

Milli-Q®

Lab Water Solutions



Are water
contaminants
impacting your
experimental results?

How to select the best water
quality for your science

LPPT UGM
Sonny N

MERCK

Have you ever wondered what type of water you should use?

Molecular-biology grade

Deionized

Pure

Distilled

Ultrapure



All water types are not created equal,
and are not interchangeable



1

Water contaminants

2

Potential impact on your experiments

3

Selecting the best water solution

Agenda

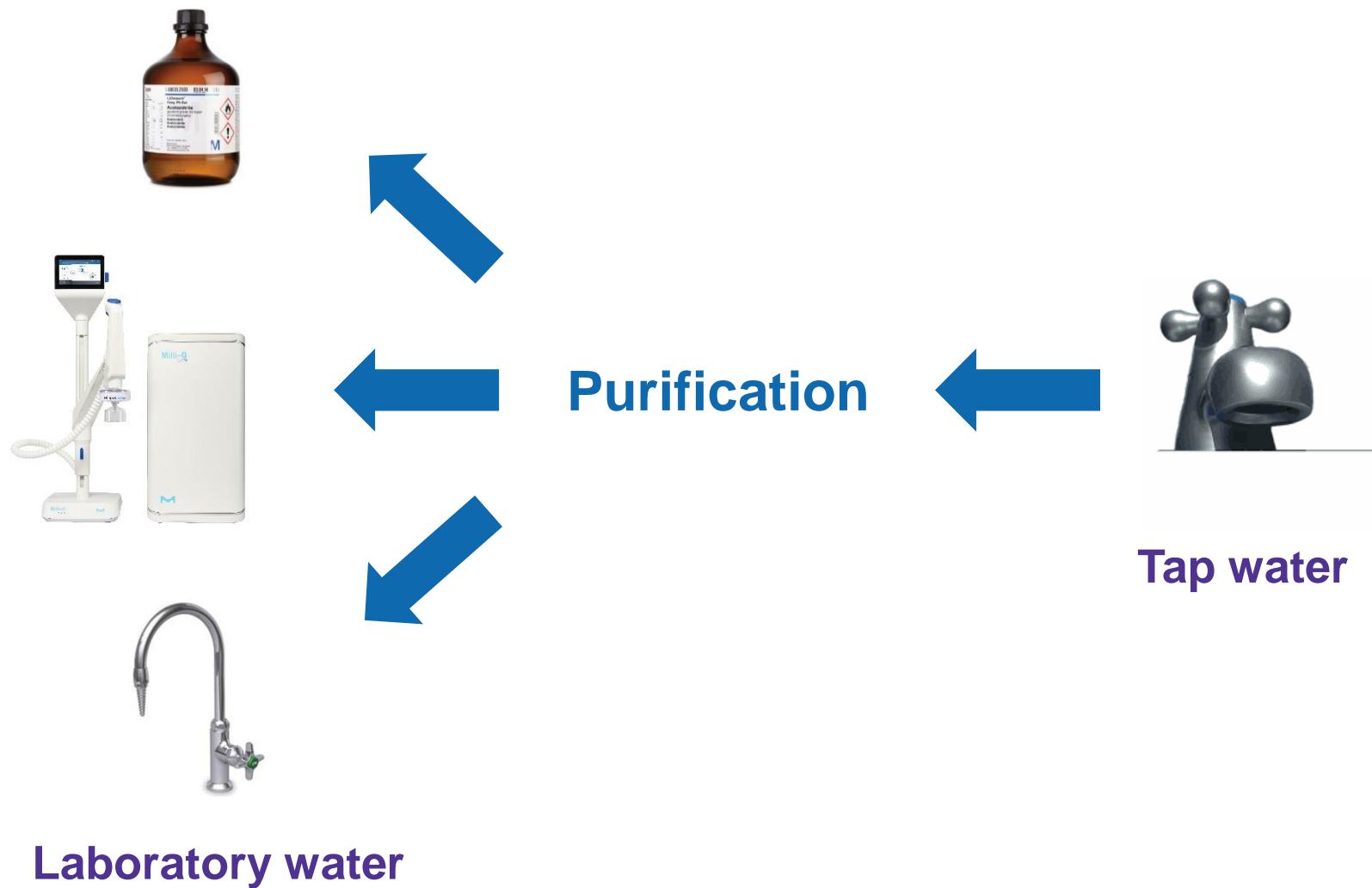


1

water contaminants

Merck KGaA
Darmstadt, Germany

Water for the laboratory



Water contaminants

Ions



Cations: Na^+ , Ca^{2+} ...

