Artificial intelligence: My thoughts, perceived positives and negatives and should we, can we and must we use it ?

Neil Piller

Our lymphatics are slow flow and small volume, but artificial intelligence (AI) is moving fast and in massive volumes across our knowledge areas.

I am always looking to check each time some bit of information or idea comes up on my screen. Where it was sourced from, is it current or old knowledge, was there a reference to it, was it from a credible website (like the Australasian Lymphology Association in Australia, the British Lymphology Society in the UK or the National Lymphedema Network in the USA – and how was that information sourced), did it just appear associated with my keyword search, was it from a reputable publication like *Lymphatic Research and Biology, Lymphology* or our *Journal of Lymphoedema* and how was the information in that article sourced and acknowledged?

Basically, it is hard to know and sometimes even harder to find out unless clear disclosures are made. But it is clear that we are going to have to live with AI, use it, benefit from its use and to show our patients how to safely and appropriately use it to their benefit, in a partnership that is going to be increasingly difficult to maintain and even establish, given our tendency to all use the net, its information and its influencers!

I have read and been involved in a number of articles with some of those who have undertaken their PhDs with me, like Dr Andrea Mangion, who based much of their work on the areas of AI and e-learning.

Do we need AI? Can we trust it? How can it help? How can we use it to establish stronger trust and partnerships with our patients, our colleagues and community? To be honest I am not 100% sure still, but in an open discourse with Microsoft 365 Copilot, I was provided with its answers to a range of questions about the pros and cons of AI in our area of lymphatics and lymphodema in the broader context.

After this editorial, an article of mine presents some of the answers and information I was presented with by Copilot. So, it is co-written by me and AI and the often-unacknowledged sources of its information!

Did it help improve my knowledge in some areas? Yes! Did it show me or tell me who was behind the knowledge training that trained this model? Not always – in fact, I'd say rarely! Could I find this information? No, not always! Was A1 good at providing balance in what was well known, what was not so well known and what was just a "bundle of fluff"? Could what I was given help me benefit my patients? If they were reading it after they had asked similar questions at their level of knowledge, would it be of benefit to them? Well yes – generally! But the major caveat here is that you have to ask the right questions to get the right answers and you have to be sure they are selected from reliable sources! This can be a great weakness of any information provider and we must remain alert to this.

What's your experience like? Let us know. How do we protect what we personally know through our learning, how can we give confidence to our colleagues and patients, both current and future and how can we live well with AI surrounding us and how do we benefit from it rather than fight it?

Neil B Piller is Director Lymphoedema Clinical Research Unit, Flinders Centre for Innovation in Cancer, Flinders University and Medical Centre, Adelaide, South Australia. He is also the Clinical Editor of the Journal of Lymphoedema.

What artificial intelligence told me about the lymphatic system and lymphoedema, and its areas of strengths and weaknesses

Neil Piller , with assistance from Microsoft Copilot

Every person and every health professional has a different knowledge base, with unique strengths and weaknesses relating to that knowledge and how to use it. As health professionals, we have that knowledge critiqued at our national and international meetings and when we publish that knowledge in reputable journals. "Influencers" can have some knowledge, but promote it as if it is leading edge, well known and evidenced, and going to make a huge difference to our health and lives, using fancy media presentations to promote their ideas and wares. Nothing wrong with that, but we must be aware of the issues and limitations and sometimes the unsupported information that we and our patients read. Nowadays many of us are increasingly using artificial intelligence (AI) to help us make decisions or to make decisions on our behalf. There are certainly positives to this, but there are some inherent dangers as well, which we all need to be cognisant of.

This article provides some answers to my questions to AI and its own questions to itself about what it perceives it can offer us and about its acknowledgment of its strengths and weaknesses.

AI indicated that the most balanced use is to regard it as a clinical support tool, not a replacement for lymphoedema therapists, physicians, researchers or patients and that the greatest benefits are when it is used to augment human expertise, while preserving patient-centred care, critical thinking and evidence-based practice.

