI: 0.277–0.547)	(95% CI: 0.388–0.862)

Diarrhoea and abdominal pain were both most mentioned and most successfully detected by MedCAT, however, significant differences were flagged in all cases.

Discussion/Conclusion: Significant differences were observed between human validations and model predictions for four common IBD signs and symptoms, suggesting that these models are not yet mature enough for use in clinical practice. Annotations for more difficult concepts, such as rectal bleeding and weight loss need to be improved in major open-source NLP corpora.

16.Can we use non-specialized, non-medical AI solutions in medical practice?

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Introduction: Diagnosis and decision-making are the most challenging and crucial tasks performed by physicians in clinical settings, where extremely high cognitive data loads resulting from frequently updating and incredibly high volumes of information, demand reliance on cognitive shortcuts, leading to mistakes and preventable harm to patients and medical

personnel. Data overloads, similar to computer-based DDoS attacks becomes significant factor impacting clinical decision-making. Coping with burnouts has minor and temporary effect, whereas data load optimization shows better perspectives. AI-based decision-making systems receive considerable attention among researchers, as AI can be used to examine high-complexity and high-volume data for predictive analytics to augment the precision of complex decision-making processes. Currently available specialized medical solutions include Hippocratic AI, Regard, PathAI, Buoy Health, Arterys, and similar, while being very potent have multiple drawbacks and limitations; among them high costs, focus on specific tasks and a set of ethical, technical, and human-centred challenges. Therefore, we found it plausible to check whether non-specialized, non-medical AI solutions may be successfully used for diagnosis and decision-making.

Methods: Three currently available AI solutions were tested (OpenAI ChatGPT, Microsoft BingAI, and Google BardAI). Modified last versions of each apps were used, in case of BardAI, the VPN-based access was necessary as it's not available in Europe. Retrospective sets of 25 clinical cases (10 IBD, and 15 NAFLD) were subject of analysis. Sensitivity, specificity and accuracy of diagnosis were calculated for each AI software. In addition, ease of use, availability and other subjective features were evaluated. Even the diagnoses, which were not fully compliant with classifications or incomplete were considered as correct.

Results: Both ChatGPT and BingAI showed very similar results: sensitivity – 81.3% and 82.7%, specificity – 63.4% and 65.1%, and accuracy 72.1%, and 71.4%. BardAI stepped aside with sensitivity – 86.0%, specificity – 68.3%, and accuracy 68.4%. The number of hallucinations was 20%, 16% and 16%, respectively.

Discussion/Conclusion: Although this study has multiple limitations, AI for personal and professional use is going to stay with us. Use of non-specialized AI solutions in medical practices is highly attractive as it has various benefits, including cost-effectiveness, availability and ease of use. However, obtained data are confusing if not disappointing. Very similar responses by ChatGPT and BingAI may be explained by similarity of their algorithms and software engines. Currently, non-specialized AI solutions in healthcare may only be used as an additional tool, unable to substitute specialized solutions.

17. Hazards and perspectives of AI use in gastroenterology: The physicians' point of view

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Introduction: The implementation of AI in healthcare possesses great promise for expanding the medical knowledge and achieving optimal and cost-effective healthcare solutions. In the clinical setting, expected accomplishment includes identification of high-risk patients, more accurate timely diagnosis and effective personalized treatment, etc. It is generally accepted that, while there is great promise in the implementation of AI technologies in medicine, it also raises several important issues. Among them, ethical problems and lack of understanding perspectives of AI implementation into healthcare practice are the most obvious. In fact, understanding of the fact that AI may fully or partially substitute medical professionals potentially causes negative response from medical personnel. Therefore, the aim of the study is to gain insight into the reasoning patterns and ethical opinions about AI in from physicians involved in the medical practice in the field of gastroenterology.

Methods: Study includes online survey of 55 medical personnel being acquaintances of the authors (working at the same or different locations but related to the field of gastroenter-

ology). Both usual Delphi statistical method which aims to collect opinions on a particular research question or specific topic, to gain consensus, as well as modified Q research methodology, used predominantly in psychology and in social sciences to study individuals' subjective viewpoint, making smaller population samples more informative, were used in this study. Google Forms and Mentimeter were used for survey. Semi-manual and HTML-based online tools were used for analysis.

