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ORIGINAL PAPER

Making AI's Impact on Pathology Visible: Using Ethnographic Methods for Ethical and Epistemological Insights

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Abstract
The field of pathology is currently undergoing fundamental changes, including the transition from analog to digital workspaces and the integration of Artificial Intelligence (AI) into digital diagnostic workflows. Discussing the ethical implications of these changes is complicated by the fact that both laypersons and medical professionals know relatively little about the ways pathologists conduct their daily work. To reveal the largely 'invisible' daily practices of pathology departments and better understand the ongoing processes of innovation within the field, we employed a variety of ethnographic methods: interviews, participant observations, and ethnographic filming. Approaching AI in pathology through three different angles helped us to gain rich knowledge and meaningful insights about the ways AI should impact pathologists' and lab technicians' roles and responsibilities. In this article, we describe the benefits and downsides of our 'slow approach' to data collection and invite those working on similar topics involving the complex dynamics of digital transitions to reflect on whether such methods might also benefit their research.

Keywords Digital pathology · Medical AI · Medical ethics · Ethnographic research

1 Introduction

To most patients, the work of pathologists is largely 'invisible' (Glazer & Ruiz-Wibbelsmann, 2011; López, 2015). This is partly due to their position in the healthcare system. Pathologists are highly trained specialists who provide essential information for diagnostic, prognostic, and treatment purposes, yet they rarely communicate these findings directly with patients. Instead, their reports are relayed to the

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primary treating physicians, who in turn communicate these findings with patients and their families. Pathologists' role in the diagnostic process is not only invisible for laypersons. Many professionals working in the healthcare domain know relatively little about how pathologists conduct their daily work (López, 2015, p. 47).

One reason for making pathologists' daily practices more visible for laypeople and their medical colleagues is the fact that the field is undergoing fundamental transitions with widespread consequences. First, pathology labs around the world are switching from analog to digital workspaces—in other words, from viewing tissue samples under microscopes to viewing digital scans on screens. This requires practical reorganizations in their workspaces and corresponding workflow; it also demands additional competencies and virtues (Sand et al., 2021; Schwen et al., 2023). Second, many digitalized labs are also exploring ways in which Artificial Intelligence (AI) can be integrated into their digital diagnostic workflows, helping them more effectively and efficiently analyze digital images (Drogt et al., 2022; Niazi et al., 2019; Pantanowitz, 2010). Scholars have even speculated that AI will revolutionize the field, leading to substantial changes in how professionals perform their work (Balázs et al., 2020; Salto-Tellez et al., 2019). These technological developments in pathology raise multiple ethical issues. It is still unclear to what extent these systems will impact clinicians' autonomy (Bjerring & Busch, 2021; Sambasivan et al., 2012; Strohm et al., 2020), under what circumstances these systems should be trusted (Asan et al., 2020; Durán & Jongsma 2021; Hatherley, 2020), and how their use will impact the distribution of responsibilities (Grote & Berens, 2020; Mittelstadt et al., 2016; Sand et al., 2021). If AI systems change the ways medical knowledge is structured, produced, and shared, this raises additional epistemic questions. How does the use of AI effect our understanding of clinical expertise (Benke & Benke, 2018; Rządeczka, 2020), how can the reliability of AI systems for medical decision-making be assessed (Bjerring & Busch, 2021), and how will AI impact the speed and efficiency of knowledge production (Bejnordi et al., 2017; Nam et al., 2018; Sultan et al., 2020)?

