

Helios Upgrade from CyTOF 2 and Trade-In from CyTOF 1

Frequently Asked Questions

Can I trade in my CyTOF 1 system for Helios?

Yes, you can trade in your CyTOF® 1 system. Please contact Robert Ellis (robert.ellis@fluidigm.com) or discuss a trade-in with your Fluidigm Sales Representative.

Can I upgrade my CyTOF 2 system to Helios?

Yes, you can upgrade your CyTOF 2 system to Helios™. Please contact Robert Ellis (robert.ellis@fluidigm.com) or discuss an upgrade with your Fluidigm Sales Representative.

What are the biggest advances that Helios brings to mass cytometry?

Here are the top three:

- 1** Sample handling: The new sample introduction system doubles throughput and increases sampling efficiency to over 60%, so you collect more data from less sample in less time. It also enables up to 5 mL samples for streamlined barcoding workflow, enabling hands-free operation while entire experiments are acquired. It incorporates sample agitation to counteract sedimentation, resulting in sustained throughput during acquisition. It eliminates the need to transfer samples to a syringe. It also eliminates carrier solution.
- 2** A new user interface (UI) simplifies user training and enables more end-user operation.
- 3** TRADE-IN—In addition, tuning is automated.
- 4** Improved onboard computer:
 - a** UPGRADE—10X storage capacity, reducing frequency of data transfer.

- b TRADE-IN—Storage drives are in RAID (redundant array of independent disks) configuration, providing redundant storage for improved data security. The Windows® 7 operating system provides improved performance and security.

How does Helios compare to a CyTOF equipped with the Super Sampler?

The Helios Pneumatic Sample Introduction (PSI) sample loader and the Super Sampler provide comparable sampling efficiency, eliminate carrier solution, eliminate the need to transfer samples into a syringe by sampling directly from a tube (1.5 or 5 mL tube for Helios PSI; any tube size for Super Sampler) and have effective methods to counteract sedimentation. (Super Sampler uses a pump-driven method; Helios PSI uses rotational agitation.) Upgrading to or trading in for Helios provides all of the additional advantages mentioned above (doubled throughput, modern UI and improved onboard data storage and security). And Helios is designed, manufactured and fully supported by Fluidigm.

How does Helios double throughput?

Helios employs a modified sample injector architecture that produces cell-derived ion clouds that are half the size (~1 mm) of those generated by CyTOF 1 or CyTOF 2 instruments. Helios also uses a modified signal amplifier that preserves dynamic range, necessitated by the larger per-push signal that results from packaging cell-derived signal into fewer pushes. As a result of these two changes, twice the number of cells can be resolved per unit of time.

How does Helios improve sampling efficiency?

Helios does not use carrier solution (which dilutes the sample) to push the sample into the nebulizer. It uses positive argon gas pressure, eliminating possible sample dilution.

How does the Helios tube loader work?

The Helios tube loader (the Pneumatic Sample Introduction, or PSI) uses argon gas to force the liquid sample within a 1.5 or 5 mL tube into the uptake probe and onward into the nebulizer. To counteract sedimentation, the tube is rotationally agitated every minute.

How does Helios increase sensitivity?

Helios theoretically increases sensitivity because each cell-derived ion cloud is measured in fewer pushes compared to CyTOF 1 and CyTOF 2 instruments. Thus, the same signal is measured with less potential noise. Also note:

UPGRADE—The instrument response specification has been raised from 400,000 to 600,000 counts/pg ¹⁵⁹Tb.

TRADE-IN—The instrument response specification has been raised from 200,000 to 600,000 counts/pg ¹⁵⁹Tb due to ion optic improvements.

What are the Gaussian parameters and how do they help my research?

Helios writes four new Gaussian discrimination parameters to your .fcs files: width, residual, center and offset. These parameters are intended to resolve ion fusion events from single events with statistics of the Gaussian distribution generated by each event.

What is the advantage of the extra channels?

UPGRADE—The extra channels accommodate future probes that fall in the 75–88 Da range.

TRADE-IN—The extra channels accommodate existing probes 89Y and 209Bi, simultaneous acquisition of cisplatin dead cell identifier with Pd-based barcoding probes and future probes that fall in the 75–102 and 194–209 range.

