

Software for Oligonucleotide Characterization

LabSolutions Insight Biologics

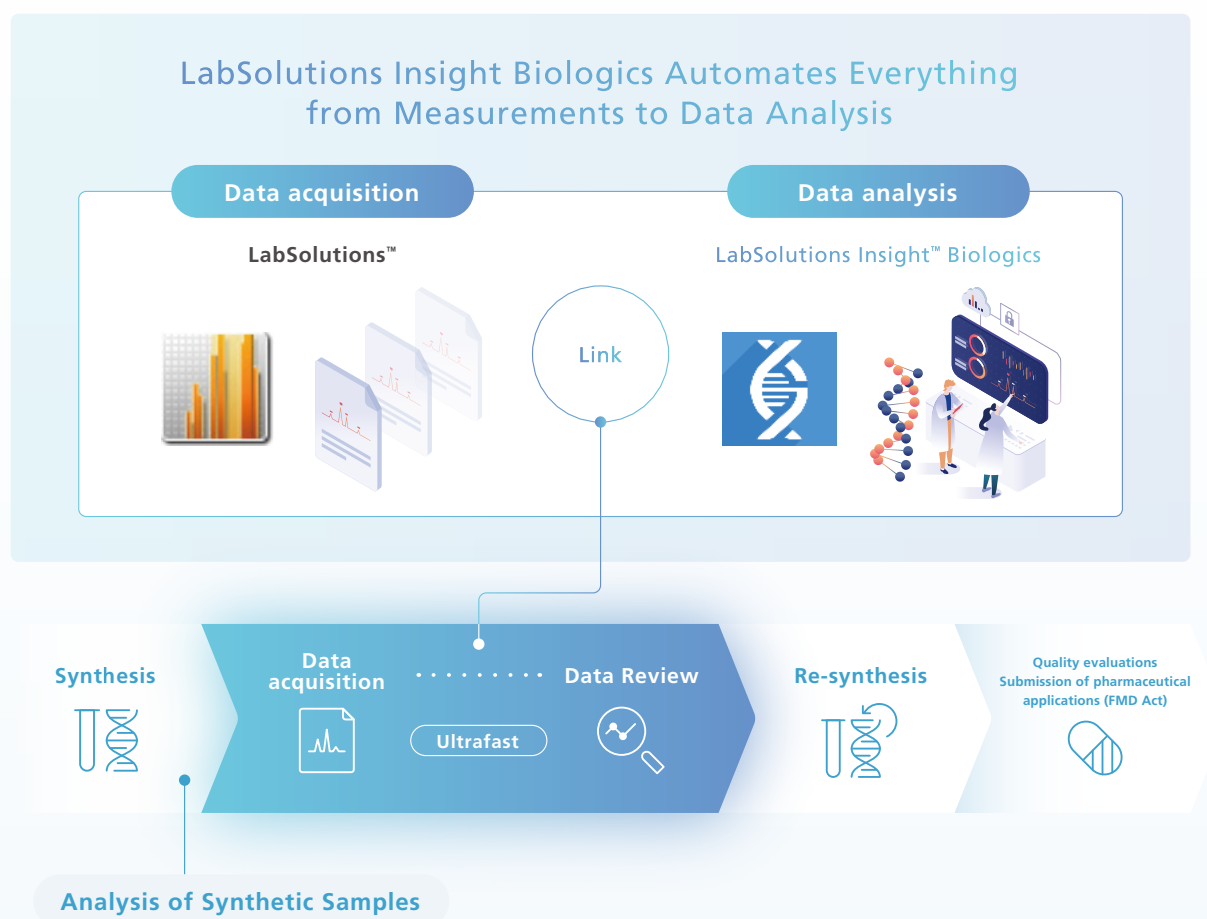


LabSolutions Insight™ Biologics

Supporting Innovation with Oligonucleotide Therapeutics

LabSolutions Insight Biologics is software for analyzing the characteristics of oligonucleotides using single quadrupole (SQ) mass spectrometers, quadrupole time-of-flight (QTOF) mass spectrometers, or MALDI mass spectrometers. Analyzing the characteristics of oligonucleotides involves the identification of impurities and sequence confirmation with modification positions estimated. Performing these analyses using a complicated mass spectrum requires a great deal of time. Additionally, using multiple software programs for the measurements and data analysis complicates the operations and puts considerable strain on the operator.