Jongsma and Bredenoord (2020) and McLennan et al. (2022) have argued that an embedded and empirically informed methodology is needed to formulate answers to these kinds of ethical and epistemological questions. Other scholars have underscored the importance of including stakeholders—such as healthcare professionals (Shinners et al., 2020), patients (Lennartz et al., 2021), medical students (Park et al., 2021), and the public (McKay et al., 2022)—in discussions about the use of AI in medicine. The primary argument in favor of such involvement is that these groups will be affected by AI and should therefore have a say in its integration within medical fields. The fact that pathology is largely 'invisible' to outsiders makes it difficult to discuss the implications of medical AI for the field of pathology with stakeholders. This increases the need for more insights into pathologists' daily practices and was a motivating factor for a larger study we are currently conducting on the responsible use of AI in image-based medicine. The project, entitled Responsible Artificial Intelligence in Clinical DecisIOn-Making (RAIDIO),[1] approaches the topic of digitalization and integration of AI in pathology and radiology from a variety of disciplinary perspectives. Our

[1] More about RAIDIO, including publications, educational resources, and information about screenings of the ethnographic film can be found at www.raidioproject.nl.

team consists of experts with diverse backgrounds and areas of expertise, including bioethics, STS, philosophy, pathology, and narratology.

In order to ethically evaluate the roles of AI in clinical decision-making, we determined that we first needed to better understand how these technologies were being discussed, developed, and used at two academic hospitals in the Netherlands. We decided to employ three ethnographic data collection strategies: interviews, participant observations, and ethnographic filming. Our rationale was that this combination of data collection techniques would help us to identify and 'make visible' professionals' daily habits and practices. To gain a more holistic view of pathology practices, we studied the intricate combinations of habitual actions and behaviors as well as complex integrations between skill, knowledge, techniques, and practice. As Blommaert and Dong (2010) have aptly noted, "[p]eople are not cultural or linguistic catalogues, and most of what we see as their cultural and social behaviours is performed without reflection on it and without an active awareness that this is actually something they do. Consequently, it is not a thing they have an opinion about, nor an issue that can be comfortably put in words when you ask about it." (p. 3) Relying solely on formalized, vocalized communication in empirical research could therefore fall short in understanding how work is performed.

In this article, we will reflect on how and why our ethnographic research design helped us better understand pathology practices and empirically ground our ethical analysis. Empirical bioethics and embedded ethics often draw on ethnographic methods (Roest et al., 2021), but they rarely employ a multifaceted approach and almost never include ethnographic film methods as a data collection strategy (King et al., 2023; Volandes 2007). First, we will explain why we consider a multi-faceted empirical approach the most suitable method for making pathology and the potential uses of AI more 'visible.' Second, we will describe the ways in which our epistemic insights, gained by what we call our 'slow science' approach, have informed the ethical guidance we aim to provide on the integration of AI within pathology. We conclude by considering the broader applicability of our empirical approach for others interested in the ethics of medical AI. Furthermore, we hope that our reflection on our own research process can inspire others who are interested in conducting interdisciplinary research on emerging technologies and exploring new ways of communicating their findings with broader publics.

2 The Call for a Multifaceted Qualitative Approach

In our study, we aimed to maximize our empirical insights into AI's potential uses in pathology as a means of grounding our ethical analyses. At the same time, we were committed to informing a broad range of stakeholders on this topic and in providing meaningful ethical guidance on how to employ AI within pathology. For these reasons we decided to employ a multifaceted approach that combines: 1) in-depth semi-structured interviews to learn about professionals' perspectives on the nature of pathology and AI's possible roles in their daily work, 2) participant observations to observe how professionals perform their (digitalized) duties and apply their expertise, and 3) an ethnographic film to capture the nuances of professionals' daily practices.

We are convinced that the combination of methods resulted in a holistic image of pathology practices and the use of AI in these case sites that, in turn, informs our ethical guidance regarding the responsible use of AI in these daily practices. Furthermore, as a team, we approached the topics of digitalization and AI from a variety of backgrounds and approaches. Table 1 provides a general overview of how these perspectives inform all steps of a research process.