Do I feel comfortable using it? Yes. Did it make reasonable decisions and was it open and relatively well informed? Yes. Did it acknowledge its weaknesses? Yes. But while using it, I will always cross check with our own knowledge as it appears in our learned journals, books and meetings to ensure a balance and to be comfortable knowing that we all need to work together to get the best outcomes possible.

Neil B Piller is Director Lymphoedema Clinical Research Unit, Flinders Centre for Innovation in Cancer, Flinders University and Medical Centre, Adelaide, South Australia. He is also the Clinical Editor of the Journal of Lymphoedema

What AI said about the lymphatic system generally

AI's advantages

AI indicated it offers several important advantages for students, clinicians, researchers and patients. Because the lymphatic system is complex, 3D and closely integrated with the immune, cardiovascular and nervous systems, AI can help make its structure and function easier to visualise and comprehend. It indicated it can improve the visualisation of the complex anatomy of the lymphatic system by creating interactive 3D models of lymphatic pathways, generating detailed anatomical visualisations from imaging data, helping users explore lymphatic structures from different perspectives and by illustrating relationships between the lymphatic and venous systems. AI claimed this makes it easier to understand structures that are often difficult to see in traditional diagrams.

Enhancing learning and education

It indicated AI-powered learning tools can tailor explanations to different levels of knowledge, provide instant answers to questions, generate quizzes and case studies and explain difficult concepts using analogies and animations.

As an example, it indicated it can explain how lymphatic vessels function like a drainage and transport network, making physiological concepts more accessible.

Gaining a better understanding of lymphatic function

It indicated it can help explain dynamic processes such as the formation and movement of lymph, fluid balance regulation, immune surveillance, transport of fats from the intestine and the removal of cellular waste products. It claimed these processes are often easier to understand through AI-generated simulations than through static textbook images.

Improving interpretation of medical imaging

It indicated it can assist in analysing lymphoscintigraphy, CT scans, MRI lymphangiography, ultrasound imaging and near-infrared fluorescence imaging. It claimed AI can highlight lymphatic vessels, identify abnormalities and improve visualisation of structures that may otherwise be difficult to detect. But to do this, it needed to be appropriately trained.

The potential to accelerate research discoveries

It indicated that the lymphatic system has been historically understudied compared with the cardiovascular system and that AI can analyse large research datasets, identify patterns that humans may overlook, discover new relationships between lymphatic function and disease and generate hypotheses for future studies. It claimed these may lead to new insights into lymphoedema, cancer metastasis, inflammatory diseases, obesity and neurodegenerative disorders.

Gaining a better understanding of disease mechanisms

It indicated it can help researchers and clinicians understand how lymphatic dysfunction contributes to lymphoedema,

cancer spread through lymphatics, chronic inflammation, autoimmune diseases, cardiovascular disease and brain waste clearance disorders. It claimed by integrating information from multiple studies, AI can reveal connections that might otherwise remain hidden.

Personalised clinical education

It indicated it can explain lymphatic findings using an individual's own imaging and clinical information and that this can help patients, Understand their diagnosis, learn why swelling occurs, appreciate treatment goals and improve adherence to management plans. It claimed that for conditions such as lymphoedema, patient understanding is often critical to long-term outcomes.

Integration of multidisciplinary knowledge

It showed it was aware that the lymphatic system knowledge intersects with immunology, oncology, vascular medicine, surgery, rehabilitation and neuroscience. AI claimed it can integrate information across these disciplines, providing a more complete picture of how the lymphatic system contributes to health and disease.

Simulation and prediction

It indicated that AI models can simulate: Lymph flow patterns, fluid accumulation, responses to therapy, surgical outcomes and disease progression. It said that this allows students and clinicians to explore "what-if" scenarios that would be difficult or impossible to study directly.