Anions: Cl^- , SO_4^{3-} ...

Organics

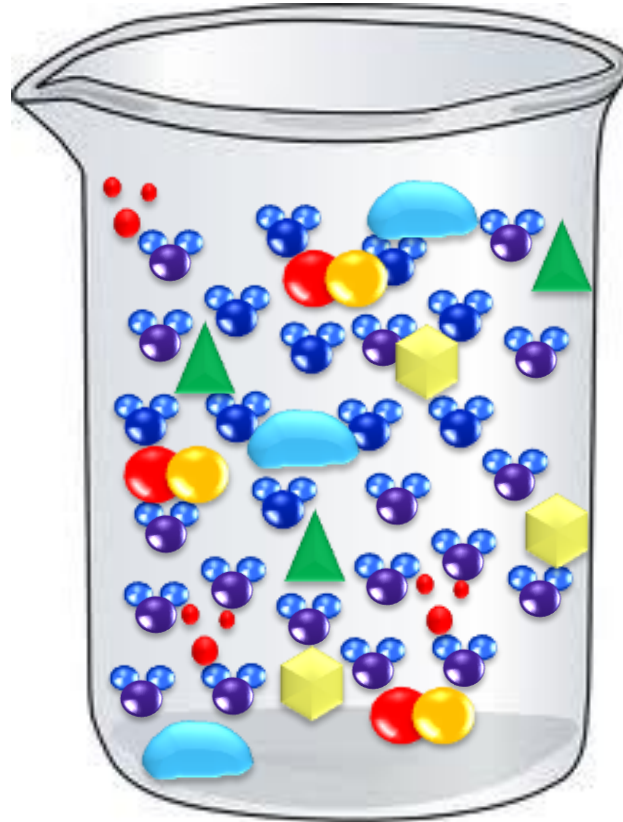


Natural:

Tannic Acid, Humic Acid...

Artificial:

Drug residues, Herbicides...



Particles & Colloids



Sand, dust, silica

Micro-organisms and by-products



Bacteria, Endotoxins, Proteins, Enzymes (Nucleases...)

