



Institut za javno zdravje, Skopje

Drinking water

Institute of Public Health Skopje

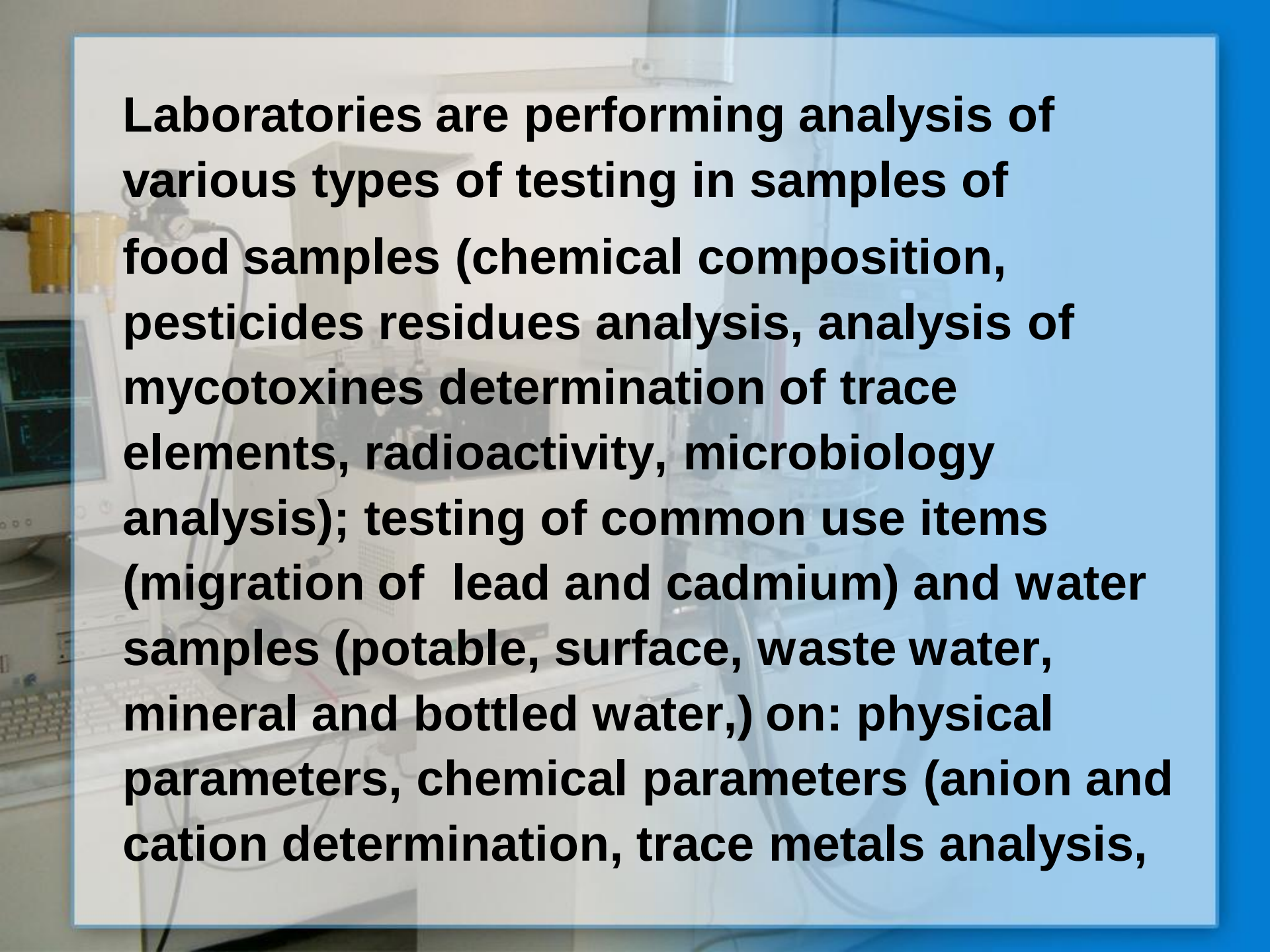
Vesna Kostik,