2.1 Semi-structured Interviews

First, we conducted in-depth, semi-structured interviews with a variety of stakeholders between June 2020 and February 2021 (Drogt et al., 2022). During these interviews ($N=24$), conducted by telephone due to the COVID-19 pandemic, we asked participants to share their opinions and preferences about the use of digital tools in their work. Some questions focused on recent developments in digitalization processes, such as switching from a microscope to digital images, or communicating with peers and students via application-embedded chat functions. Other questions aimed at determining participant's perspectives on the responsible development and use of AI. Although the interviews provided rich sources of information, we became acutely aware of our limited knowledge about the daily practices in a pathology department. For example, our interview data could not give us sufficient insights into how pathologists and lab technicians performed their daily tasks or how they applied their expertise on a case-by-case basis. This further motivated our decision to observe pathologists and lab technicians at work.

2.2 Participant Observations

In October 2021, we started our participant observations in a Dutch pathology department at the Radboud University Medical Center in Nijmegen. This approach helped us "closely watch" the ongoing digital transitions in this department (Nippert-Eng, 2015, p. x). This method also allowed us to verify verbal claims from the interviews, observe our respondents going about their daily tasks, and witness their interactions with members of the department who had not participated in the interview study. Both in pairs and independently, we (MM and JD) followed various members of the department, observing, asking questions, having informal conversations, and generally spending time with them as they went about their daily work (Picken, 2013, p. 344). We also observed AI research team meetings, resident training sessions, and multidisciplinary diagnostic sessions. Sometimes, we requested that a technical process or procedure be reenacted or explained (Hirschauer, 2006). In our written 'thick descriptions,' we aimed for a 'textualization' or 'narrating' of our experiences (Geertz, 1973; Clifford & Marcus, 1986; Henare et al., 2006; Van Maanen, 1988; Richardson & Pierre, 2005). During debriefing sessions, we compared our field notes; these conversations helped us answer lingering questions from the interview study and provided us with the rich contextualization we needed. For example, we learned that lab technicians and pathologists had been using AI-supported dictation devices for years. These support systems were not mentioned wby our interviewees, which made us wonder to what extent they considered them examples of medical AI.

Table 1 Comparing approaches per discipline

The (film) ethnographer	The STS scholar	The applied ethicist
Begins with theoretical problems and research plans	Begins with a technological artifact or research question	Begins with the identification of values, agents, risks, and benefits
Gathers data by making observations, asking questions, and filming	Conducts (archival) research, gathers relevant theories and insights	Gathers information about the setting and practices
Analyzes data	Analyzes and synthesizes collected data	Combines practical and theoretical insights
Produces a written and visual report	Writes an academic paper	Writes down empirically informed normative insights

(inspired by Heider, 2006, p. 8)

2.3 Ethnographic Film

In some situations, one or two empirical data collection methods may be sufficient to understand complex processes. In our study, however, interviews and participant observations proved to be insufficient for our understanding and communication of AI's potential impact on pathology practices. Written language alone failed to capture the range of skills and expertise a pathologist employs on a daily basis. Film, we realized, was an ideal medium to help render the implicit and intuitive aspects inherent in this kind of work more explicit, more visible.

For these reasons, we created an ethnographic film that included both recorded interview material and observations of daily tasks, interactions, patterns, and processes. Throughout this article, we have included stills from this film. We had previous experience with qualitative research and ethnographic methods (for example, Milota, 2018, 2020; Postma et al., 2023), but filmmaking was new to us. We were convinced by Heider's promise that "[t]he effort of thinking cinematically about ethnography or thinking ethnographically through film results in a new and different understanding of each of these disciplines" (2006, p. 7). We also took seriously the warning that "[i]f a film is to be informed by ethnographic understanding, it is virtually essential that a knowledgeable ethnographer be intimately involved as *ethnographer* in each step of the filmmaking process" (Heider, p. 112). To prepare for the film work, MM and JD took part in online and face-to-face workshops about film ethnography[2] and participated in the Granada Centre for Visual Anthropology's introductory film course.

