

ASH Studies Highlight Impacts of Applying New Technologies in Everyday Care

Findings show benefits of AI-driven techniques, chemotherapy-free treatments, and cell therapy.

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Researchers report striking progress in the application of cutting-edge tools and treatments to address longstanding challenges in blood disorders and related health conditions in four studies presented during the [65th American Society of Hematology \(ASH\) Annual Meeting and Exposition](#).

“These studies together illustrate the power new technologies and innovations hold for better meeting medical needs,” said Aaron T. Gerds, MD of Case Western Reserve University and the Cleveland Clinic. “With this work, researchers have identified logical and promising places to use emerging tools and harness technology to benefit patients.”

The first two studies apply artificial intelligence (AI) techniques to aid clinicians in accurately diagnosing blood cancers and understanding the experiences of patients with sickle cell disease (SCD), respectively.

The third study reports excellent outcomes from the use of a fully oral regimen as a frontline therapy for treating acute promyelocytic leukemia, results that Dr. Gerds said are likely to lead to widespread changes in medical practice in the near term, helping many patients minimize or entirely avoid chemotherapy and infusion-based treatments.

The fourth study offers promising findings from a study applying CD19-targeting chimeric antigen receptor (CAR) T-cell therapy to serious autoimmune diseases. Although the study is relatively small and the results are preliminary, the results suggest autoimmune disease could become a new frontier in extending cell therapy beyond hematologic malignancies.

AI shows promise as support tool for identifying rare blood cancers

[Abstract 901](#): Interpretable Artificial Intelligence (AI) Differentiates Prefibrotic Primary Myelofibrosis (prePMF) from Essential Thrombocythemia (ET): A Multi-Center Study of a New Clinical Decision Support Tool

Distinguishing and identifying prefibrotic primary myelofibrosis (prePMF) from essential thrombocythemia (ET) is important to inform treatment approaches and enroll patients in clinical trials, but this is difficult to do with current diagnostic methods. A new study suggests AI algorithms could help.

Myeloproliferative neoplasms (MPNs) are a type of cancer in which the bone marrow overproduces certain types of blood cell. PrePMF is rarer and has a much worse prognosis than ET, with a median survival of 12 years compared with 22 years for ET. As a result, prePMF eventually may require more aggressive treatment; however, getting a definitive diagnosis is difficult and experts do not always agree when interpreting laboratory and biopsy results.

The study, which involved a model previously trained on over 32,000 pan-cancer biopsy images that has learned general pathological features, is the largest test to use AI to differentiate between prePMF and ET. The AI-based system used patient images from the U.S. and Italy and was able to return results in just over six seconds for a new patient, on average, with an overall accuracy of 92.3%.

“With the combined accuracy, sensitivity, and specificity we saw, it would allow the physician to be confident in one diagnosis versus another and help rule in or rule out the rarer prePMF diagnosis, particularly for clinical trials,” said Andrew Srisuwananukorn, MD, assistant professor at The Ohio State University Comprehensive Cancer Center, the study’s lead author, who completed this work during his fellowship at Icahn School of Medicine at Mount Sinai. “My hope is that it would maintain this accuracy when tested in larger cohorts.”

To aid diagnosis, the researchers trained an AI algorithm to distinguish features indicating prePMF versus ET in bone marrow biopsy images from 200 patients in Florence, Italy. They then tested the algorithm’s ability to tell the two types of MPNs apart in biopsies from 26 patients in Florida.

The AI system performed well, showing 92.3% agreement with human experts. The sensitivity and specificity for prePMF diagnosis was 66.6% and 100%, respectively. After further testing, Dr. Srisuwananukorn said the algorithm could potentially be used as a companion tool for clinical diagnoses and help doctors match patients with the clinical trials that are most likely to help them, which could ultimately result in better treatments.

Researchers cautioned that the algorithm is intended to complement, not replace, human experts. “What we’re trying to develop is a clinical decision support tool, with an emphasis on support,” said Dr. Srisuwananukorn. “Physicians with no computer science background are increasingly recognizing the value of AI algorithms and closer to being able to use them for their clinical practice. However, more investigations would be needed for this algorithm to be used in clinical practice, including testing in cohorts with different racial backgrounds.”