LabSolutions Insight Biologics has been designed to resolve these issues.



With LabSolutions Insight Biologics, it is easy to configure the primary component sequence and data analysis parameters. Then using the sequence entered, the program can comprehensively identify chain length differences, nucleotide gaps, modifications, ion adducts, and other impurities. The molecular weights of the primary components and impurities are estimated with the MS1 spectrum, and the sequence is estimated from the fragment spectra of the impurities. Also, the sequence validity can be confirmed by visually checking the fragment coverage.

LabSolutions Insight Biologics is all-in-one LabSolutions series software. After measurements with LabSolutions, the data analysis is implemented automatically with the specified parameters, so when the measurements are started, everything up to the display of the analysis results is performed seamlessly.

Capable of Analyzing LCMS-SQ, LCMS-QTOF, and MALDI Data

In addition to QTOF, LabSolutions Insight Biologics can analyze SQ and MALDI data. When QTOF is used, high-accuracy results are obtained, while SQ and MALDI can be used for applications where convenient measurement is prioritized. In process management, everything from the establishment of efficient processes to productivity improvements can be implemented. In addition, it can be used in research and development in a variety of fields.

The data analysis parameters can be conveniently deployed even in workflows with different instruments, so there is no need to remember new operations.



A Variety of Mass Spectrometer Solutions for Various Workflows			
Synthesis confirmation	◎	◎	◎
Sequencing confirmation		◎	◎
Impurity analysis	◎	◎	◎
Synthesis and purification monitoring	◎	◎	◎
Molecular weight confirmation tests	◎	◎	◎
Sequencing confirmation tests		◎	◎
Purity tests	◎	◎	◎

◎: Excellent ○: Good △: Average

Advantages of Each Mass Spectrometer at Each Stage and for Each Need			
Confirmation of the molecular weights of the primary components	○	◎	○
Sequence estimation		◎	◎
Comprehensive impurity analysis	○	◎	△
Analysis time	△/○*	△	○
Data compliance	○	○	
Installation footprint	◎	△	○

* The analysis time differs depending on the application.

List of Basic Functions Provided by LabSolutions Insight Biologics

Application: Comprehensive identification and quantitative determination of oligonucleotide impurity sequences

- Easy creation and importing of the primary component sequences of oligonucleotides
- Display of structural formulas for the primary component sequences
- Selection of target modifications (impurities) or addition and editing of modification dictionaries
- Display of component chromatogram
- Simultaneous display of the MS1 spectrum and polyvalent ion analysis spectrum
- Selection of the method for calculating the abundance ratio to suit the objective **NEW**
- Comparison of identified components between batches and between components **NEW**
- Positive **NEW** and negative polarity analysis
- Stand-alone mode and CS mode **NEW** (Compliance-ready support for LCMS-SQ and LCMS-Q-TOF)
- Searches for impurities with different chain lengths, intermediate gaps **NEW**, and ion adducts
- Five types of reports (full, summary, method, comparison **NEW**, and custom)
- Supports oligonucleotides up to 140 bases long
- Available languages: Japanese, English, Chinese
- Compatible with LCMS-SQ **NEW**, LCMS-Q-TOF, and MALDI-MS **NEW**
- Audit trail
- Optimization of data analysis results **NEW**
- Comparison with theoretical fragment spectrum **NEW**

UX A Superior User Experience

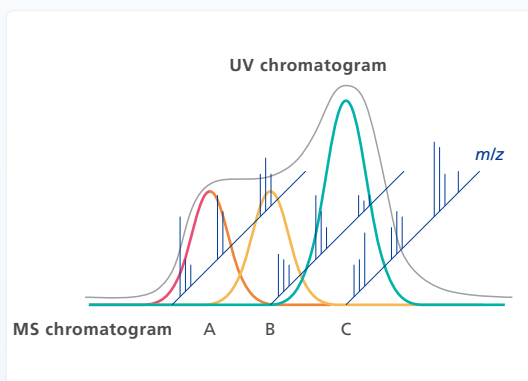
LCMS-SQ

LCMS-QTOF

MALDI

LC Based Purity Calculations

Using the peak information from the MS spectrum simultaneously with the integrated LC chromatogram peaks enables purity calculations, even for components that are insufficiently separated in the LC chromatogram.