Results: Attitude towards AI use in gastroenterology varied (five levels) from fully accept to fully unacceptable (41.8%, 16.4%, 10.1%, 25.5%, 5.5%, respectively). Q-analysis indicated that a predominant positive attitude towards implementation of AI is caused by accepting it as a helpful tool that will allow doctors to have more resources to focus on over the license skills and efforts. The negative attitude was mainly based on understanding AI as a "black box" obscure technology. The neutral responses mostly resulted from lack of contextual competence. Other critical concerns expressed even by AI supporters were that AI implementation may increase medical stuff workload because physicians will be forced to not only provide medical care but additionally participate in the AI design and update process.

Discussion/Conclusion: Summarizing up the received data, it becomes apparent that to great extent AI implementation in gastroenterology is inevitable and is generally well accepted by gastroenterology community. However, AI specific education is essential in both competence-based and ethical manners. The limitations of this study are based on the fact that survey contingent is comparatively small and less diverse, timeframe is limited, and different cultural, economic and other factors may impact results.

18. Application of artificial intelligence in GI endoscopy via computer-assisted visual assessment

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Introduction: Artificial intelligence (AI) is widely seen as the ability of computer to fulfil tasks that are usually done by human operators. AI's common applications include improving communication between physician and patient, diagnosing patients, transcribing medical documents, such as prescriptions, end-to-end drug discovery and development, and remotely treating/consulting patients. However, most of AI systems simply repeat or mimic actions performed by human personnel including possible human mistakes and drawbacks. In fact, humans collect necessary data, which after being input into computerized AI system will produce expected results. Successful implementation of AI requires use of digital data obtained from primary source of information. While it seems easy to use biochemical variables, use of AI for endoscopic investigation is limited. The fractal nature of the majority of biological tissues stimulates creation and implementation of new optical methods in diagnostics and analysis of biological properties. While confocal microscopy (CM) is being introduced into clinical practice, its use is limited due to difficulties and subjectivity of results assessment. In recent years, coherent polarimetry microscopy (CPM) became widely used in military and space innovations as a diagnostic remedy. It provides good background for use of AI because all data is immediately digitized in special graphic software. The object of this research is to evaluate CPM's diagnostic value and applicability by means of digitization and use of AI.

Methods: We used modified Pentax®-based CM endoscopic system. Reflected He-Ne laser beam wavelength of 0.6328 Qm by means of collimator transforms into a collimated beam, then passing through linearly polarized plane, quarter-wave phase shifting plane with optical

axis oriented at the angle of 45° to the polarization plane of laser radiation. Obtained picture was real-time digitized in MathLab® software. In addition to standard visual assessment following optical digital parameters were calculated: S-average polarization value, Mx-mathematic expectation, STD2-average squared variation, Dx-disperse, As-asymmetry, Ex-excess, MEDx-median. Stocks-polarimetry of obtained static visual images was the last step for data analysis. Totally 107 patients participated in the study: 26 healthy volunteers (control), 46 patients with endoscopically clearly identified gastric atrophy or inflammation (group 1) and 35 patients with dubious endoscopic (at least two endoscopists didn't fully agree about diagnosis or repeated endoscopies or biopsies were needed) picture (group 2).

Results: Data obtained at the study showed that the pathological process involving inflamed gastric mucosal structures is usually accompanied by the sufficient enlargement and disorientation of anisotropic and amorphous optical components while inner layers remain less anisotropic. Following CPM variables were obtained in automated calculations: in control - $S = 0.3599301$, $Mx = 0.3599304$, $STD2 = 0.0940612$, $Dx = 0.0090288$, $As = 77.3583341$, $Ex = 2591.8350251$, $MEDx = 0.3530412$; in group 1 - $S = 0.4275069^*$, $Mx = 0.4275069^*$, $STD2 = 0.1076124$, $Dx = 0.0115804^*$, $As = -2.0407966^*$, $Ex = 1231.3691156^*$, $MEDx = 0.4196078^*$; in group 2 - $S = 0.3595752$, $Mx = 0.3595752$, $STD2 = 0.1053428$, $Dx = 0.0110971^*$, $As = 430.0877889^*$, $Ex = 36154.1218620^*$, $MEDx = 0.3529412$, where $^* - p < 0.05$ compared to control. Stocks-polarimetry showed 23.1-28.6% increase of Stocks vector maximal value in both study groups, and two to three-fold evaluation of statistical distribution parameters.