The researchers plan to continue to refine the system and test it with larger data sets. In addition, Dr. Srisuwananukorn said AI could potentially be used to advance basic research on MPNs to link biological processes with particular morphological features visible on biopsy slides. Eventually, this could lead to ways to predict a person’s prognosis or response to treatment based on biopsy

images, he added.

Andrew Srisuwananukorn, MD, The Ohio State University Comprehensive Cancer Center, presented this study during an oral presentation on Monday, December 11, 2023).

Social media posts underscore burden of living with sickle cell disease

[Abstract 1057](#): Understanding the experiences of patients with sickle cell disease and their caregivers by social media listening in the UK

An analysis of social media posts reveals striking evidence that people living with SCD in the United Kingdom (UK) experience health inequities and barriers to care. The study — which used AI to analyze patient experiences based on public social media posts — provides a new window into the patient journey that could help inform efforts to address unmet needs among people with the inherited blood disorder.

“If you were to ask patients about their sickle cell disease care in the clinic, it is likely you would get a filtered response. Interestingly, people are far more open to sharing their experiences on social media, so I think this approach provides quite a candid view of the patient experience,” said Oliver Shastri, BSc (Hons) MBBS MRCS, Rare Disease Team lead, Pfizer UK Ltd., and the study’s lead author.

He added that, “These first-hand accounts illustrate the burden of the disease on patients and caregivers, including limited access to emergency care, racial bias, and negative preconceptions when seeking medical care, and reinforce the need to further increase education within the medical community to help improve patient care.”

In addition to long-term organ damage, SCD causes episodes of acute pain called vaso-occlusive crises that often require strong painkillers, such as opioids. Patient anecdotes and previous studies indicate that some patients have experienced treatment delays because health care professionals do not have an appropriate understanding of SCD and incorrectly perceive patients as drug seekers.

For the study, researchers partnered with data analysts and a patient living with SCD to develop a list of search terms to find public posts related to SCD on social media platforms including Instagram, TikTok, X (formerly known as Twitter), and online forums. Researchers used analytics to visualize the data at scale and used AI to identify high level themes. Using a random sample of the posts, they isolated posts specifically related to patient and caregiver interactions and applied a natural language processing algorithm to detect key topics of discussion, which researchers then manually validated and contextualized.

In total, the study captured over 45,000 posts from users in the UK, out of which the researchers analyzed a sifted sample of 513 posts related to patient or caregiver experience. Six main themes were identified, including the experience managing SCD within the UK’s National Health Service; living with and understanding the disease; the importance of community support and family

planning; understanding the burden of SCD through accounts over their lifetime; raising awareness of SCD; and access to or experiences with treatment.

Within each theme, a significantly greater proportion of posts were determined to be negative than positive, although over half of posts overall were considered neutral. Many posters expressed a desire for a higher number of effective SCD treatments in the UK and felt the severity of their pain and its impact on their life was underappreciated.

In addition to sharing the results with the scientific community, the researchers plan to develop layperson summaries of the findings to increase awareness of SCD and its impacts on families, employers, and the general public. They also are planning to develop targeted educational programs to improve awareness among front-line health care professionals who may be less familiar with this rare disease.

Researchers noted that the analysis method could be useful for better understanding the experiences of people with other types of diseases, as well.

“This approach lends itself particularly well to rare diseases,” said Dr. Shastri. “Social media listening offers a novel and quantifiable method of capturing the patient’s digital voice, where traditionally gathering these insights was limited by geography or the high burden of administration. As AI technology improves, it may be a quick and convenient way of gathering many more insights, helping us highlight the unmet needs of patients faster and more accurately using information already in the public domain.”

The study was limited to posts shared via IP addresses in the UK on a subset of social media platforms, and only English-language posts were included in the analysis. Further studies would be needed to determine whether people posting in other languages, other countries, or other social media platforms share similar experiences, Dr. Shastri noted. The study was developed and funded by Pfizer UK.