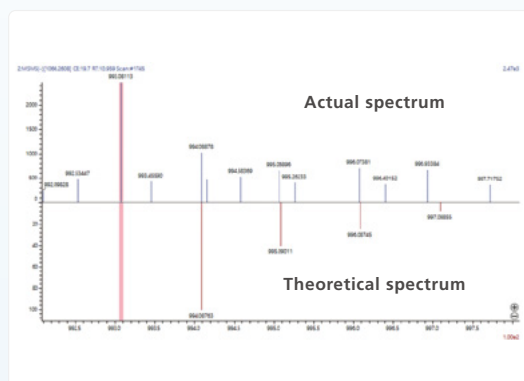
LCMS-SQ

LCMS-QTOF

MALDI

Fragment View Function

The software includes a coverage display, which indicates fragment spectral assignments. The coverage display switches to match the items to be checked. Reports can also be output.



LCMS-SQ LCMS-QTOF MALDI

Optimization of Identification Results

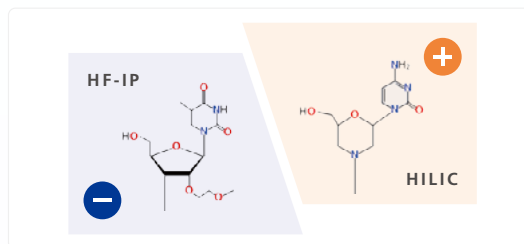
Given the complex nature of synthesizing oligonucleotide therapeutics Insight Biologics is designed to positively identify each product related component with high confidence.



LCMS-SQ LCMS-QTOF MALDI

Analysis Functions for Each Ionization Polarity

By supporting both positive and negative ionization modes it enables data analysis using ion pair reagents in negative ion and HILIC separations in positive ion (for example analyzing morpholino nucleic acid in positive ion).



LCMS-SQ LCMS-QTOF MALDI

Efficient Analysis of MALDI Spectra

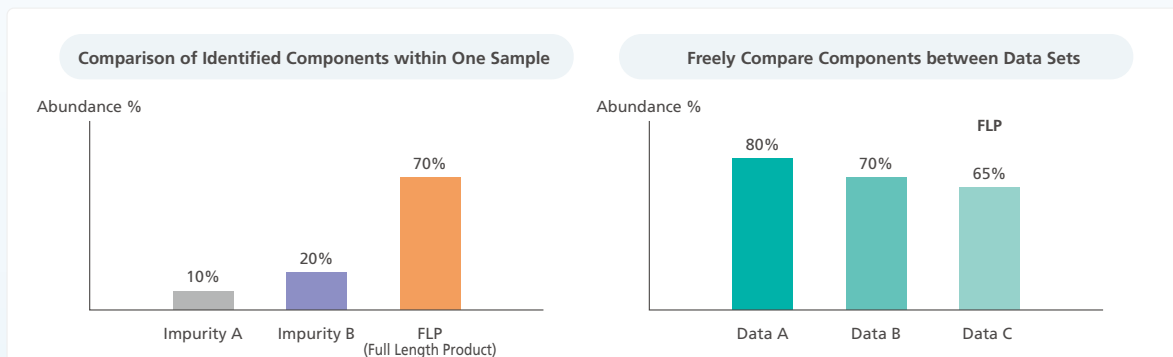
With MALDI-MS, the data analysis algorithm has been optimized for a nominal mass univalent spectrum to deliver synthesis and sequence confirmation. The underlying workflow is common to both MALDI and LC-MS instruments providing the same user experience and data presentations negating the need for instrument specific training in data analysis.