Discussion/Conclusion: Endoscopic visualisation of intact and pathologically changed gastric mucosa is not always a reliable diagnostic remedy, though CM dramatically improves its value. CPM is a further development of CM decreasing subjectivity of investigation due to 'human factor' and allowing real-time transformation of visual images into digital form. However, real use of obtained data and their application into diagnosis through use of AI remains uncertain. In fact, a set of physical parameter is easy to implement into AI software but difficult to implement into real-life diagnostic approaches. To add confusion, some figures are very similar in different pathological conditions, leading to suggestion that these variables are able to distinguish normal tissue from pathological but unable to provide accurate and diagnosis. A closer cooperation of endoscopists, optical engineers and software developers may support further advances in the field.

19. Endoscopic management of chronic pancreatitis in a tertiary center in Tunisia

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Introduction: Chronic pancreatitis (CP) is a long-term illness characterized by chronic pain, recurrent pancreatitis and several other complications including pseudo cysts and biliary duct strictures. Endoscopic treatment of local complications in patients with chronic pancreatitis has gained ground over the surgical alternative in the last two decades. Even though therapeutic endoscopic retrograde cholangiopancreatography (ERCP) is increasingly gaining acceptance in developing countries, the majority of published studies reporting its outcomes and complications in CP were conducted in developed countries. We aimed in this study to describe the indications and outcomes of ERCP performed in patients with CP in a Tunisian hospital.

Methods: We reviewed all 1238 ERCP reports performed between January 2016 and December 2023 in the gastroenterology department of a tertiary center in Tunisia. We included

patients with CP requiring endoscopic therapy. We excluded patients who were lost to follow-up and those with pancreatic cancer.

Results: Overall, we included 11 procedures in 10 patients, 9 of whom were male. The median age was 35 years with an interquartile range of [18–51]. Four patients had alcohol related chronic pancreatitis. The cause of the CP remained unknown among the other patients. The main indication for ERCP was pain with presence of pancreatic duct calculi on CT scan ($n = 8$) followed by jaundice ($n = 3$). In all eight cases, the calculi were small with a diameter ≤ 5 mm and non-impacted. In 6 cases, ERCP allowed extraction of stones. In the two remaining cases, a pancreatic duct stent placement was performed. Two patients presented distal regular benign biliary strictures and both responded well to single plastic stent. Only one patient had hilar biliary stenosis revealed by moderate angiocholitis. ERCP revealed short left biliary duct stenosis. The patient was managed with bilateral plastic stents. None of these patients presented complications following endoscopic therapy. Patients presenting with pain reported moderate improvement in pain intensity.

Discussion/Conclusion: In spite of our limited experience in endoscopic therapy in CP, we were able to provide partial pain relief in our patients and to successfully treat local complications.

20. Neuroendocrine pancreatic tumors: About 13 cases

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Introduction: The pancreatic location of neuroendocrine tumors is one of the less common to find, representing only 5% of the pancreatic neoplasms. They are a heterogeneous group of tumors in which behavior and prognosis can be very variable. The goal of our study was to describe the different characteristics of these tumors in a tertiary center in Tunisia.

Methods: We conducted a retrospective descriptive monocentric study in a tertiary center in Tunisia. All patients presenting with a histologically proven neuroendocrine pancreatic tumor were included (2015–2023). We evaluated the prevalence of the neuroendocrine pancreatic tumors as well as their clinical, histologic and evolutive characteristics.

