



A matter of timing

ENSURE OPTIMAL DELIVERY FOR
ACID-SENSITIVE PRODUCTS

The preferred choice for you and your customers

Capsugel DRcaps® capsules offer nutritional supplement makers a dosage form with outstanding consumer and manufacturing appeal.



Acid resistance protects nutritional ingredients without the need for film coatings.



Plant-based, vegetarian capsule designed to release when you need it.



Enhanced stability for moisture sensitive and hydroscopic ingredients.



Taste and odor masking of herbal or mineral ingredients which can increase digestive comfort.

Protect your ingredients. Improve your bottom line.

Delivering acid-sensitive supplement products can be a challenge for health and nutrition companies. Protecting ingredients from stomach acids to maintain potency is crucial – but it can require complex enteric coating formulations and manufacturing techniques, expensive packaging, and use of solvents many dietary supplement consumers find unacceptable.

DRcaps® capsules are made with an innovative hypromellose (HPMC) formulation that can help protect sensitive ingredients from the low pH environment of the stomach – without the cost and complexity of adding acid-resistant properties during manufacturing. The low moisture level of DRcaps can also be exploited to accommodate hydroscopic ingredients.



The consumer-preferred solution



The vegetarian option your market demands

Vegetarian society-certified, Kosher-certified and vegan approved, DRcaps capsules offer an appealing solution for vegetarian-aware consumers – about 35%* of the population and those with cultural or dietary requirements. This key market is known to take more supplements than the general population and to prefer supplements from vegetarian sources without solvents and other unnatural ingredients.



Supplement benefits without the aftertaste and smell

By protecting against early disintegration, DRcaps capsules reduce the potential for unpleasant odors, aftertaste and reflux from supplements such as garlic or valerian root. In addition, consumers prefer capsules because they consider them easier to swallow and gentle on the stomach.



Powerful branding potential to differentiate your products

- Highlight a “promise of performance” for your products with sensitive ingredients
- Promote greater comfort for consumers who take certain ingredients such as garlic or valerian root
- Leverage “new and improved” labeling for retail differentiation
- Promote your vegetarian solution to fit customer needs
- Create a family of “protected products”

*NMI Supplement, Over-the-counter and Rx Study.



Proven targeted release for acid-sensitive ingredients.

DRcaps capsules help protect nutritional supplement ingredients that are sensitive to stomach acid. The innovative DRcaps capsule targets release after an extended time period, protecting ingredients from degradation in the stomach.

DRcaps capsules disintegration performance in human subjects

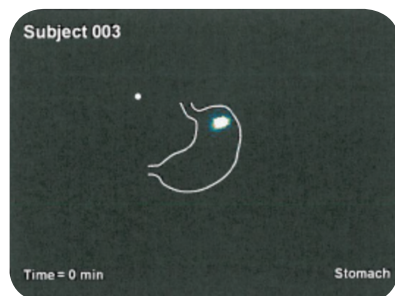
The study was designed to investigate the *in vivo* behavior of unbanded DRcaps capsules using qualitative and quantitative scintigraphic methods to assess the GI transit of DRcaps capsules and the release of capsule contents based on the scintigraphic images obtained.

Each subject consumed a light breakfast approximately 30 minutes prior to dosing a DRcaps capsule containing 300mg of lactose, 10mg of which was radiolabelled.* Anterior and posterior images were taken after dosing and then every 5 minutes up to four hours post-dose.

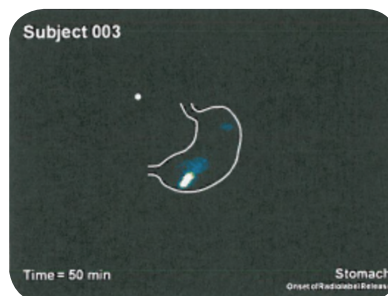
Key Study Results

- DRcaps capsules displayed delayed release properties
- Disintegration started approximately 45 minutes later than a typical immediate release capsule of about 5 minutes
- For the majority of subjects, complete release took place in the intestine
- Complete release occurred 20 minutes after the onset of release
- DRcaps capsules significantly reduced opportunity for nutritional ingredient degradation compared with standard immediate release capsules

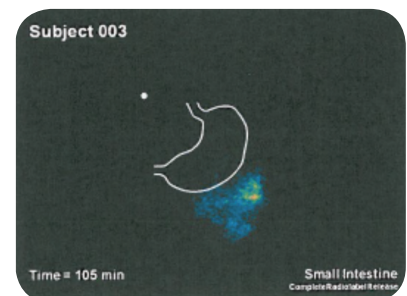
DRcaps capsule administered



Intact DRcaps capsule reaches the stomach



DRcaps capsule starts to release the contents



DRcaps capsule has left the stomach and releases its contents in the intestine

*Each capsule was filled with 290mg of 'cold' lactose monohydrate and approximately 10mg of radio labelled lactose monohydrate.

The simple alternative to coating processes

Conventional film coatings for acid-resistance involve costly manufacturing processes that are complex and may lead to waste, delays and yield loss. Cumbersome tablet-coating and microencapsulation techniques require use of chemicals and solvents that do not fit many consumers' preference for 'healthy and natural' products. Additionally, heat used in the coating process can compromise your ingredients.

DRcaps capsules, on the other hand, offer significant manufacturing advantages that may help to:

- Optimize manufacturing processes with flexibility on batch size, reducing waste and storage requirements. DRcaps capsules run smoothly on all high-speed and semi-automatic filling machines with no special change parts required.
- Simplify formulations, reduce time to market and increase margins.
- Speed development processes and product registration – DRcaps capsules comply with all the requirements of the major food standards, simplifying regulatory processes.



Potential film coating issues

- Utilize plasticizers, solvents, and additives*
- Erosion and adherence problems
- Variable moisture, bulk density, and compressibility
- Extended coating times and energy costs
- Time-consuming spraying, coating distribution and drying

DRcaps capsules

- ✓ Release properties built into the capsule
- ✓ Reduced manufacturing time, cost and yield loss
- ✓ No added chemicals, solvents or other coating polymers
- ✓ Shorter development cycle
- ✓ Adherence to cGMP guidelines
- ✓ Traceability of raw materials

*TEC, triacetin, PEG, glyceryl monostearate.



Kosher, Vegetarian-society and Vegan certified



Put our development expertise to work for you

No other company has more experience to help strengthen your brand with one-of-a-kind capsule-based applications.



- **200 billion hard capsules produced annually for more than 4,000 different customers in 100+ countries**
- **Strong focus on quality and have implemented numerous initiatives to continuously improve overall quality of our products**
- **Extensive global supply capability**
- **Technical training to improve your productivity**

For more information visit capsugel.com/DRcaps