

DiluFlow Pro
BagMixer 400 S
BagFilter
easySpiral Dilute



GHU Henri-Mondor is the second largest producer at the AP-HP of fecal microbiota suspensions in syringe or capsule form for fecal microbiota transplantation (FMT). This activity ensures the dispensing of preparations to all the hospitals of the GHU as well as to hospitals in the Eastern Paris region.

Work with: DiluFlow Pro / BagFilter / BagMixer 400 S / easySpiral Dilute



Manufacturing syringes and capsules for fecal microbiota transplantation (FMT) with Interscience devices?

- Work under a biosafety cabinet
- No cross-contamination
- Optimal preservation of anaerobic conditions

Dr B. Nebbad-Lechani, Hospital physician in Microbiology and responsible for fecal microbiota transplantation, Henri-Mondor Hospital Pharmacy Department.

Fecal microbiota transplantation (FMT) consists of administering a preparation of fecal matter from a healthy subject to a patient suffering from a pathology linked to an alteration of the intestinal microbiota, in order to exert **therapeutic effects**. Its efficacy is recognized in the treatment of recurrent *Clostridioides difficile* infections. At GHU Henri-Mondor, **Dr Nebbad** and her team use Interscience products to ensure the safety and hygiene of the fecal microbiota suspension manufacturing in the form of **syringes** or **capsules**.

What is the microbiota?

A microbiota is the **collection of microorganisms** - bacteria, viruses, parasites and non-pathogenic fungi, known as commensals - that **live in a specific environment**. In the body, there are different microbiota: in the skin, mouth, vagina, lungs... The **intestinal microbiota** is the most "populated" of them, hosting 10^{12} to 10^{14} microorganisms.

Microbiota and health

The role of the intestinal microbiota on our health is more and more known and recognized. We now know that it **plays a role in digestive, metabolic, immune and neurological functions**. Consequently, **dysbiosis**, i.e. qualitative and/or functional alteration of the intestinal microbiota, is a serious lead to explain certain diseases, especially those underlying autoimmune or inflammatory mechanisms. Dr. Nebbad and her team use Interscience products to produce fecal microbiota suspensions in syringe or capsule form for **fecal microbiota transplantation (FMT)** as part of **routine treatment** of recurrent *Clostridioides difficile* infections, with a **success rate of up to 80%**.

How can you go from a stool to a drug?

It all starts with the donation of stool from a healthy individual whose selection corresponds to specific criteria aimed at excluding the transmission of infectious agents as much as possible. Today, there are **very few donors because few people are aware of stool donation**, and the selected donor must be eligible for donation according to the recommendations of the ANSM.

"The donor is very crucial." Dr Nebbad

Preparation of fecal microbiota transplants

The stool is first **weighed and diluted** with the gravimetric dilutor **DiluFlow** directly into a **BagFilter** sampling bag, then **homogenized** in the paddle blender **BagMixer**. The lateral filter integrated to **BagFilter** allows to **filter directly** the stool during the homogenization step, so that cellular debris and non-digested food fibers are eliminated. The recovered filtrates are kept in 10% Glycerol for the **syringe** form or 80% Glycerol solution for the **capsule** form after centrifugation.

Bacterial qualification of the preparations

The **bacterial count** of the preparations is performed by the **Spiral counting technique** (an ISO7218 standardized technique). From a stool suspension with NaCl and glycerol, the **easySpiral Dilute** device automatically performs **serial 1/10 dilutions** until a 10^{-5} solution is obtained. Then, from this suspension, the automat proceeds to a plating by **Spiral** technique (allowing to obtain 4 logs of dilution on the same Petri dish) on different specific media for the enumeration. Each plating medium is performed in duplicate to ensure **reproducibility**.

Why did you need these automats?

Dr Nebbad: We needed to **save time** and reduce the **risk of cross-contamination**.

"My microbiologist's expertise allows me to attest of the safety and hygiene that Interscience products provide. We are approaching maximum safety." Dr Nebbad

How have our devices changed your way of working?

Dr Nebbad: Interscience products are a **clear improvement compared to the old preparation methods**. For example, the homogenization of samples was done with a blender that had to be cleaned after each manipulation, which was a major source of cross-contamination. Today, each sample is diluted in its irradiated **BagFilter** using the **DiluFlow** and automatically homogenized by a **BagMixer**. The **devices are not in direct contact with the sample** and are **compact enough to be used under a biosafety cabinet** which makes the **donation as safe as possible** and **protects the manipulator**. Moreover, with **BagFilter**, there is no need to filter the samples by hand, we take the filtrate directly in the bag. This **reduces manipulation steps and the number of consumables** in contact with the sample. It is therefore faster and safer from a **hygiene** and **safety** point of view. As for bacterial enumeration, it is facilitated by the use of the **easySpiral** which allows to have directly interpretable Petri dishes thanks to its 9 dilution logs. This **saves us time** and allows us to have more **reliable** and **reproducible results** thanks to our double validation.

"Before, the homogenization of samples was done in a blender that we had to clean after each manipulation and this was a major source of cross-contamination." Dr Nebbad

What do you like most about our equipments?

Dr Nebbad: Interscience products give us great satisfaction for the bacterial qualification of our preparations because we work in duplicate and these devices have very **reproducible** performances. Moreover, the use of bags with **BagClip** closure sticks allows us to maintain good **anaerobic conditions**, essential for the culture of bacteria living in the intestine. The compact format of Interscience devices allows their **use under a biosafety cabinet** and reduces the risks of contamination.

If you had to define Interscience products in 3 words

Dr Nebbad: **Safe, easy to use** and **robust**.

Protocol of analysis: Bacterial quantification of donor stool and FMT preparations

- **Number of analysis per day:** Depends on the rate of donations
- **Dilution mode:** Automatic mode with the **DiluFlow**
- **Dilution factor:** 1:4 (v/v)
- **Microorganisms:** Cultivable facultative aero-anaerobic flora of the intestinal microbiota
- **Culture medium:** TSA, Drigalski, Schaedler KV 5% of sheep's blood, Bifidobacterium, LBS, Colombia 5% horse blood
- **Colony Counting:** Manual