

On Target: Site-Specific Release with the HS Capsule

Bio-*i*images

Capsules that can be modified to allow controllable drug release at the site of choice can assist in early stage formulation development

There currently exists a large range of compounds with challenging biopharmaceutical properties, such as limited or narrow oral absorption windows. To evaluate the behavior of such compounds at specific sites in the gastrointestinal tract, appropriate controlled-release delivery vehicles are required.

Bio-Images Research Ltd., in collaboration with the University of Strathclyde, has developed a novel and site-specific drug delivery device for the gastrointestinal tract. The device—known as the Hydrophilic Sandwich (HS) capsule—allows targeted delivery of its contents to the site of interest.

This simple, manually assembled capsule within a capsule system contains the test formulation in the inner capsule and a layer of gelling, erodible polymer in the intercapsule space. With judicious choice of the density of the polymer layer, the time taken for erosion of this layer and subsequent bursting of the inner capsule and release of the formulation can be controlled.

Following extensive in vitro validation studies, Bio-Images Research conducted a clinical study to monitor the behavior of the system in vivo. The noninvasive imaging technique of gamma scintigraphy was used to visualise radiolabelled capsules from outside the body.



In this single-centre, open-label, three-way crossover study in six healthy male volunteers, three HS capsules with varying polymer layer viscosity were tested. The following ratios of hydroxypropyl methylcellulose (HPMC) were incorporated into the intercapsule space: E15:E50 75:25 percent (w/w) (Capsule A); E15:E50 50:50 percent

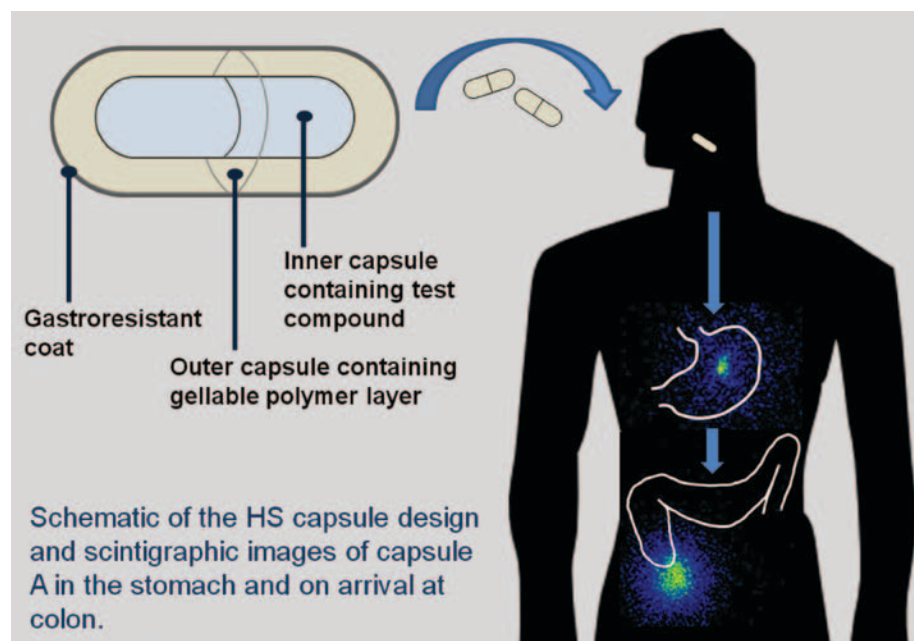
(w/w) (Capsule B) and E50 100 percent (w/w) (Capsule C).

Capsules were spray coated with an organic coating of Eudragit L100 to provide resistance to the stomach environment. Each capsule contained approximately 4 MBq ^{99m}Tc -DTPA-labeled charcoal in the HPMC layer and approximately 0.3 MBq ^{111}In -DTPA-labeled lactose in the inner capsule at the time of dose. Dual isotope labelling allows two properties of a system to be monitored simultaneously, in this case facilitating correlation of the erosion of the polymer layer with release of the inner capsule contents.

Mean gastric emptying times for the three HS capsule variants were 106.5 ± 34.5 minutes, 107.3 ± 31.3 minutes, and 88.3 ± 17.2 minutes for capsules A, B, and C, respectively. Release of the radiolabel was seen postgastric emptying in all three cases, showing the robustness of the gastroresistant coat. Capsules B and C predominantly released in the small intestine, while capsule A successfully delivered the inner capsule radiolabel to the ileocecal junction/proximal colon, demonstrating the potential of the HS capsule for targeting those distal sites.

Howard Stevens, professor and Bio-Imaging Research chairman, commented, "The combination of gamma scintigraphy together with HS capsule technology provides a convenient means of studying drug absorption from regional sites in the [gastrointestinal] tract. This is a prerequisite for the rational development of controlled-release formulations. Bio-Images is delighted to make this technology available to its clients to assist their development programs."

Bio-Images Research Ltd. offers complete clinical research services, combined with a high level of expertise in drug delivery systems, providing clients with early stage guidance in the drug development process. The development of the HS capsule and its use with gamma scintigraphic imaging will enable clients to test how their formulation works in defined parts of the gastrointestinal tract. Coupled with pharmacokinetics, this provides a potentially powerful tool in regional absorption studies.



Movin' Out!

The time is coming for us to part ways. Exhibitors, here is the move-out information you'll need to know to make your departure smooth.

MOVE-OUT HOURS

Wednesday: 4:30 pm–9:00 pm
Thursday: 8:00 am–2:00 pm

BASIC INFORMATION:

- Aisle carpet removal will take approximately one hour; empty crates will be returned after carpet is removed.
- Arrangements can be made to complete move-out without exhibitor supervision. Go to the Freeman Service Desk for more information.
- All exhibits must be packed and ready for removal from the exhibit hall by 2:00 pm Thursday.
- Outbound freight carriers need to check in by noon Thursday for loading. More information is available at the Freeman Service Desk.
- Bring all lead retrieval equipment to the Experient Service Desk by 5:00 pm Wednesday.
- Registration badges are required for move-out. Badges accepted for entrance to the Exposition Hall during move-out include the exhibitor badge and move-in/move-out badge. All EAC personnel are required to have AAPS-issued move-in/move-out badges.
- Note: No one under 18 years is allowed in the exhibit hall. This is strictly enforced.