LCMS-SQ LCMS-QTOF MALDI

Component Comparison Functions

The identification results within one sample and for each batch row can easily be compared.



UX

A Superior User Experience

UX 1

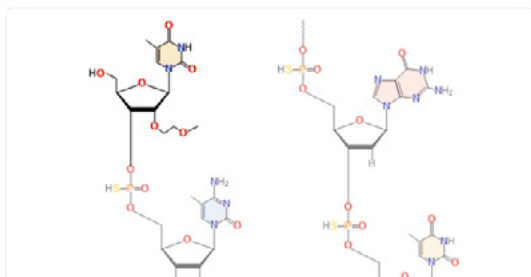
Structural Formula Display

In the window for setting the oligonucleotide sequences, the structural formula of the sequence that was entered is displayed in real time, enabling quick and easy verification of the information. Also, the nucleobases used in the sequence, as well as the backbone linker, ribose, and base modifications, can be added and edited.

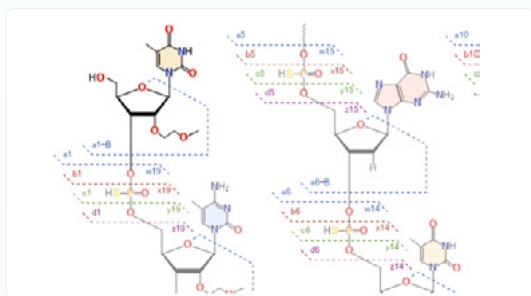
Input oligonucleotide sequences

#	Name	Base	Base Modification	Linker	Ribose	Formula	Mono-isotopic
1	Cd	Cytosine	None	-----	Deoxy	C ₉ H ₁₁ N ₃ O ₂	193.06513
2	sTd	Thymine	None	Phosphorothioate	Deoxy	C ₁₀ H ₁₃ N ₂ O ₆ P S	320.02319
3	sGd	Guanine	None	Phosphorothioate	Deoxy	C ₁₀ H ₁₂ N ₅ O ₅ P S	345.02968
4	sCd	Cytosine	None	Phosphorothioate	Deoxy	C ₉ H ₁₂ N ₃ O ₅ P S	305.02353
5	sTd	Thymine	None	Phosphorothioate	Deoxy	C ₁₀ H ₁₃ N ₂ O ₆ P S	320.02319
6	sAd	Adenine	None	Phosphorothioate	Deoxy	C ₁₀ H ₁₂ N ₅ O ₄ P S	329.03476
7	sGd	Guanine	None	Phosphorothioate	Deoxy	C ₁₀ H ₁₂ N ₅ O ₅ P S	345.02968

The structural formula of sequences is shown in real time



Base modifications can be added and edited

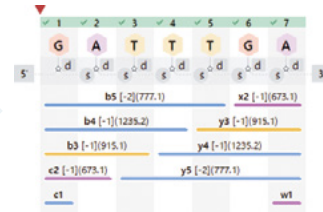


UX 2

Fragment Coverage Display

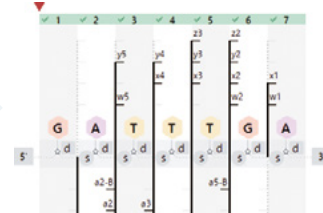
The software includes a coverage display which indicates fragment spectral assignments. The coverage display switches to match the items to be checked. Reports can also be output.

Checking ion intensity and coverage



Switchable coverage display

Checking the fragment sequence



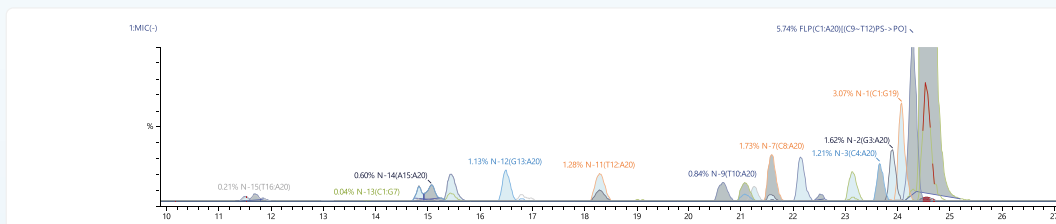
Modification positions are also clearly identified



UX 3

Component Chromatogram Display

The impurity peaks are displayed as a component chromatogram. The UV and MS chromatograms can be checked simultaneously.