24th September 2014

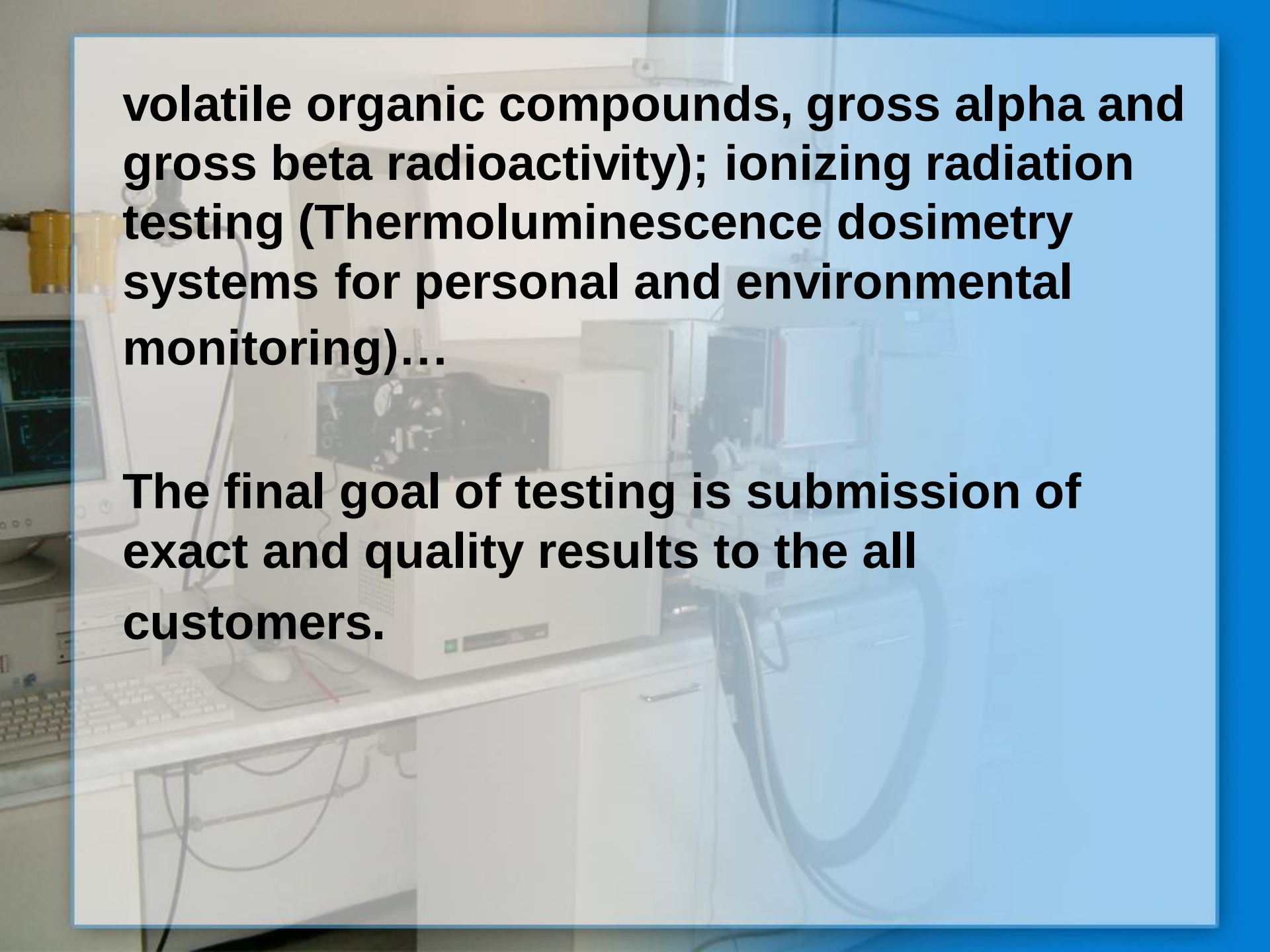
Institute of Public Health Skopje – Centre of reference laboratories