Results: Thirteen patients were gathered (7 females and 6 males), the mean age was 56.27 years [34–78]. Abdominal pain was the revelation mode in 6 cases (53.8%), jaundice in two, while pancreatitis, digestive bleeding and carcinoid syndrome were the revealing modes in one patient each.

The median size of the found tumors was 56.3 mm [6–150]. Eight were in the head and the others were caudal. The diagnosis of neuroendocrine tumor was done by biopsy in 8 cases (61.5%) and by surgical resection in the other cases.

Histologically, Ki67% was superior then 2% in 8 patients. The mitotic index was between 0 and 6 with a median at 2.28.

A metastatic location was found in four cases, two in the ganglions and two were hepatic.

The treatment was surgical in 8 cases; while chemotherapy was indicated in five patients.

Discussion/Conclusion: The pancreatic neuroendocrine tumors are very rare. Their revelation modes are nonspecific et were diagnosed in 30.7% of our series at a metastatic stage. The common treatment remains however surgical and a narrow follow-up is needed in order to prevent the extension of the neoplasms

21. Endoscopic resection of upper gastrointestinal subepithelial tumours: Our clinical experience

Oktay Yener (Istanbul, TR)

Introduction: Upper gastrointestinal subepithelial tumours (SETs) are generally asymptomatic and clinically insignificant and have malign, borderline and benign variants. In advanced endoscopic procedures, histopathological diagnosis and endoscopic resection are possible and feasible.

Methods: In this study, we examined our approach to upper gastrointestinal subepithelial tumours and our clinical results. Adult patients who applied to Surgical Endoscopy unit between January 2022 and January 2023 were included in the study. The patients' files and final histopathological diagnoses were recorded and analysed retrospectively for this single-center study. SET lesion lower than 30 mm and the lesion whose endoscopic submucosal dissection attemptation was included in the study.

Results: The total of 8 patients were four female (50%) and four male (50%), aged 31–66 years (median, 53 years). The tumoral lesions were located 4 (50%) patients in esophagus, 3 (37.5%) patients in stomach and one (12.5%) patient in duodenum and their diameter ranged from 5 to 30 mm (median, 14 mm). Post-interventional no complications or abdominal symptoms were encountered. Also, in early follow-ups for six months, no recurrence was observed.

Discussion/Conclusion: Our experiences together with literature reported here, indicated endoscopic resection is a safe and effective method of treatment for most patients with upper gastrointestinal SETs.

22. A case of ischaemic pancolitis managed conservatively

Andreea-Elena Zotescu (Gillingham, GB), Lasitha Herath (Gillingham, GB)

Introduction: Ischaemic colitis is a result of an acute self-limiting decrease in the blood supply of the colon and commonly involves watershed areas like splenic flexure and the sigmoid colon. Ischaemic pancolitis is an uncommon variant with high mortality and morbidity.

Methods: A 70-year-old man with Asperger's syndrome, prostate cancer and osteoarthritis presented with a 4-day history of abdominal pain, fresh per rectum bleeding and malaena, denied any vomiting. He had a history of NSAID use for 3 months. He was hemodynamically stable with diffuse abdominal tenderness.

His bloods showed Hb 151, leukocytosis with neutrophilia. He also had acute kidney injury – 2 with mild hyperkalemia and metabolic acidosis (pH 7.28) with a bicarbonate level of 19.9 and lactate of 3.5.

Results: CT scan of the abdomen showed wall thickening, submucosal oedema, mucosal hyperaemia and surrounding fat stranding involving the entire colon – consistent with pancolitis. Flexible sigmoidoscopy on day 3 showed superficial patchy ulcerations and healing mucosa from distal transverse to proximal descending colon suggestive of ischaemic colitis. Biopsy reports from the transverse colon and splenic flexure showed ulceration, erosions, and mucosal fibrosis with ecstatic capillaries and withered crypts suggestive of acute ischaemic change.

Discussion/Conclusion: Ischaemic pancolitis is described in less than 1% of all patients with ischaemic colitis. Most of these patients require surgical management. Our patient, however, responded well to supportive management alone and recovered completely within two weeks.

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