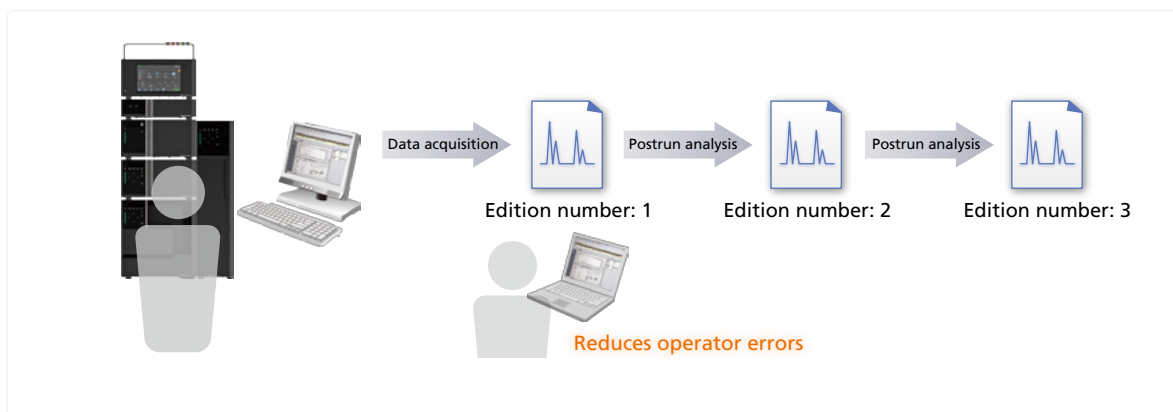


Data Integrity Support

LabSolutions Insight Biologics contributes to heightening workflow efficiency while managing data in accordance with the guidelines in U.S. FDA 21 CFR Part 11, the Japanese edition of the ER/ES Guidelines, and the EU GMP Annex 11.
(Compliance-ready support for LCMS-SQ and LCMS-Q-TOF with LabSolutions CS)

Database Management Prevents Mistakes

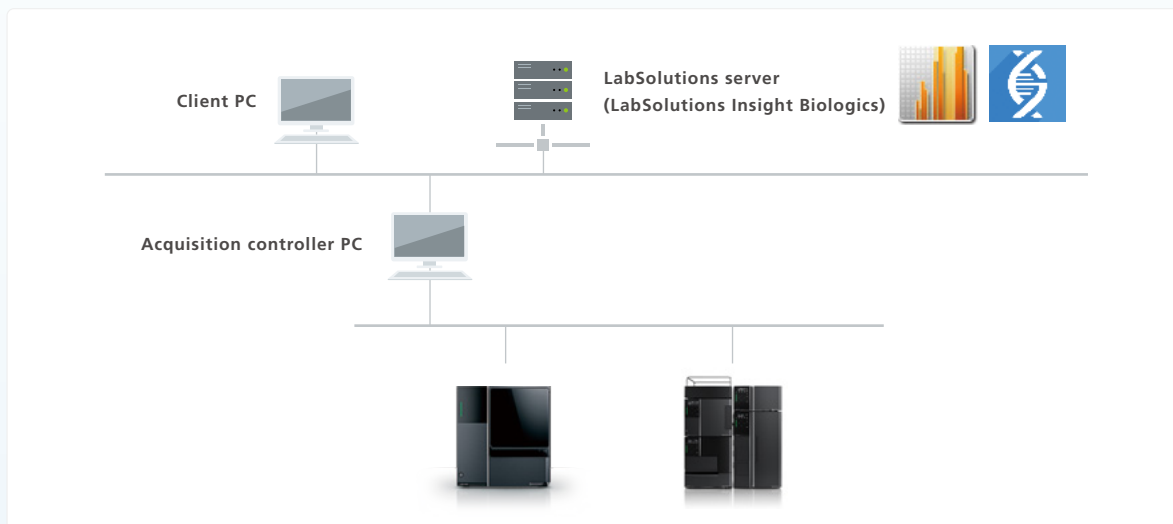
The acquired data can be securely managed using a database. Mistakes such as overwriting or deleting acquired data can be avoided by managing acquired data logs with a database. In addition, when postrun analysis is performed on the acquired data, the postrun analysis data is automatically managed using edition numbers, so the acquired data is not overwritten. Past data can also be easily displayed.