The democratisation of knowledge

It indicated that AI can make expert-level information more accessible by: Translating complex research into plain language, summarising large volumes of scientific literature, providing educational content on demand and supporting learners regardless of geographic location. It claimed that this is particularly valuable in lymphology, where specialist expertise may not be readily available everywhere.

Its summary statement about itself and its strengths and advantages with respect to the lymphatic system

The greatest strengths of AI in understanding the lymphatic system are its ability to visualise complex anatomy, explain dynamic physiological processes, analyse imaging data, integrate large volumes of research, and personalise learning. Collectively these capabilities can accelerate education, improve clinical practice, enhance patient understanding, and support new discoveries in lymphatic science.

What AI said about its limitations

While AI has enormous potential to improve our understanding of the lymphatic system, it also has important limitations and risks. These should be recognised, so that AI supports – rather than replaces – scientific observation, clinical expertise and critical thinking.

Only as good as the data

It indicated that the lymphatic system is one of the least well-mapped systems in the body compared with the cardiovascular or nervous systems and that Potential problems include: Incomplete anatomical datasets, limited imaging data for lymphatic structures, underrepresentation of diverse populations and historical gaps in lymphatic research. It clearly indicated that if the underlying data are incomplete or biased, AI models may produce misleading conclusions.

The risk of incorrect information

It indicated that AI systems can sometimes generate plausible sounding but incorrect explanations. As an example, it indicated AI may: Invent anatomical pathways, misinterpret lymphatic physiology, overstate scientific certainty, combine findings from unrelated studies and that without expert review, users may have difficulty distinguishing established knowledge from AI-generated speculation.

The potential oversimplification of complex biology

AI indicated that the lymphatic system interacts with immunology, tissue mechanics, vascular physiology, neurology and oncology. It mentioned that the explanations often simplify these interactions to make them understandable and that while useful educationally, oversimplification may hide important nuances and lead to misconceptions.

Our limited understanding of emerging science

AI said many aspects of lymphatic biology remain poorly understood, including organ-specific lymphatic functions, the brain and meningeal lymphatics, mechanisms of lymphatic regeneration and individual variations in lymphatic anatomy. It indicated AI cannot truly "know" what scientists have not yet discovered. It may present current theories as established facts or fail to identify important unanswered questions.

Dangers of the potential reinforcement of existing errors

It noted that if incorrect theories or outdated information exist within training data, AI may reinforce them and this can slow scientific progress, increase confidence in inaccurate concepts and make novel discoveries seem less plausible. AI then warned that researchers must remain prepared to challenge accepted assumptions, rather than relying solely on AI-generated summaries.

Impact on critical thinking

It indicated that students and clinicians who rely heavily on AI may become less likely to: read primary research papers, analyse evidence independently, question conclusions and develop anatomical reasoning skills. AI warned that the understanding the lymphatic system often requires deep engagement with anatomy, physiology, and pathology that cannot be fully replaced by automated explanations.

Difficulty interpreting individual variation

It indicated that the lymphatic system varies considerably between individuals, and that AI models may struggle to account for anatomical variations, congenital abnormalities, surgical changes, effects of ageing and disease-related remodelling. For this reason, an AI model trained on average anatomy may not accurately represent a specific patient.

Awareness of privacy and ethical concerns

It acknowledged that many AI systems require large datasets containing: medical images, clinical records, genetic information and treatment outcomes and that this raises concerns regarding: patient privacy, data security, consent and data ownership and that these issues become increasingly important as AI-driven lymphatic research expands.

AI cannot deal with the human experience of disease

It acknowledged it can analyse anatomy and physiology but may not fully capture the lived experience of patients with conditions such as lymphoedema, lipoedema, cancer-related swelling and chronic lymphatic disorders. It indicated clearly that factors such as discomfort, emotional distress, body image concerns, and quality of life are difficult to reduce to data alone.

