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When Blasts Become Explosions and Multicolor Cytometry is a Rainbow

Exploring the potential of AI-Assisted Video Translation to Broaden Global Access to Flow Cytometry Education

If you are a child of the last millennium, you may have grown up watching (and disbelieving) movies where artificial intelligence (AI) changes the future. Today, AI has indeed become a reality, offering tools for a variety of tasks. This is also true for flow cytometry, where AI shows great promise in data analysis, panel selection, or workflow improvements, with new use cases or applications emerging and being tested at a rapid pace. As access to high-quality education is on a global scale unevenly distributed, another role for AI in flow cytometry lies in making educational content more easily accessible, including in different languages. This is because in many developing countries or emerging economies, achieving professional fluency in English remains inaccessible by a large portion of the population, limiting exposure to domain-specific education or scientific advances. Moreover, even scientists who have reached English proficiency as part of their advanced education may still face challenges with accents, specific vocabulary, or context.

Serving the needs of those involved in the current and emerging clinical applications of cytometry throughout the world, including education and professional development, are major goals of the International Clinical Cytometry Society (ICCS). As such, ICCS has made a continued effort to expand educational opportunities. A recent initiative is the "revival" of the ICCS YouTube Channel, where flow cytometry experts present and discuss a range of flow cytometry topics in video format. To increase accessibility and global uptake of this freely available offering, the ICCS Community & Growth Committee (CGC, a recently formed committee merging the former Diversity and Inclusion and Women In Cyometry Committees) explored the utility of AI-assisted subtitles and translation into different languages. The goal of this project was to determine if flow cytometry educational videos could be supplemented with AI-generated subtitles in multiple languages, and to what extent content and meaning were accurately captured.

First, the committee explored different translation tools that are already embedded into common internet browsers or the YouTube platform and created detailed instructions on how to enable these features (see image with instructions below, and instructions can also be found on the YouTube channel website and the pages of the ICCS Outreach and Community & Growth Committees). To assess the quality of the YouTube embedded tool and to determine whether it could reliably support learners in different languages, we next selected two videos for evaluation and created a survey that was disseminated across different ICCS committees. The first video (Flow Cytometry Basics/Introduction) represented a foundational flow cytometry topic, whereas the second video (MRD testing) was chosen to challenge the tool with an advanced and highly technical concept. Committee members who are also fluent in a language other than English were asked to follow the provided instructions to enable AI-generated translation in their preferred language, watch both videos, and share impressions regarding translation performance and clarity. Seven responses were received, and languages tested included German, Arabic, Vietnamese, Portuguese, Chinese (simplified), and Spanish.

Most (6 of 7) of the participants reported using AI generated transcriptions for the first time after learning about the tool from ICCS. Regarding accuracy of translation of technical terminology, such as "CD45," "gating," "blast population," and "compensation", five respondents reported that AI generated translations handled these terms very well with a few errors and two participants reported fair translations but noted some terms were unclear or had lost technical meaning. Overall, respondents found the subtitles helpful in understanding content, particularly for the introductory video, Flow Cytometry Basics/Introduction. For the more specialized topic, MRD testing, respondents noted occasional challenges with technical terminology and minor inconsistencies, but most still found the subtitles manageable and supportive of learning. Respondents also suggested minor "tweaks" to enhance comprehension such as slowing the video speed or including disclaimers for technical terms. Together, this pilot survey underscores the potential of AI-generated subtitles to improve accessibility for non-native English speakers, while highlighting the importance of careful consideration of context.

In summary, the findings of this project highlight both the promise and the limitations of AI-assisted translation. While accessible and easy to use, careful evaluation and context are essential. AI-assisted translation, while powerful, may misrepresent technical terms or introduce confusing interpretations, such as "blasts" becoming "explosions" or "multicolor flow cytometry" a "rainbow". Such quirks underscore an important reality: AI is a powerful tool that can enhance accessibility but

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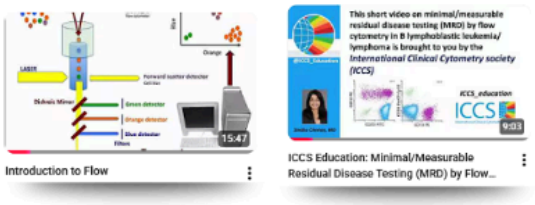
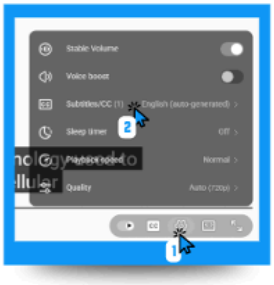
cannot replace human-level ability to contextualize. Regardless, the use of this feature represents a meaningful opportunity to extend the reach of ICCS education and reduce language-based barriers for learners around the world by reducing obstacles that prevent learners from fully engaging with educational material.

Go to the ICCS channel on Youtube

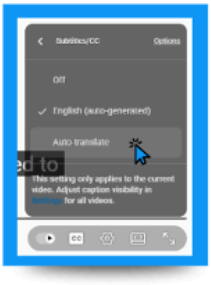


Search the videos:
Introduction to Flow, and MRD Testing

In the lower right corner of the video, click on the "CC" subtitles icon



Click on the settings icon, then select "Subtitles/CC"



Click on "Auto-translate" and select your language

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