Oliver Shastri, Pfizer, presented this study during an oral presentation on Monday, December 11, 2023).

Oral regimen with minimal chemotherapy found safe and effective for treating APL

Abstract 157: An Entirely Oral Regimen of Oral-Arsenic Trioxide/All-Trans Retinoic Acid/Ascorbic Acid in Newly-Diagnosed Acute Promyelocytic Leukaemia (APL): Updated Results of an Ongoing Multicentre Trial

Patients with acute promyelocytic leukemia (APL) who received a combination therapy including arsenic trioxide, all-trans retinoic acid, and ascorbic acid (AAA) in oral form with no or minimal chemotherapy showed high rates of survival and relapse-free survival at three years, according to new findings from a multicenter trial in Asia.

The study is the first to evaluate survival outcomes from an entirely oral AAA regimen in patients

with both high- and standard-risk forms of APL, a form of blood cancer in which certain forms of immature white blood cells (abnormal promyelocytes) harboring the PML::RARA fusion oncogene accumulate in the bone marrow. People with APL have a high fatality rate due to bleeding complications if untreated.

The latest study findings suggest APL can be effectively treated with this synergistic oral regimen in most cases without the need to administer any of the drugs intravenously or accompany the treatment with chemotherapy, according to researchers.

“This entirely oral regimen is highly effective, safe, and can be administered in an outpatient setting for all risk categories,” said Harinder Gill, MD, clinical associate professor at the University of Hong Kong, and the study’s lead author. “In addition, we found we can minimize chemotherapy in patients with all risk levels — not only in lower risk patients — as well as in both pediatric and adult patients.”

Historically, standard of care for both newly diagnosed and relapsed APL has included intravenous administration of arsenic trioxide and chemotherapy, which requires repeated hospital admissions and causes treatment-related toxicities. However, recent studies have suggested that an oral formulation of arsenic trioxide can perform just as well, and eliminating or minimizing chemotherapy can reduce hospitalizations (and associated costs) as well as side effects and long-term complications.

For the study, researchers administered an entirely oral AAA regimen to 117 patients (including five children) with newly diagnosed APL at sites in Hong Kong, Singapore, and mainland China between 2018 and 2023. Patients with a high white blood cell count — about 30% of study participants — received a three-day course of chemotherapy (a regimen considered to represent “minimal chemotherapy”) to reduce the complications associated with having an overabundance of white blood cells during the treatment. The rest of the participants received no chemotherapy.

Participants showed deep molecular responses to treatment, with all patients achieving a complete response initially. After a median follow-up time of 32 months, the rates of three-year overall and relapse-free survival were 99% and 97%, respectively.

Eight patients who were initially enrolled in the study died before receiving the full drug regimen, most from bleeding in the brain as a result of their APL. One patient died during the course of the study, which was determined to be unrelated to the treatment, and one patient experienced a disease relapse, which was determined to be related to a rare genetic mutation conferring resistance to arsenic trioxide, according to Dr. Gill.

No cardiotoxicity or serious adverse events were reported, and the most common adverse events were low-grade headache and elevation of liver enzymes. APL differentiation syndrome, a known complication of treatment with all-trans retinoic acid and arsenic trioxide, occurred in over half of patients, which was resolved in all cases with the standard treatment of intravenous steroids.

Taken together, researchers say the results extend and enhance previously reported evidence on

the safety and efficacy of an all-oral treatment regimen for APL.

“This brings us from a practice that involves repeated hospital admissions to an outpatient-based practice that doesn’t require a lot of intensive monitoring,” said Dr. Gill. He noted that switching from intravenous infusions to an all-oral regimen could also significantly reduce the cost of treatment.

Additional studies are being planned to further assess the use of intravenous and oral formulations of arsenic trioxide as frontline treatment for APL.

This study was supported by the Innovation and Technology Fund, Innovation and Technology Commission, the Government of the Hong Kong SAR (project code: PRP/029/22FX).