Like a written ethnography, a film ethnography is a situated work as it is "influenced by the particular interests and circumstances of the anthropologist" (MacDougall, 2011). We made our interests and goals explicit to the members of the pathology department from the onset; our intention was to make a film that would function as a tool to inform stakeholders about pathology and the development of AI in image-based medicine. While filming in the department, our position as 'outsiders' arguably served as an asset.[3] As Hirschauer (2006) has pointed out, "[t]he most powerful resource for dealing with things taken for granted and with the obvious ethnographically, is the unfamiliarity of the observer. That this is a resource for sociological knowledge, is one of the oldest insights of the classical sociology of the stranger" (p.433). Our 'inexpert' eyes were drawn to practices and juxtapositions that may not have been considered significant by those working in the department (see Fig. 1); in this way, filming served as an additional epistemological tool for reflection. The short

[2] *Documentary Concepts and Research,* UCL (Open City Docs), course 2020, led by dr. Catalin Brylla. *Doing Ethnographic Film in Global/Multilingual Contexts*, University of Edinburgh, workshop 2019, led by Annelies Kusters.

[3] Our work was also dependent upon our close and collaborative relationship with an 'expert insider' in the department, Dr. Shoko Vos. She helped us in every step of the research process, connecting us with colleagues, answering our questions, suggesting interesting cases and procedures, and kindly correcting the most egregious errors in our descriptions of tissue sampling.

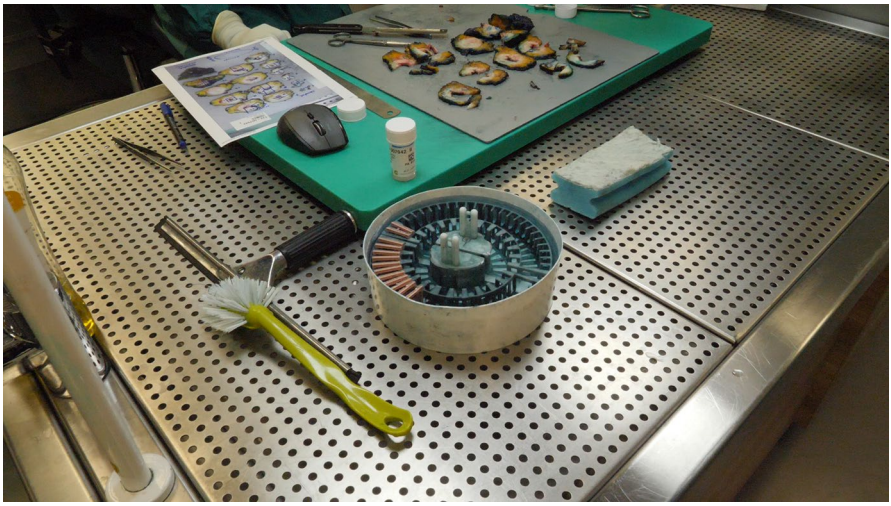

Fig. 1 A lab technician surrounded by both precise tools and familiar objects like a dishwashing brush and sponge

film we created will also help us engage with and influence the broader societal debate about possibilities and limitations of AI during a series of screenings we will organize (Kusters et al., 2016; Rutten & Verstappen, 2015). We expect this research methodology, participatory learning and action (PLA), will help us gather additional data about the topic beyond the boundaries of the pathology department by encouraging a meaningful dialogue with a variety of audiences about possibilities and limitations of AI (Wheeler, 2012).

3 Ethical and Epistemological Insights Gained by 'Slow Science'[4]

We believe it is impossible to say anything meaningful about the ways AI should impact pathologists' and lab technicians' roles and responsibilities without first arriving at a deep understanding of the 'status quo' in this field. Approaching AI in pathology with the aforementioned methodological frames provided the necessary knowledge for us to carry out our grounded ethical reflection and guidance (Drogt et al., 2022). Below, we will describe three ethical and epistemological insights we gained as a result of our multifaceted qualitative research.