Robust Security

Multiple policies are provided for strengthening the security of the system. The software can be customized in detail depending on the operation. This includes an electronic signature workflow; password policies, including minimum password length and expiry dates; and audit trail settings to ensure data integrity. Further, basic items required for data integrity can be automatically collected and set.

Note: Contact your Shimadzu representative regarding QTOF data integrity.
LabSolutions CS regulatory support is available for LCMS-SQ and LCMS-Q-TOF.



Licensing Types and Expiration Dates

Stand-Alone Edition

Licensing Classifications	Base License	Annual License
	LabSolutions Insight Biologics can be used.	Product support and updates are provided.
First Year Pack	No expiry (2 users)	3 years
1-Year Continuous License	—	1 year

- For the first year, be sure to purchase the first year pack.
- For the fourth year and afterward, purchase as many 1-year continuous licenses annually as the number of users on the system at the time of renewal. If the annual license has expired, a separate update license must be purchased for product updates.
- A support plan contract is necessary for system maintenance.

Client Server Edition

Licensing Classifications	Base License	Annual License
	LabSolutions Insight Biologics can be used.	Product support and updates are provided.
First Year Pack	No expiry (2 users)	3 years
Additional License for 5 Users	No expiry (5 users)	—
Additional License with No Expiry for 10 Users	No expiry (10 users)	—
1-Year Continuous License (Up to 10 Users)	—	1 year
1-Year Continuous License (Up to 30 Users)	—	1 year
1-Year Continuous License (Unlimited Number of Users)	—	1 year

- For the first year, be sure to purchase the first year pack.
- For the fourth year and afterward, purchase a 1-year continuous license annually. If the annual license has expired, a separate update license must be purchased for product updates.
- A support plan contract is necessary for system maintenance.
- The user license indicates the number of simultaneous users.
- The LabSolutions CS system must be purchased separately.

System Requirements

Operating System

OS	Windows® 10/11
Software	LabSolutions LCMS Ver. 5.128 or earlier LabSolutions CS Ver. 6.128 • For some functions, inquire regarding the compatible LabSolutions version.

Operating System

LC	Nexera XS inert and other Nexera series instruments
LC-MS	LCMS-9050 (recommended), LCMS-9030, LCMS-2050 (recommended), LCMS-2020
MALDI-MS	MALDI-8030 (mzML), MALDI-8020 (mzML), MALDImini-1 (mzML)

LabSolutions Insight, LabSolutions, MALDImini and Nexera are trademarks of Shimadzu Corporation or its affiliated companies in Japan and/or other countries. Windows is either a registered trademark or a trademark of Microsoft Corporation in the United States and/or other countries.



Shimadzu Corporation

www.shimadzu.com/an/

For Research Use Only. Not for use in diagnostic procedures.

This publication may contain references to products that are not available in your country. Please contact us to check the availability of these products in your country.

Company names, products/service names and logos used in this publication are trademarks and trade names of Shimadzu Corporation, its subsidiaries or its affiliates, whether or not they are used with trademark symbol "TM" or "®". Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services, whether or not they are used with trademark symbol "TM" or "®". Shimadzu disclaims any proprietary interest in trademarks and trade names other than its own.

The contents of this publication are provided to you "as is" without warranty of any kind, and are subject to change without notice. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication.