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In addition to automated cell detection, AI and ML techniques have proven to be instrumental in classifying leukemia subtypes accurately. Various leukemia subtypes exhibit distinct genetic and phenotypic characteristics, necessitating accurate classi cation for tailored treatment approaches. AI algorithms can analyze and learn from large datasets of patient samples, identifying patterns and features that di erentiate between di erent subtypes. Leveraging supervised learning techniques and deep learning architectures, these models can achieve impressive accuracy in classifying leukemia subtypes [5], which can be bene cial for treatment planning and prognostic assessment.

AI models to handle the complexities of leukemia subtypes, as well as rare and challenging cases. Advancements in deep learning architectures and transfer learning techniques could lead to even more accurate and robust models capable of handling diverse and limited datasets. Additionally, the development of federated learning approaches, where AI models are trained across multiple healthcare institutions without sharing raw patient data, could address data privacy concerns and encourage collaborative research without compromising patient con dentiality [15].

To facilitate the clinical adoption of AI-powered diagnostic tools, educational initiatives should be implemented to train healthcare professionals in AI concepts and their application in leukemia diagnosis. Building awareness and understanding among clinicians will lead to greater acceptance and utilization of AI technologies in routine practice. In the long term, the integration of AI and ML in leukemia diagnosis could lead to a paradigm shi in patient care, moving from a one-size- ts-all approach to personalized and precision medicine. AI-powered diagnostic tools can provide oncologists with actionable insights, enabling them to tailor treatments based on individual patient characteristics, genomic pro les, and treatment responses. is patient-centric approach has the potential to improve treatment e cacy, minimize adverse e ects, and ultimately extend the survival and quality of life for leukemia patients. However, it is important to acknowledge that AI should not replace human expertise and clinical judgment but rather serve as a powerful tool to augment and support healthcare professionals in their decision-making process [16].