Harinder Gill, University of Hong Kong, will present this study in an oral presentation on Saturday, Dec. 9, 2023, at 2:00 p.m. Pacific time in room 6A (San Diego Convention Center).

CAR T-Cell therapy results in rapid and marked improvement in autoimmune diseases

[Abstract 220](#): CD19-Targeted CAR-T Cells in Refractory Systemic Autoimmune Diseases: A Monocentric Experience from the First Fifteen Patients

Fifteen patients with severe autoimmune diseases who received CD19-targeting chimeric antigen receptor (CAR) T cells experienced substantial improvements and no longer required any other treatments for their autoimmune disease, according to a new study. The preliminary findings include a median of 15 months of follow-up.

The research is the first to test CAR T-cell therapy in autoimmune diseases, according to Fabian Müller, MD, of Bavarian Cancer Research Institute and Friedrich-Alexander University of Erlangen-Nuremberg, the study’s lead author. After reporting promising results in an initial cohort of five patients with systemic lupus erythematosus (SLE), researchers expanded the study to include people with two additional types of autoimmune disease that also involve autoreactive B-cells, systemic sclerosis (SSc) and inflammatory myositis (IIM).

“CD19 CAR T cells are well tolerated in B-cell driven autoimmune diseases, and the disease is entirely controlled without any additional disease-related therapeutics so far,” said Dr. Müller. “The results have really been life-changing for these patients. Our first lupus patient was 21 years old and she was so sick that she had a life expectancy of 4-6 weeks; now, she is out jogging five days a week.”

For CAR T-cell therapy, a patient’s white blood cells are removed from the body and the T cells are separated out, genetically altered, and allowed to multiply. The altered T cells, known as CAR T-cells, are infused back into the body and attack disease-causing cells. CAR-T therapy is a well-established treatment for certain types of blood cancer. Researchers are now exploring whether it can also fight other diseases.

Autoimmune diseases occur when a person’s immune system erroneously attacks their own cells.

Based on laboratory studies and preliminary clinical results, it appears that CD19-targeting CAR T cells can effectively seek and destroy errant B cells that cause some types of autoimmune diseases and restore proper immune cell functioning.

For the study, the researchers enrolled eight patients with SLE, four with SSc, and three with IIM who faced serious or life-threatening disease that was not or no longer responding to multiple standard treatments. Before receiving the CAR-T therapy, all of the patients faced an extremely poor prognosis, and several were so weak that they could not walk farther than a few meters.

After receiving their CAR-T infusions, B cells were eliminated from the blood within a week and then reoccurred in most patients a few months later. At the time of reporting, patients have been followed for a median of 15 months after their CAR-T infusion (with a range of four to 29 months) and all patients are doing well, show decreased disease activity, and have stopped taking immunosuppressive drugs.

The therapy was well tolerated overall. Ten patients experienced mild cytokine-release syndrome – an inflammatory side effect of CAR-T therapy – one experienced moderate cytokine-release syndrome, and one experienced vertigo. No serious treatment-related adverse events were reported.

Based on the findings, researchers say CAR-T therapy appears to be a promising alternative to autologous stem cell transplant, which is currently seen as the most curative option for life-threatening autoimmune disease when other treatments do not work, but which carries a significant risk of serious side effects.

“We have opened up an entirely new route of possibly treating several more diseases,” said Dr. Müller. “We are hopeful that this is at least as good as autologous bone marrow transplant with substantially fewer side effects, but the data are preliminary, and we need to do follow up studies to confirm these results.”

Researchers said it will take several years, along with a larger group of patients, to determine whether the therapy confers longer-term benefits in the context of chronic autoimmune diseases. They added that it is still too early to tell whether it works equally well for SLE, SSc, and IIM, or if particular diseases see a better response. Additional clinical trials are underway to test CAR T-cell therapy in these and several other autoimmune disorders.

Fabian Müller, Bavarian Cancer Research Institute and Friedrich-Alexander University of Erlangen-Nuremberg presented this study in an oral presentation on Saturday, December 9, 2023).

This [news release](#) was published by the American Society of Hematology on December 9, 2023.