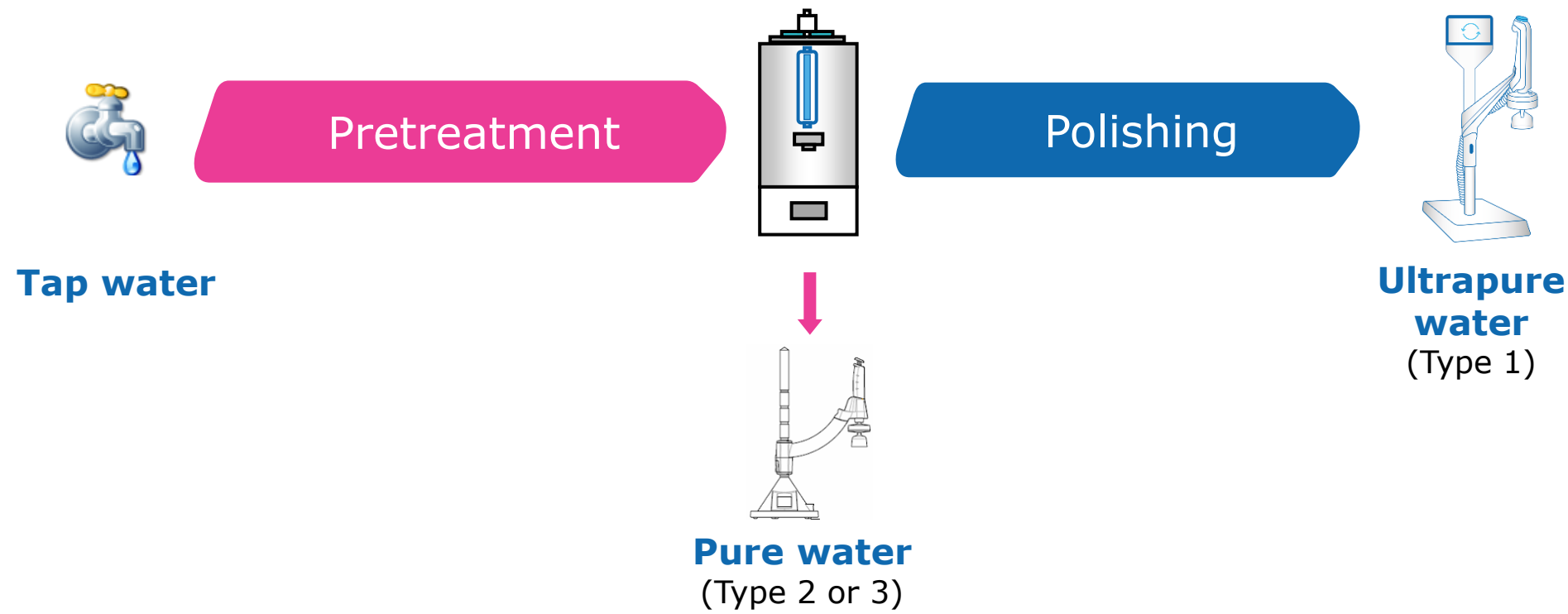
Dissolved Gases



O_2 , CO_2 , N_2



Water purification



<u>Ions:</u>	ppm	→	sub-ppb	→	ppt, sub-ppt
<u>Organics:</u>	ppm	→	< 50 ppb	→	< 5 ppb



Water quality monitoring

**Ionic purity
(Resistivity)**

**Organic
purity (TOC)**



Laboratory water types



Ultrapure
Type I
(R = 18.2 MΩ.cm)

- **Ultrapure water**
- HPLC-grade
- Molecular biology grade

- **0.055 µS/cm**
- ASTM Type I
- CLSI SRW

- Chromatography
- Cell and Molecular Biology
- Trace metals analysis
- Specific removal

Pure / Type 2
(~1-15 MΩ.cm)

CLRW
(R > 10MΩ.cm)

- **Pure water**
- DI. RO DI,
- Distilled

- **~ 1- 0,067µS/cm**
- ASTM Type II
- CLSI CLRW
- USP Purified

- Titration, pH, UV-Vis
- Microbiology (0.22 µm filtered)
- Glassware rinse, weathering devices

Pure / Type III / SRW
(R < 1 MΩ.cm)

- **Pure water**
- RO
- Filtered

- **< 1 µS/cm**
- ASTM Type III
- CLSI SRW

- Autoclave feed
- Environmental/ stabilitychambers
- Non-critical rinsing



The impact of water on experimental results



Water should be free of any contamination that could compromise the results of any given experiment:

- Free of the analytes of interest (or that could interfere with the results)
- Free of contaminants that may interfere with the performance of the instrument



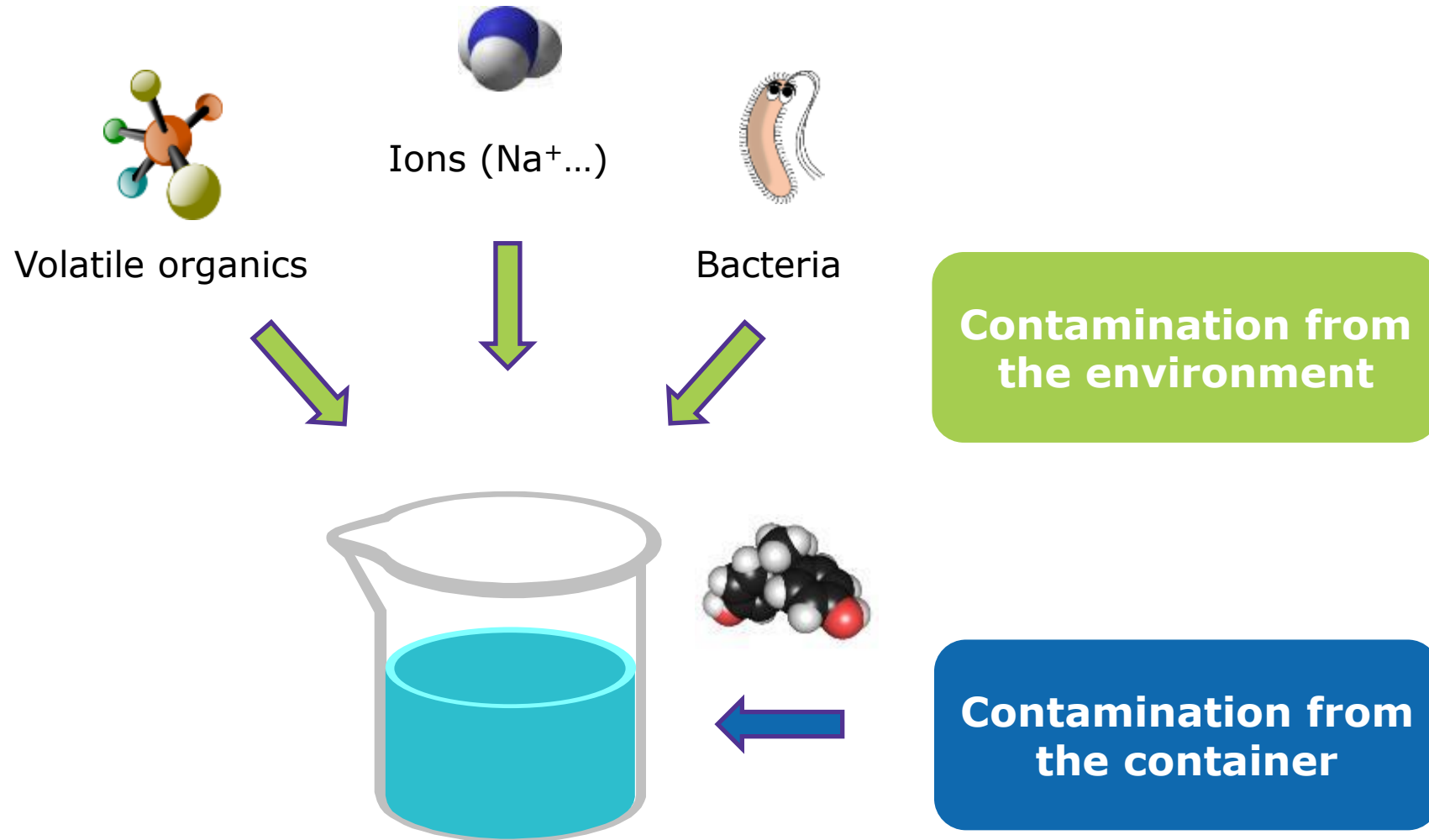
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potential impact on your experiments

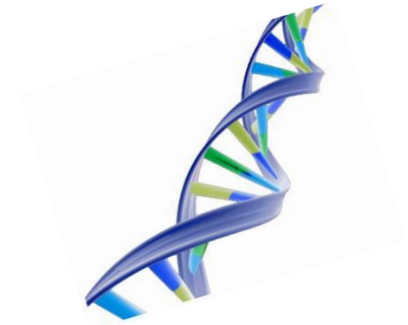
Impact on critical applications



Storage of ultrapure water should be minimized



Effects of water contaminants on PCR-based techniques



Bacteria & by-products

- Bacteria are source of nucleases, DNA, organics, ions

Organics

- Organics (especially humic or fulvic acids) could bind to DNA or interfere with enzymes

Ions

- Fe, Cd or Zn may interfere with enzymes
- Mg concentration must be carefully controlled

Particles

- May deposit in lines (if automation)



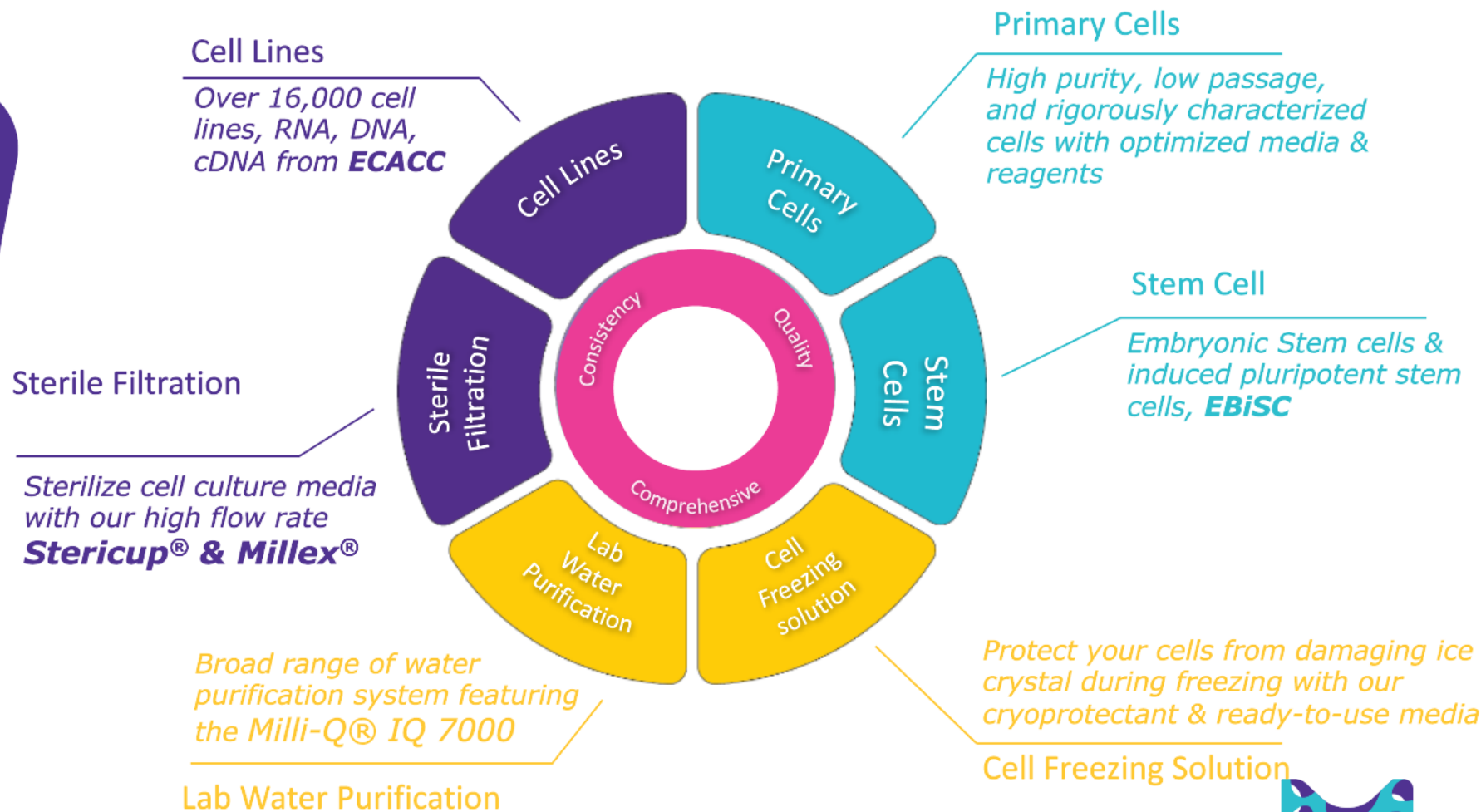
PREPARE

GROW

ANALYZE

Merck Cell Culture

Establishing a successful culture begins with preparing cells and media with the highest standards



Cultivate Consistency

Solutions for all your
cell culture needs

Discovery requires a solid foundation. From cell preparation and growth to investigation and analysis, our comprehensive portfolio provides the quality and consistency to ensure the validity of your results.

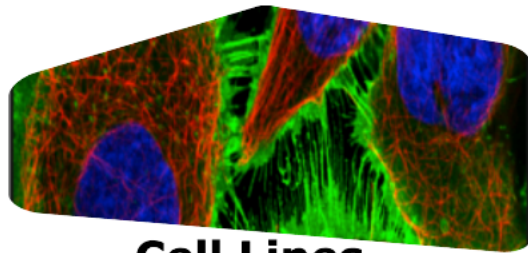
PREPARE

GROW

ANALYZE



Filtration



Cell Lines



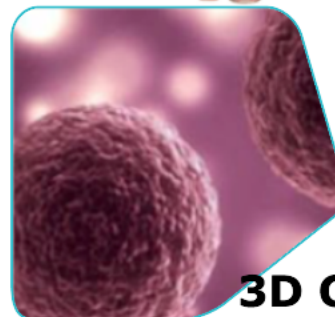
Water
Purification



Cultureware



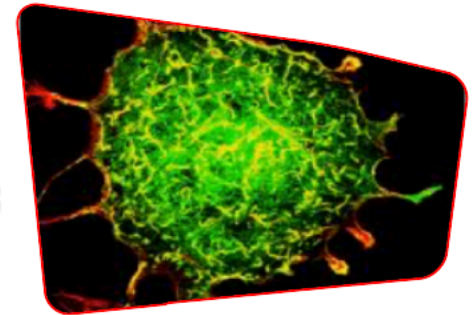
Media



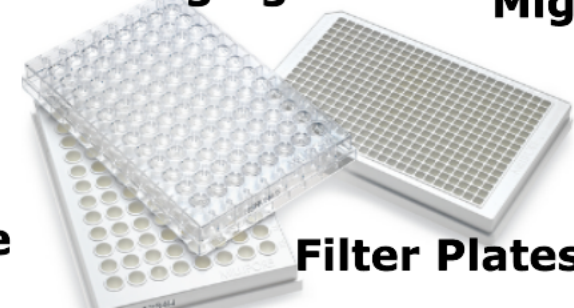
3D Culture



Live Cell
Imaging



Invasion/
Migration



Filter Plates

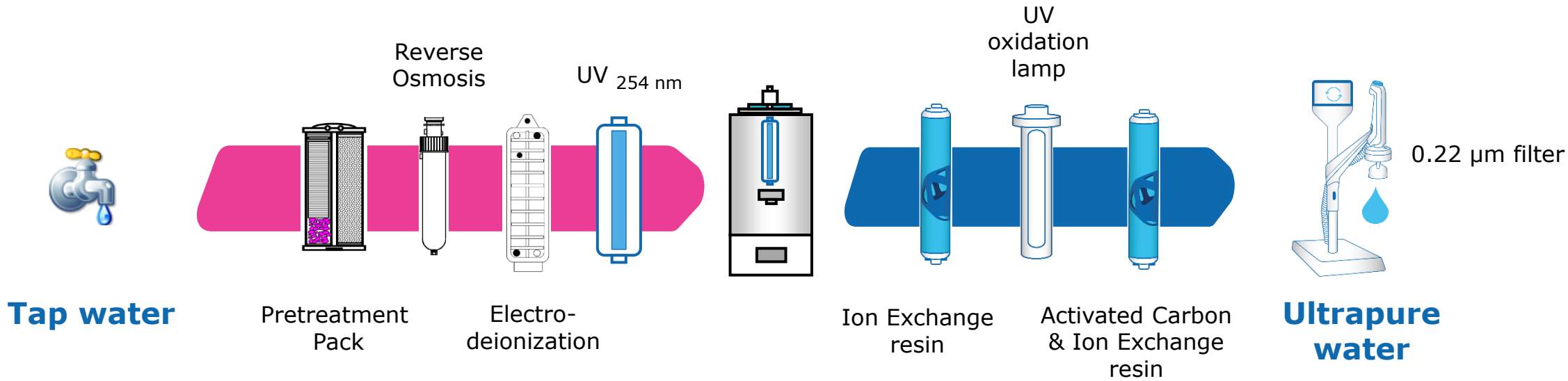




3

selecting the best water solution

Combination of technologies



	RO	EDI	UV 254 nm	UV 254 nm	Ion exchange	UV oxidation	Activated carbon	0.22 µm screen filter*
Organics	X					X	X	
Ions	X	X			X			
Particles	X							X
Bacteria	X		X	X				X

*Note: Other final polishers are available, depending on your application



Benchtop range: Milli-Q® products portfolio

Feed water:

Potable tap water

Pure water



Tiering	Ultra Pure / Type 1 R = 18.2 MΩ.cm	Pure / Type 2 R>5 MΩ.cm	Pure / Type 3
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High Tier


 Milli-Q® IQ 7000


 Milli-Q® IQ 70XX


 Milli-Q® IX 70XX

Mid Tier


 Milli-Q® EQ 7000


 Milli-Q EQ7008/16


 Elix® Essential


 RiOs™ Essential

Low Tier


Synergy®


Simplicity®


Direct-Q®


RiOs-DI®

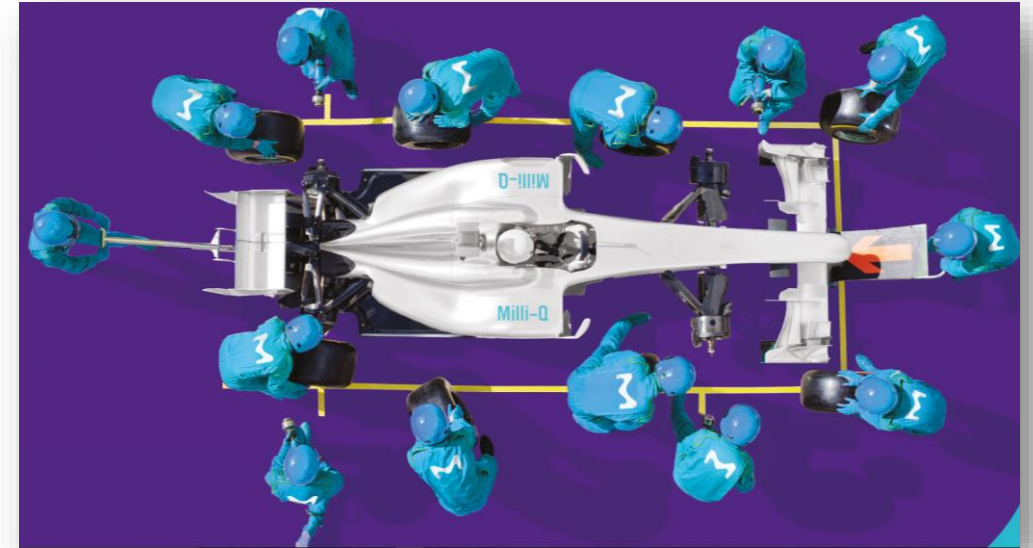

Milli-DI®


RiOs™



Peace of Mind

- Your purification system is a sophisticated laboratory instrument and needs to be maintained
- A **comprehensive set of services** are available to meet your needs and support you throughout the entire lifetime of your Milli-Q® system
- You can tailor your **Service Plan** to meet your lab's needs
- **Qualification and calibration** services available to support you in complying with international quality standards





Conclusions

- Water is not “just water”. It is a reagent. It should be considered with the same care as other reagents in the laboratory.
- Different laboratory applications require different water qualities. Being aware of the various water contaminants and their potential impact can help you make the best choice.
- A wide range of water purification systems is available to provide the water quality best fitted to each scientist’s needs. The availability of several cartridges tailored to specific applications provides great flexibility.



Thank you for your attention



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