In terms of its weaknesses regarding the lymphatic system AI Summarised them as

That it is not unintelligent, but that it depends on existing data and patterns. AI can accelerate learning, research, and analysis, but it cannot replace scientific curiosity, clinical expertise, patient experience, or the discovery process itself. The most effective approach is likely to be a partnership in which AI assists researchers and clinicians while human experts provide critical judgment, biological insight, and real-world context.

AI's responses about lymphoedema

AI indicated it has the potential to significantly improve how we identify, understand, treat and manage lymphoedema, particularly when combined with clinical expertise and patient-centred care.

Earlier identification and diagnosis

It indicated that one of the greatest opportunities for AI is the early detection of lymphoedema, before visible swelling becomes severe. It said AI can analyse limb volume and circumference data over time, detect subtle changes in tissue composition from imaging, identify patterns suggesting subclinical lymphoedema and flag patients at increased risk following cancer treatment. It indicated that earlier identification can lead to earlier intervention, which is associated with better long-term outcomes and reduced progression.

Improved risk prediction

It rightly indicated that not every person exposed to a lymphatic insult develops lymphoedema and indicated that AI can help identify risk factors by integrating cancer treatment history, surgical procedures, radiation exposure, body mass index, comorbidities and genetic and biological markers. AI indicated that this could enable more personalised surveillance programs and preventive strategies.

Lymphatic imaging

AI indicated that modern imaging techniques, such as indocyanine green lymphography, lymphoscintigraphy, MR lymphangiography and ultrasound generate large amounts of information and that it could assist clinicians by highlighting abnormal lymphatic pathways, classifying disease severity, identifying dermal backflow patterns, monitoring progression over time and improving consistency between observers.

Accurate staging and classification

AI was aware that Lymphoedema presents differently across patients and that it can help classify disease stage, distribution patterns, tissue changes, severity levels and response categories. It said that this may support more standardised assessment and treatment planning.

Personalised treatment planning

AI acknowledged that lymphoedema management often requires individualised approaches and that it could assist in determining compression garment selection, compression pressures, exercise recommendations, surveillance frequency and self-management priorities. It indicated that rather than applying a one-size-fits-all model, treatment could become more tailored to each patient's presentation and needs.

Monitoring treatment outcomes

AI claimed it can analyse trends from limb measurements, bioimpedance data, patient-reported outcomes, imaging studies and wearable devices. It claimed that this would allow clinicians to identify whether a treatment is working effectively, requiring modification, associated with deterioration or producing long-term improvements.

Enhanced patient self-management

AI was clear that successful lymphoedema management depends heavily on day-to-day self-care and that AI-powered tools can support patients through symptom tracking, reminders for compression use, exercise guidance, skin care monitoring, education programmes and early warning/red flag alerts. It stated that this may improve adherence and patient confidence.

Providing a better understanding of disease mechanisms

AI stated that lymphoedema is not simply swelling, but it also involves lymphatic dysfunction, inflammation, fat deposition, fibrosis and immune changes. It indicted that it can analyse large biological datasets to uncover relationships among these processes, potentially leading to improved understanding of disease development and progression.

The possibility of accelerating research

It stated that researchers studying lymphoedema often deal with complex and diverse datasets and that AI can assist by reviewing the scientific literature, identifying patterns across studies, generating hypotheses, analysing imaging and clinical data and supporting multicentre collaborations. This may accelerate discovery of new treatments and management approaches.

Support for surgical decision-making

For a range of procedures, such as lymphovenous anastomosis, vascularised lymph node transfer and liposuction for advanced lymphoedema, it could help identify suitable candidates, expected outcomes, optimal timing of intervention and factors associated with surgical success.

Possible improved access to expertise

It stated that many patients have limited access to specialist lymphoedema services and suggested that AI-based systems may help: to provide educational resources, support rural and remote clinicians, assist non-specialist healthcare providers and increase consistency of care. This could help reduce disparities in access to lymphoedema knowledge and services.

Improved patient education

AI indicated that patients often struggle to understand why lymphoedema develops, how the lymphatic system works, why compression is important and how self-management affects outcomes. It suggested AI can provide personalised explanations at appropriate levels of complexity, helping patients become active participants in their care.

Summary

AI gave a summary of the major ways in which it believed it can help us in

lymphoedema care. These were:

- Earlier identification of lymphoedema.
- Improved risk prediction.
- Enhanced imaging interpretation.
- More accurate staging and classification.
- Personalised treatment planning.
- Better monitoring of outcomes.
- Stronger support for self-management.
- Improved understanding of disease mechanisms.
- Accelerated research and innovation.
- Better access to specialist knowledge.
- Enhanced patient education.

Importantly, perhaps the greatest opportunity is that AI can help transform lymphoedema care from a predominantly reactive model – treating swelling after it becomes established – to a more predictive, personalised, preventive, and participatory approach, supporting both clinicians and patients in achieving better long-term outcomes. This is what many of us are wanting to achieve!

What AI said about its negatives

We have to be aware that there are negatives of AI use and we must look at both sides of the coin.

While AI can be a powerful tool for advancing lymphoedema care, there are also significant drawbacks and risks. Understanding these limitations is important to ensure that AI complements, rather than replaces, our clinical expertise, patient experience, and scientific rigor.

In response to my questions about the negatives of using AI it responded with the following points.

Poor data quality leads to poor AI performance

It indicated that AI systems depend on high-quality data, but lymphoedema data can be: Inconsistent across clinics, collected using different measurement methods, Limited in size compared with other medical conditions and missing important demographic groups. It warned that if the data are incomplete or biased, AI may produce inaccurate predictions, classifications, or treatment recommendations.

There can be a difficulty diagnosing a complex condition

It indicated that lymphoedema is often influenced by multiple underlying factors, including lymphatic dysfunction, obesity, venous disease, immobility, inflammation and comorbid health conditions. But it did miss some, including diabetes and the various forms of arthritis. It acknowledged that it may struggle to distinguish between these overlapping causes of swelling and could misclassify patients if the clinical context is not adequately included.

The need to get the balance right to avoid the risk of over- or underdiagnosis

It stated that AI systems designed to detect early lymphoedema may: Flag normal variations as disease, miss subtle cases that do not fit typical patterns and may create false positives or negatives. AI indicated that this can lead to unnecessary anxiety, inappropriate treatment, delayed intervention, or missed opportunities for prevention.

Potential oversimplification of individual patient needs

It also recognised that lymphoedema management is highly individualised. It indicated that two patients with similar limb volumes may differ greatly in fibrosis, mobility, symptoms, psychosocial impact, treatment preferences and the ability to self-manage. It indicated clearly that AI recommendations may fail to capture these nuances, leading to generic rather than truly personalised care.

The potential/real loss of clinical judgment

It recognised this and indicated that there is a risk that clinicians become overly reliant on AI-generated assessments and that this can result in reduced critical thinking, less emphasis on physical examination, overconfidence in automated recommendations and a failure to recognise unusual presentations. It acknowledged that experienced lymphoedema clinicians often identify important issues through observation, palpation, patient history, and clinical reasoning – skills that AI cannot replicate.

Cannot understand the patient experience

AI also recognised that it cannot fully understand the patient experience and that living with lymphoedema involves much more than measurable swelling. It indicated that patients may experience pain or discomfort, emotional distress, fear of progression, social isolation, body image concerns and the burden of treatment. It was clear that it "was aware" that these aspects are difficult to quantify and may be overlooked by data-driven systems like itself focused on measurements and clinical outcomes.

Limited evidence for some AI applications

AI recognised that there is still limited evidence for some AI applications and that many proposed AI applications in lymphoedema remain in early stages of development. This is a point that we must all be strongly aware of!

It indicated that many questions remain about clinical effectiveness, long-term reliability, generalisability across populations, cost-effectiveness and the impact on patient outcomes. AI was aware that an AI model that performs well in a research study may not perform equally well in real-world clinical settings.