[4] We call our approach 'slow science' in response to the pressure put on empirical studies and ethical guidance to produce results 'fast,' with the consequence that such pressure may limit knowledge and insights needed to support innovation.

Fig. 2 One afternoon's worth of tissue samples mounted, colored, and awaiting digitalization

3.1 Pathology Departments Are Artisanal Sites

On our first visit to the pathology department—two floors of pathologists' offices plus a floor of interconnected labs devoted to the selection, preservation, mounting, coloring, scanning, and storing of tissue samples—we were struck by the sheer quantity of materials. Figure 2 provides an example of the volume of tissue processed per day in the lab. Each of the processing stations in the lab had its own array of machines, screens, cutting tools, and tissue sample awaiting processing. Similarly, each section of the floor exuded its unique cacophony of sounds: beeps, whirring machines, squelchy sounds of tissue being sliced, or colorants being poured and mixed. And always the low intonation of lab technicians dictating their work into the electronic record files via headsets and foot pedals.

Lab technicians working in the pathology lab process human tissue (biopsies, bone fragments, and even complete organs), essentially transforming bodily materials into paraffin-mounted, colored samples, which are thinly sliced, mounted on slides, scanned, and later examined by pathologists. Each step in this process involves improvisation, technical mastery, and critical thinking skills; protocols guide each procedure, but technicians must determine how to apply the protocols depending on the tissue sample before them (for instance how thick or large it is). Those choices are influenced by the machines and tools they have at their disposal, as well as their personal preferences. Furthermore, every lab has its own 'book of protocols' and 'recipe book' for coloring procedures, depending on the brand of tools and chemicals used within a lab. During one of our visits, a technician pointed out the window to another lab on the hospital campus and explained "even there they use different liquids and coloring methods."

We observed that lab technicians' and pathologists' tasks are not completely standardized; they are also dependent upon an individual's choices, knowledge, and

previous experience. AI is sometimes seen as a gamechanger because it might redefine the diagnostic process and lead to the diffusion of medical professionals' expertise (Rządeczka, 2020). Yet the insights gained by our empirical work indicate that AI-supported diagnoses will still rely on the artisanal expertise of the pathology professionals who process, digitalize, and analyze tissue samples. This aligns with the positions of other scholars who view AI's involvement in the diagnostic process as a collaborative process (Cai et al., 2019; Tschandl et al., 2020) where AI could take on different roles (Kempt & Nagel, 2022). Our observations also highlight the importance of deliberating how human expertise should be valued in such collaborations in pathology and under which circumstances it should be given precedence.

3.2 Pathologists' Knowledge and Skill Are Gained by Practice and Apprenticeship

Even after many hours of observation, the digitalized tissue samples we observed remained merely intricate—and mysterious—patterns of colored splotches. Pathologists need to develop a 'trained' or 'expert eye' to make sense of what is visible on a slide (Drogt & Milota, 2021). As Slatman (2016) states: "It may seem that all details of a body can now be mapped neatly, but its visualization has become so technical that most people will hardly see any meaning in the images. Without explanation by an expert, mostly we cannot see what the images depict." (p. 139). For example, in the pathology slides, we could recognize digitalized human tissue samples but would be hard pressed to say whether they originated from a liver, lung, breast, or kidney.

To develop a trained eye, pathologists must first successfully finish apprenticeships under the close supervision of experienced pathologists. Several pathologists in training pointed out that while there are some standardized or protocolized guidelines, expert pathologists have their own 'modus operandi' in the sense that they have individual preferences for how to perform their work. Pathologists in training must adapt to each supervisor's unique working style while simultaneously developing their own preferred habits, preferences, and techniques for analyzing the images produced in the lab.

