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ReachMD
www.reachmd.com
info@reachmd.com
(866) 423-7849

Progress and Practical Limits with AI in Psoriatic Arthritis

Ryan Quigley:
You're listening to *AudioAbstracts* on ReachMD, and I'm Ryan Quigley.

Artificial intelligence, or more commonly referred to as AI, is no longer a future concept in rheumatology. It's already shaping how we think about diagnosis, risk stratification, and treatment planning in arthritis care. And while much of the early momentum has been centered on rheumatoid arthritis, important developments are now emerging in psoriatic arthritis, based on the narrative review we'll be discussing today.

Now, for some background, psoriatic arthritis remains a diagnostic challenge. Recognition is often delayed, which is why improving early identification of high-risk patients has become a major focus of recent AI research.

Several machine learning models now use electronic health records along with natural language processing to detect patterns suggestive of psoriatic arthritis *before* the diagnosis appears. By extracting information from clinical notes, medication history, and laboratory trends, these models have achieved positive predictive values above 90 percent in large health system datasets. And while these findings are largely derived from retrospective analyses, they demonstrate the feasibility of identifying psoriasis patients who may warrant closer monitoring or earlier referral to rheumatology.

Looking beyond clinical text, AI is being applied to biological signals that differentiate psoriatic arthritis from cutaneous psoriasis. In fact, machine learning analyses of serum proteomics and immune cell profiling have been able to identify distinct immunologic patterns associated with psoriatic arthritis.

Genetic data have also been explored, although studies have shown that individual genetic features provide limited discrimination between psoriasis and psoriatic arthritis. This reinforces the need for multimodal approaches that integrate genetic, clinical, and laboratory data.

Now, when it comes to how disease activity and disease impact are assessed in psoriatic arthritis, machine learning models analyzing metabolomic profiles have identified exploratory lipid and bile acid signatures associated with higher disease activity. However, these findings will require further validation.

Other models have examined clinical variables driving patient-reported disease impact and have consistently highlighted pain, inflammatory markers, and comorbid conditions like hypertension as key predictors to severe disease. These findings align with clinical experience while providing a data-driven framework for understanding disease burden.

Treatment response is another area where AI shows promise. Post hoc machine learning analyses of large clinical trial datasets have identified distinct psoriatic arthritis phenotypes with differential responses to biologic therapies.

In particular, cluster-based analyses suggest that patients with axial involvement, higher articular burden, or more extensive skin disease may experience greater clinical improvement with higher-dose IL-17 inhibition. Similar approaches show that responses to IL-23 blockade also vary, and so these findings really show the heterogeneity of psoriatic arthritis and the limitations of a one-size-fits-all treatment strategy.

The final emerging frontier involves remote assessment. Smartphone-based applications using image analysis and motion-based tasks have demonstrated feasibility for detecting nail disease and assessing upper extremity involvement. Although diagnostic accuracy remains moderate and validation in larger cohorts is still required, these tools may eventually support hybrid care models, particularly for screening and longitudinal monitoring.

Now, despite all of these advances, important limitations remain. For instance, many rheumatology AI models rely on retrospective data, lack external validation, and are trained in populations that may not fully reflect real-world diversity. Additionally, imaging-based AI specific to psoriatic arthritis remains preliminary and is often adapted from tools developed for rheumatoid arthritis. And lastly, ethical considerations related to data quality, transparency, and bias are still unresolved.

But even with these limitations in mind, AI in psoriatic arthritis is progressing beyond early proof-of-concept studies. Even though most applications remain investigational, its greatest near-term value may lie in improving early identification of at-risk patients, refining disease stratification, and supporting more personalized treatment approaches. But realizing this potential will depend on prospective validation, standardized data collection, and close collaboration between clinicians, data scientists, and patients.

This has been an *AudioAbstract*, and I'm Ryan Quigley. To access this and other episodes in our series, visit ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening!

Reference:

Bilgin E. Current application, possibilities, and challenges of artificial intelligence in the management of rheumatoid arthritis, axial spondyloarthritis, and psoriatic arthritis. *Ther Adv Musculoskelet Dis*. 2025;17:1759720X251343579. Published 2025 Jun 21. doi:10.1177/1759720X251343579