Black-box decision maker

AI recognised itself as a black-box decision maker and indicated that many AI models provide recommendations without clearly explaining how they reached their conclusions. It gave examples such as: Why was a patient classified as high risk? Why was one treatment favoured over another? What factors influenced the prediction?

This lack of transparency can reduce trust and make clinical decision-making more difficult.

Reinforcing existing biases

AI was aware that there is a risk of reinforcing existing biases. This is because certain groups are underrepresented in the historical datasets on which it is trained. So AI may perform less accurately for: different ethnic populations, rural and remote patients, men with lymphoedema, those with primary lymphoedema and individuals with uncommon presentations. AI indicated that this can potentially widen existing healthcare inequalities.

Privacy and data security concerns

AI indicated that its use may raise privacy and data security concerns. This is because AI systems often require large amounts of health information, including clinical records, imaging data, photographs, wearable device data and patient-reported

outcomes. The significant potential risks include data breaches, unauthorised access, re-identification of patients and a possible unclear ownership of health data. It acknowledged that protecting patient confidentiality remains essential, but that was our business as therapists and clinicians.

Cost and resource requirements

AI acknowledged that developing and maintaining effective AI systems can be expensive. For this reason it indicated that organisations may require specialised software, data infrastructure, technical expertise, ongoing model validation and, importantly, staff training. It was aware that resources invested in AI could potentially divert funds from direct clinical services if not implemented carefully.

Cannot generate new biological understanding

At the moment, AI indicated it cannot generate new biological understanding on its own and indicated that while AI excels at finding patterns in existing information, it cannot independently conduct experiments, observe patients (yet!), develop clinical insight or challenge assumptions in the way human researchers can. It emphasised that major advances in lymphology have historically resulted from scientific observation, curiosity and experimentation, rather than data analysis alone.

Unrealistic expectations

Lastly, it indicated that its use could have the potential for unrealistic expectations and that there is sometimes a belief that AI will "solve" complex conditions, such as lymphoedema. It emphasised that in reality, lymphoedema remains influenced by biological variability, treatment adherence, access to care, lifestyle factors and a range of psychological and social factors. It indicated that while AI can assist decision-making, it is unlikely to provide simple answers to a complex chronic condition.

In its summary, it indicated that the main disadvantages of using AI in lymphoedema identification, treatment, and management include:

- Dependence on data quality.
- Risk of misdiagnosis and misclassification.
- Oversimplification of complex patient needs.
- Reduced reliance on clinical judgment.
- Inability to fully capture patient experiences.
- Limited evidence for some applications.
- Lack of transparency in decision-making.
- Potential bias and inequality.
- Privacy and security concerns.
- High implementation costs.
- Inability to replace scientific discovery and clinical expertise.

Conclusion

So what did you think of all of that? It was all basically written by AI in response to my questions. Yes, I spent a lot of time thinking about them, but in my view it did a pretty good job and provided information about other points relating to questions I did not ask!

In terms of a statement about itself, it indicated that the most balanced view is that AI should be regarded as a clinical support tool, not a replacement for lymphoedema therapists, physicians, researchers or patients themselves, and that the greatest benefits are likely to occur when AI is used to augment human expertise, while preserving patient-centred care, critical thinking and evidence-based practice.

Where to from here? We all must learn about the various models, find the best (I was happy with Copilot), test the information they provide. Try it with some of your patients, and their and your questions and issues and see how it responds. Work out what your responses would be based on your knowledge and clinical experience, then line up its responses with yours and look for matches and differences. Consider the differences and see if they may lead to better outcomes (or not!), but whatever happens present it and publish it, so humans and AI can learn from all of us! It still needs us !

Will our positions be redundant in the near or distant future? Not that I can see no matter what the large language model is and what AI can tell us, we need communication and cohesiveness and collaboration with our members and with the patients we aim to help.