Although pathologists are trained to evaluate all kinds of tissue samples, they usually choose to specialize in one or two areas, such as dermatopathology (focusing on skin) or nephropathology (focusing on the kidney). After completing their apprenticeship, pathologists primarily assess images in their field of expertise but are still expected to do 'general pathology' shifts as well. A pathologist's daily workload typically consists of a number of 'simple' cases that can be quickly diagnosed and a number of 'difficult'—rare or complex—cases where the diagnosis is neither obvious nor evident. We observed various pathologists, both those at the beginning of their careers and those with many years of experience, sift through piles of specialized books, puzzle over the tissue samples, and deliberate various differential diagnoses. This could take up to an hour per case (see Fig. 3 for a pathologist working through a series of tissue samples).

The time necessary to assess a case also depends on the subspecialty. Some subspecialties require longer traineeships and continued guidance by an expert in the field even *after* becoming a 'fully-trained' pathologist due to the rare or extremely

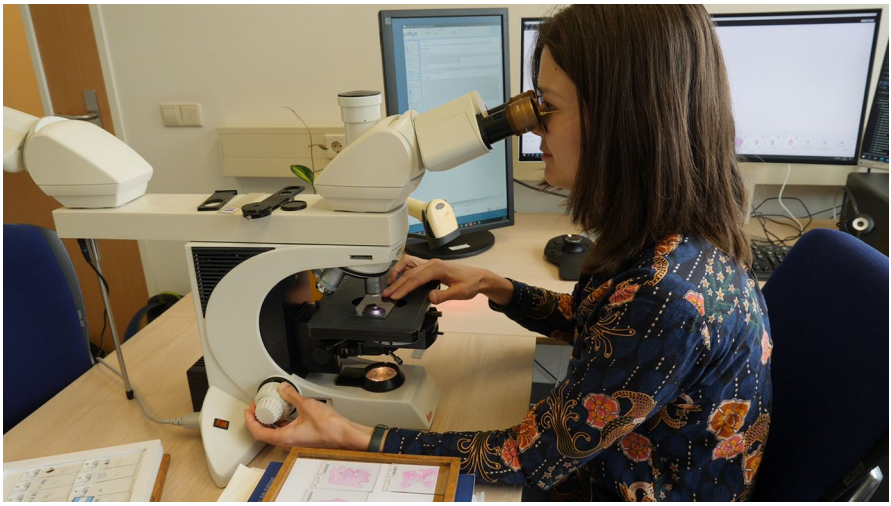

Fig. 3 A pathologist closely examining a tissue sample with a microscope

complex nature of certain diagnostic procedures. In the Netherlands, there is no set time period or standardized requirements for completing sub-specialization training; as one pathologist told us, "it's a matter of trusting yourself enough [to diagnose rare or complex cases], and sometimes still getting it wrong."

If AI will eventually play a more prominent role in the diagnostic process, this could have implications for the current apprenticeship practices for pathologists in training. Tasks that are now considered 'simple'—such as the diagnosis of basal cell carcinomas—may be the first candidates for AI automation. It is therefore essential to think about the consequences for the education of new pathologists: should they still be able to carry out tasks that can be performed by AI systems? How should experts use AI in the training of new pathologists? Would an additional apprenticeship with a computer scientist make sense to better deal with the new responsibilities? These questions have a clear ethical dimension, since it is not evident what would be the most desirable way to deal with AI involvement in these educational processes. Ethical reflection can also help keep the overarching goal of these changes in mind, namely, that AI should support pathologists in carrying out their roles and responsibilities without undermining their ability to interpret medical images. A commonly cited fear is that AI will precipitate the "deskilling" of healthcare professionals, resulting in compromised decision making and potentially undermining patient safety (Aquino et al., 2023; Becker, 2019; Macrae, 2019). Respondents in our interviews and observations were reasonably appreciative of AI, but many emphasized the importance of retaining clinical skills like using the microscope.