**Centre of reference laboratories as a part of
Institute of Public Health- Skopje is consisted of
following laboratories:**

- Laboratory of Sanitary Microbiology**
- Laboratory for Food Quality Control**
- Laboratory for Water Quality Control**
- Laboratory for Contaminants and Eco - toxicology**
- Laboratory for Testing of Metals**
- Laboratory for Radioecology**
- Laboratory for Ionizing Radiation**
- Laboratory for Testing common use items**

The background of the slide shows a laboratory setting with various pieces of equipment. On the left, there is a computer monitor displaying some data, and a keyboard is partially visible. In the center and right, there are various laboratory instruments, including what appears to be a spectrophotometer or a similar analytical device with a sample holder and a light source. The overall scene is a typical laboratory environment for chemical and biological analysis.

Laboratories are performing analysis of various types of testing in samples of food samples (chemical composition, pesticides residues analysis, analysis of mycotoxines determination of trace elements, radioactivity, microbiology analysis); testing of common use items (migration of lead and cadmium) and water samples (potable, surface, waste water, mineral and bottled water,) on: physical parameters, chemical parameters (anion and cation determination, trace metals analysis,

The background of the slide is a photograph of a laboratory or office setting. It features a desk with a computer monitor displaying data, a keyboard, and various pieces of scientific equipment, including what appears to be a large detector or spectrometer. The image is faded and serves as a backdrop for the text.

volatile organic compounds, gross alpha and gross beta radioactivity); ionizing radiation testing (Thermoluminescence dosimetry systems for personal and environmental monitoring)...

The final goal of testing is submission of exact and quality results to the all customers.

INSTRUMENTATION

- **Atomic Absorption Spectrometer (Flame; ETAAS – trace elements analysis)**
- **Mercury analysis system (FIAS)**
- **Gas Chromatograph (GC – FID and ECD; volatile organic compounds)**
- **Ion Chromatograph (IC; cation and anion)**
- **Liquid Chromatograph (LC)**
- **Spectrophotometer**
- **Very low background multiple detector counting system for low alpha and beta activities**

OUTPUT

Laboratories for food and water testing
8790 total samples analyzed in 2011

- **7501 samples of foodstuff**
- **1289 samples of water**
 - ➡ **729 samples of drinking (potable) water**
 - ➡ **429 samples of surface water**
 - ➡ **116 samples of bottled water**
 - ➡ **15 samples of waste water**

QUALITY ASSURANCE

- **The first accreditation certificate was obtained in 2006.**
- **58 accredited methods**
- **Accredited matrix: potable, surface, treated water, waste water and mineral water, precipitations, foodstuff, thermo luminescent dosimeters and pharmaceuticals dosage forms.**

QUALITY ASSURANCE - INTERNAL CONTROL

- **Certified reference materials (CRM) used to check trueness and provide traceability of measurements**
- **Control charts**
- **The regular use of blank and control samples**

QUALITY ASSURANCE – EXTERNAL CONTROL

Regular participation in proficiency testing schemes:

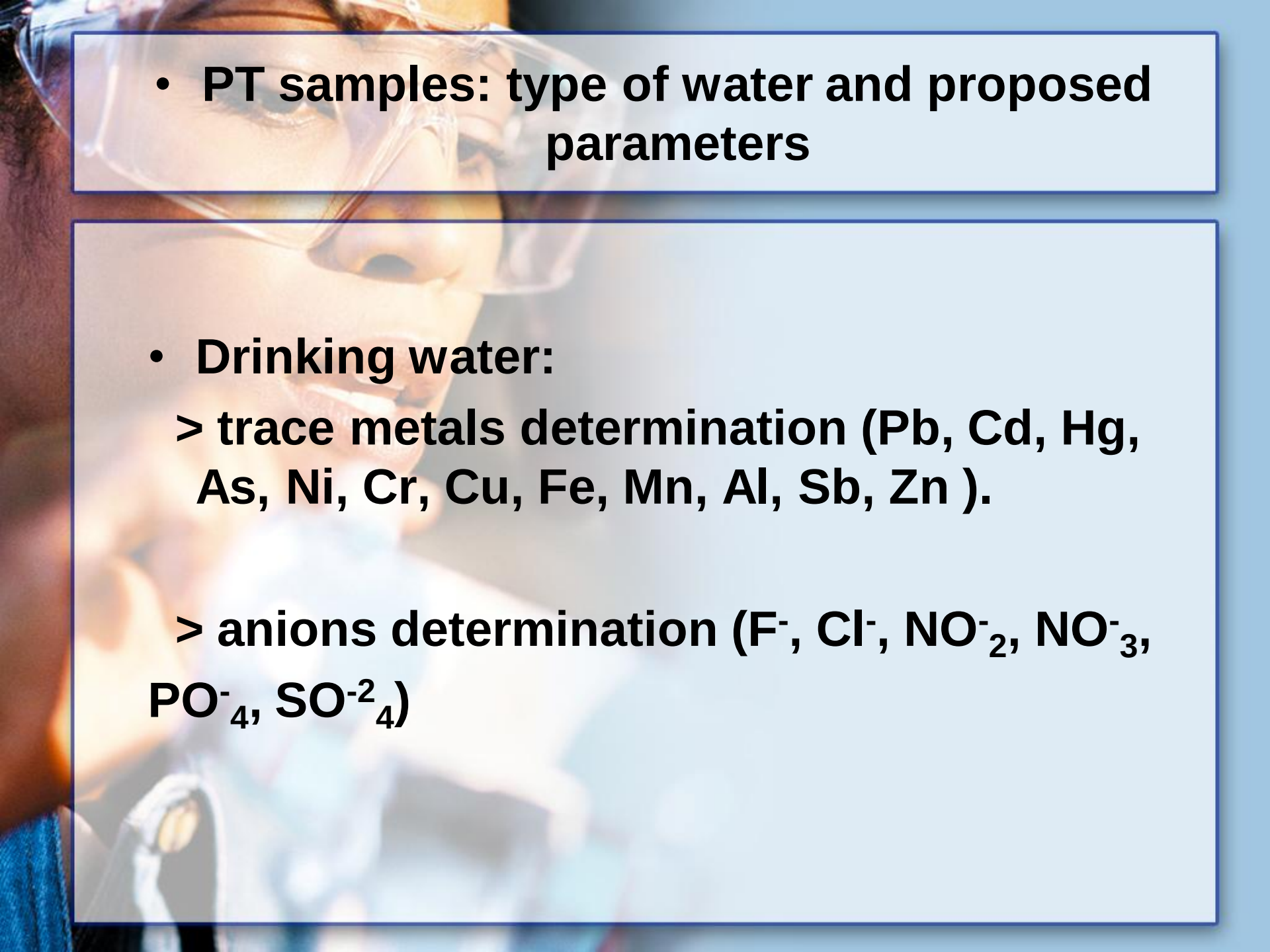
- The Swedish National Food Administration – NFA (trace elements analysis)**
- Leap Proficiency testing schemes – physical and chemical components, pesticides UK**
- National food agency microbiological division Sweden – microbiological parameters**

PROFICIENCY TESTING – PRESENTATION

THE PURPOSE OF THE PROFICIENCY TESTING

Proficiency testing comparative testing is an important way of meeting the requirements of ISO / IEC 17025 in the area of quality assurance of laboratory results.