Why is the barcoding workflow easier on Helios than on CyTOF 1 or CyTOF 2?

The Cell-ID™ 20-Plex Pd Barcoding Kit enables unique barcoding of 20 samples so they can be combined and subsequently stained and acquired as one multiplexed sample, followed by software debarcoding and individual sample analysis.

Multiplexing samples improves data quality because the 20 samples are stained, processed and acquired as one sample, eliminating sample-specific staining and data collection variation.

The multiplexed sample often exceeds 0.5 mL, the maximum loop volume for CyTOF 1 and CyTOF 2 instruments. Helios samples from 5 mL tubes, which accommodate barcoded experiments better. This enables unattended operation because the entire experiment is collected as one extended acquisition.

TRADE-IN—In addition, the extra channels enable simultaneous acquisition of cisplatin dead cell identifier with Pd-based barcoding probes.

Will my Autosampler work on the upgraded machine?

Yes.

Does the Autosampler show increased sampling efficiency and throughput when connected to Helios?

Throughput is increased on Helios, since the gain is a property of the Helios injector/amplifier architecture to which all Autosampler samples are exposed.

Autosampler sampling efficiency for Helios, CyTOF 1 and CyTOF 2 is comparable since the efficiency gain for Helios is a property of the tube loader, which is not used by the Autosampler.

With the upgrade, should I update my mass response curve to the Helios standard?

We do recommend updating the mass response curve. Helios instruments are manufactured with a tight mass response specification with the aim of better enabling collection of samples from the same experiment on different machines.

What impact does changing the mass response curve have on my data?

Changing the mass response curve changes the sensitivity of each channel. Some channels will become more sensitive, some less. This is only an issue for targets that are at the detection limit of the system.

Does the bead passport normalize my machine's mass response curve to the Helios standard?

Yes. But be aware that changing the mass response curve does change the sensitivity of each channel: Some channels will become more sensitive, some less. This is only an issue for targets that are at the detection limit of the system. Normalization cannot recover any signal that is not detected during data collection.

How will my data change after the upgrade?

UPGRADE—The only change expected would result from updating your mass response curve to the Helios standard, in which case some channels will become more sensitive, some less (see the question above, “What impact does changing the mass response curve have on my data?”).

TRADE-IN—The instrument will likely be more sensitive. Also, the mass response curve may differ from your CyTOF system, in which case some channels will become more sensitive, some less (see the question above, “What impact does changing the mass response curve have on my data?”).

What do I not get with the upgrade?

The CyTOF 2-to-Helios upgrade provides full Helios functionality. You have the option (highly recommended) to update your instrument's mass response curve to the Helios standard.

What new capabilities are on the horizon for mass cytometry?

The Helios platform is designed for growth. Future capabilities in tissue imaging and RNA detection have already been proven and are currently in commercial development. More metal tags for expanding panel size are also on the horizon.

What is the difference between Helios and the Helios Imaging system?

Helios is the latest generation of the CyTOF mass cytometer system. It is designed to analyze metal-tagged antibodies in cells suspended in solution. The forthcoming Imaging system will be a separate module that can be connected to Helios to analyze metal-tagged antibodies in tissue. It uses laser ablation and can relate the metal tags to their spatial position on a slice of tissue. To use an Imaging system you must also buy, or have access to, a Helios or a Helios-upgraded mass cytometer. The Imaging system is expected to launch in the summer of 2016. If you have questions about the Imaging Mass Cytometer (IMC), please contact Ashton Brietkreutz (ashton.brietkreutz@fluidigm.com) or Robert Ellis (robert.ellis@fluidigm.com).

Will the Helios Imaging system be compatible with CyTOF 1 or CyTOF 2 instruments?

The Imaging system will be compatible with Helios and CyTOF 2-to-Helios upgraded instruments, but not CyTOF 1, CyTOF C5 upgrade, or CyTOF 2 instruments. The Imaging system will launch in the summer of 2016. If you have questions about the IMC, please contact Ashton Brietkreutz (ashton.brietkreutz@fluidigm.com) or Robert Ellis (robert.ellis@fluidigm.com)

For technical support visit fluidigm.com/support

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