3.3 Human–Technology Interactions Are Everywhere

A final, and fundamental, insight from our empirical research is that human–technology interactions are ubiquitous in this field. Similar to other image-based specialties,

Fig. 4 A pathologist scrolling through a digital tissue sample while dictating into an AI-supported headset

pathology has a rich history of technological innovation. When looking at pathology professionals at work, it becomes obvious that its history is reflected in the current ways in which the work is carried out. We were amazed by the number of technological devices and tools in the pathology lab and the pathologists' offices and their seamless integration in the artisanal activities of the pathology professionals. For example, almost every pathology professional used an AI-supported headset to dictate their findings to the computer (as seen in in Fig. 4), while simultaneously manipulating, examining, and analyzing either physical tissue samples or slides under a microscope or a digital image. In addition to the headsets, lab technicians also used their feet to operate a dictation toggle strip on the ground. These intricate, embodied interactions highlight the fact that these technologies are not just disembodied functionalities independent of human involvement.

In our interviews and observations, we talked to many pathology professionals about the possibility that some parts of their work would be made redundant by automation or the introduction of AI programs. Certain aspects of the laboratory work have already been automated, as can be seen in Fig. 5.

One of the lab supervisors told us about plans to buy new kinds of machines that could select, cut, and embed tissue samples without any human intervention. The hope is that these machines will diminish technicians' workload and make the work less repetitive, while also resulting in more reliable samples and digital images. The introduction of such machines would also necessitate significant changes in types of lab technicians that would need to be trained or hired; as the supervisor told us, it would require "another kind of lab technician, a sort of engineer lab technician." Furthermore, work tasks would likely need to be further differentiated and new roles and responsibilities delineated. A likely scenario could be stratified job training and tasks for expert lab technicians, who would deal with complex issues, routine lab technicians who would complete basic tasks, and supportive lab technicians. This

Fig. 5 A lab technician checking on an automated tissue coloring machine

example illustrates how the integration of innovative new machines or technologies can have far-reaching consequences for how professionals perform their work. It also indicates that new technologies will not merely replace professionals. New, and hopefully *better*, workflows and responsibilities will likely result from the introduction of new technologies.

Scholars have indicated that AI will lead to significant changes in professional roles like the ones described above (Jha & Topol, 2016; Cui & Zhang, 2021). Pathology is currently in an early stage of AI implementation, meaning that AI applications could still be developed in a variety of different directions. The field of pathology is highly adaptive and is responding positively to AI applications. The pace in which pathology innovates may also make it more vulnerable to unwanted consequences due to hasty implementation. The will to innovate is often fueled by reports about the promises of AI, yet many of these studies have yet to be substantiated outside of testing environments (van der Laak et al., 2021; Wagner et al., 2022). Slowing down to include ethical reflection in the development and implementation process can lead to more conscientious innovation processes, and more meaningful integration of ethical frameworks.

4 Can Our Ethnographic Methods to Explore Ethical AI Be Helpful for Others?

Medical AI is currently one of the most quickly evolving scholarly fields, and AI systems have proven to be particularly useful for image processing. This may explain why most current and proposed AI applications in medicine are used to aid image-based diagnostics in fields like radiology and pathology (Hosny et al., 2018; Jiang

et al., 2017; Pesapane et al., 2018). In scholarly debate, many ethical concerns about medical AI have been raised, including implications for responsibility, trust, and expertise. The extent to which these rather theoretical concerns become reality also depends on the purposes for which these technologies are used, how skilled their users are, and the ways in which these technologies are adopted (Sand et al., 2021), in other words: how these technologies are being used and employed. Scrutiny of the realities in which these technologies are employed is necessary for identifying potential effects and implications of the implementation of the new technology. It can also help indicate how the technology can best be aligned with user's needs, such as the workflow of a clinician or the preferences of a patient. These insights are vital inputs for providing meaningful ethical guidance to steer the use of these technologies in practice.

