Media Advisory

# Lonza Capsugel's Licaps® DUOCAP® technology delivers up to four times the enzyme activity of standard capsules in peer-reviewed study

- New peer-reviewed research published in *Pharmaceutics* demonstrates that Lonza Capsugel's Licaps® DUOCAP® capsule-in-capsule technology can significantly improve protection and targeted delivery of acid-sensitive enzymes in the gastrointestinal (GI) tract
- The study shows up to four times higher enzyme activity in the upper small intestine compared to standard immediate-release capsules
- The findings show how advanced capsule technologies can support the development of digestive enzyme nutraceutical solutions

**Basel, Switzerland, 28 May 2026** – Lonza Capsugel has released new peer-reviewed research showing that its Licaps® DUOCAP® capsule-in-capsule technology can significantly improve the protection and targeted delivery of acid-sensitive enzymes in the gastrointestinal (GI) tract. Conducted in collaboration with ProDigest (Belgium), leading experts in preclinical gastrointestinal tract models, the study highlights the impact of dual-release capsule technologies in unlocking advanced product development opportunities, and reinforces the importance of delivery choice for nutraceutical products.

Published in ***Pharmaceutics***, the study used the Simulator of the Human Intestinal Microbial Ecosystem (SHIME)® *in vitro* model to compare multiple capsule polymers and formulations under realistic fed and fasted digestive conditions. To assess dissolution behavior, capsules contained caffeine as a marker of capsule dissolution as well as pancreatin, an acid-sensitive digestive enzyme that is converted from tributyrin to butyrate when it reaches the upper small intestine. Five capsule formulations, including two single capsule types and three Licaps® DUOCAP® capsule-in-capsule configurations, were assessed for dissolution timing, ingredient protection and enzyme activity throughout the upper gastrointestinal tract, with particular focus on the upper small intestine where digestive enzymes are most effective.

When taken with food, the Licaps® DUOCAP® capsule-in-capsule formulations demonstrated superior protection and targeted release profiles, with caffeine released at the end of the duodenum and/or jejunum and a high butyrate recovery, ranging from 53% to 87%. Enzyme activity was up to four-times higher in the upper small intestine compared to standard immediate-release

capsules. In contrast, the immediate-release single capsule format released a high level of its contents in the stomach, as shown by low butyrate recovery in the upper small intestine (16–21%). This suggests gastric degradation of the unprotected enzyme, meaning that the intended delivery was significantly impaired when compared to the Licaps® DUOCAP® capsule-in-capsule technology.

**Dr. Elnaz Karimian Azari, Senior Manager R&D, Lonza Capsugel and lead author of the study said:** "This study further reinforces the robustness and reliability of our Licaps® DUOCAP® capsule-in-capsule technology, providing independent, peer-reviewed validation of its ability to deliver sensitive ingredients to targeted regions of the gastrointestinal tract. While this work focused on release in the upper small intestine, it builds on a growing body of evidence demonstrating that Licaps® DUOCAP® capsules can protect and transport ingredients like live probiotics all the way to the colon, where they are needed to achieve optimal performance. It also highlights just how important capsule selection is to the success and effectiveness of nutraceutical products – and why delivery really does matter."

For more information on Licaps® DUOCAP® capsule-in-capsule technology, please visit **Licaps® DUOCAP® Dual Release Capsules | Lonza** or **contact us**.

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