The complex ethical issues raised by the integration of AI in pathology demand careful reflection on both theoretical and practical aspects of the developments taking place. Ethnography has historically been described as a method for making detailed descriptions about contextually and culturally specific forms of human behavior based on a long-term study on one spot (Heider, 2006, p. 5). We have been actively working with members of the pathology department at the Radboud University Medical Center for over two years. Through the process of interviewing, ethnographic observation, and filming, we have become visible figures in the department. Gradually, we have become accepted outsiders whose interest in daily work practices is tolerated and sometimes even admired. Our continued presence and the slow pace of our work has allowed us to gradually build trust with our respondents and even led to a sense of common purpose and investment in our film. It also helped us gain deep insights into the daily choices these professionals make. These insights have enriched our scientific publications related to pathology and professional expertise. This method of data collection is, however, time-consuming. We made the methodological choice to focus on in-depth knowledge rather than broad knowledge on the topic; this yielded rich and highly context-specific data. Due to our focus on depth, we acknowledge that we may have sacrificed opportunities to compare our findings across a variety of sites. Yet taking the time to become embedded in one department opened the door to rich and informal conversations and gave us access to interactions and daily behaviors that we would have otherwise never been privy to. This, in turn, helped us gain valuable insights related to the ethical implications of this transition including expertise, deskilling, and efficiency.

The process of filming made especially clear to us the collaborative nature of any ethnographic engagement. Like all social research, our presence was the result of various formal and informal negotiations (Banks, 2001, p. 119). These negotiations had to be revisited when we arrived with a camera, microphones, and lighting equipment. Some of the department members who let us observe their work and willingly answered our questions were reluctant to continue these interactions while being filmed. We repeated our informed consent procedure before filming, and multiple people who had participated in the interview study and participant observations declined to be followed around by a camera. A lot can be said about the potential causes of the discomfort or aversion to filming. The most

obvious reason is that film has a perceived higher degree of permanence; what a person says or does on film can be reproduced verbatim. From a methodological perspective, filmmaking also constitutes an entirely different mode of communication. One could even make the argument that "filmmaking is not just a way of communicating the same kinds of knowledge that can be conveyed by an anthropological text. It is a way of creating different knowledge" (MacDougall, 2011).

Indeed, while a film may at first glance look like a medium that can objectively present aspects that otherwise would remain opaque or invisible, many choices are made during the process of filming that inevitably shape the way reality is presented. This includes decisions about where, what, and whom to film. Our aim of encouraging debate about medical AI by focusing on digital pathology in a film might be at tension with being inclusive of all specialists' voices. We are therefore aware of the risk that Johnson and Saxena (2022) describe, namely, that "ethnographic approaches can also highlight the power relationships involved in digital technologies and digital spaces, including the ways in which they reinforce preexisting hierarchies or, sometimes, contest and upend them." (p. 753) While some of the choices we made when creating an ethnographic film intended for a broad audience may prove to be sub-optimal, we nevertheless consider film the most suitable medium for making AI applications for pathology practices visible. Our hope, with our 'slow' empirical approach, is to provide practitioners, patients, and members of the general public with a better picture of the skill and knowledge necessary to perform pathology work and include them in conversations on medical AI in pathology.

The novelty of digital transitions challenged us to 'think outside the box' when considering the most appropriate methodology for approaching our research subject. As Johnson and Keleman Saxena (2022) also argue: "this historically emergent period of digital sociality begs more careful consideration of method (e.g. how/what ethnographers do and observe), interpretation (how/what we analyze), and audience (who we speak to about it all)" (p. 754). By describing the benefits and downsides of our own 'slow approach' to data collection, we hope to inspire those working on similar topics involving the complex dynamics of digital transitions to reflect on whether such methods might also benefit their research.

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Author Contribution M.M. and J.D. contributed equally to the drafting and revision of this article, and conducted the ethnographic research described in the article. K.J. provided critical intellectual input and revisions. All authors approved the manuscript.

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Data Availability The datasets used and analyzed used for this study are not available and are protected under the General Data Protection Regulation (GDPR: article 9).

Declarations

Conflict of Interest The authors declare no competing interests.

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