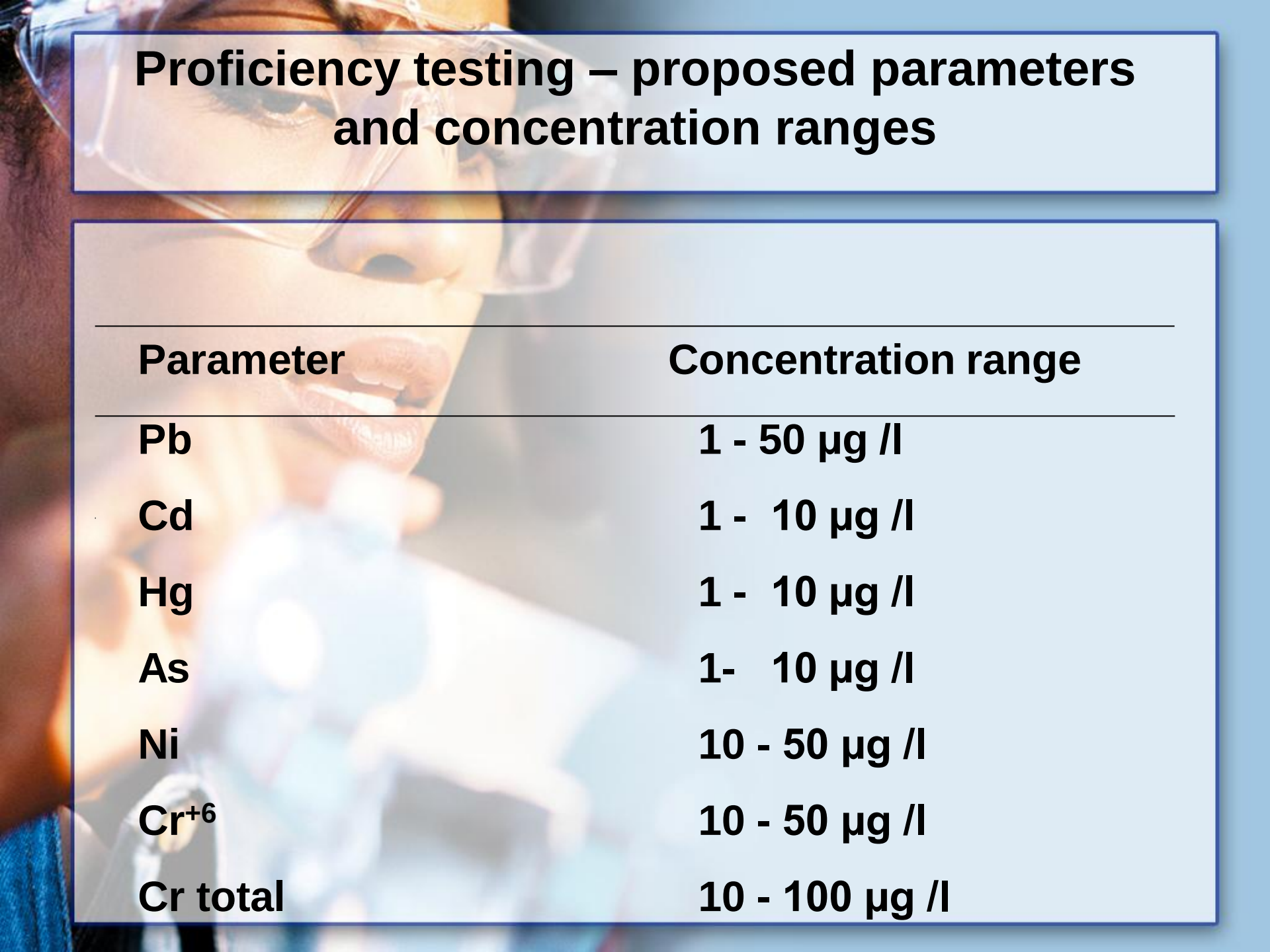
- * For the providers - to assess performance of participating laboratories.**
- * For the participating laboratories – to gain confidence in their abilities and capabilities of their staff.**

- 
- A person wearing safety goggles and a lab coat, holding a test tube.
- **PT samples: type of water and proposed parameters**

- **Drinking water:**

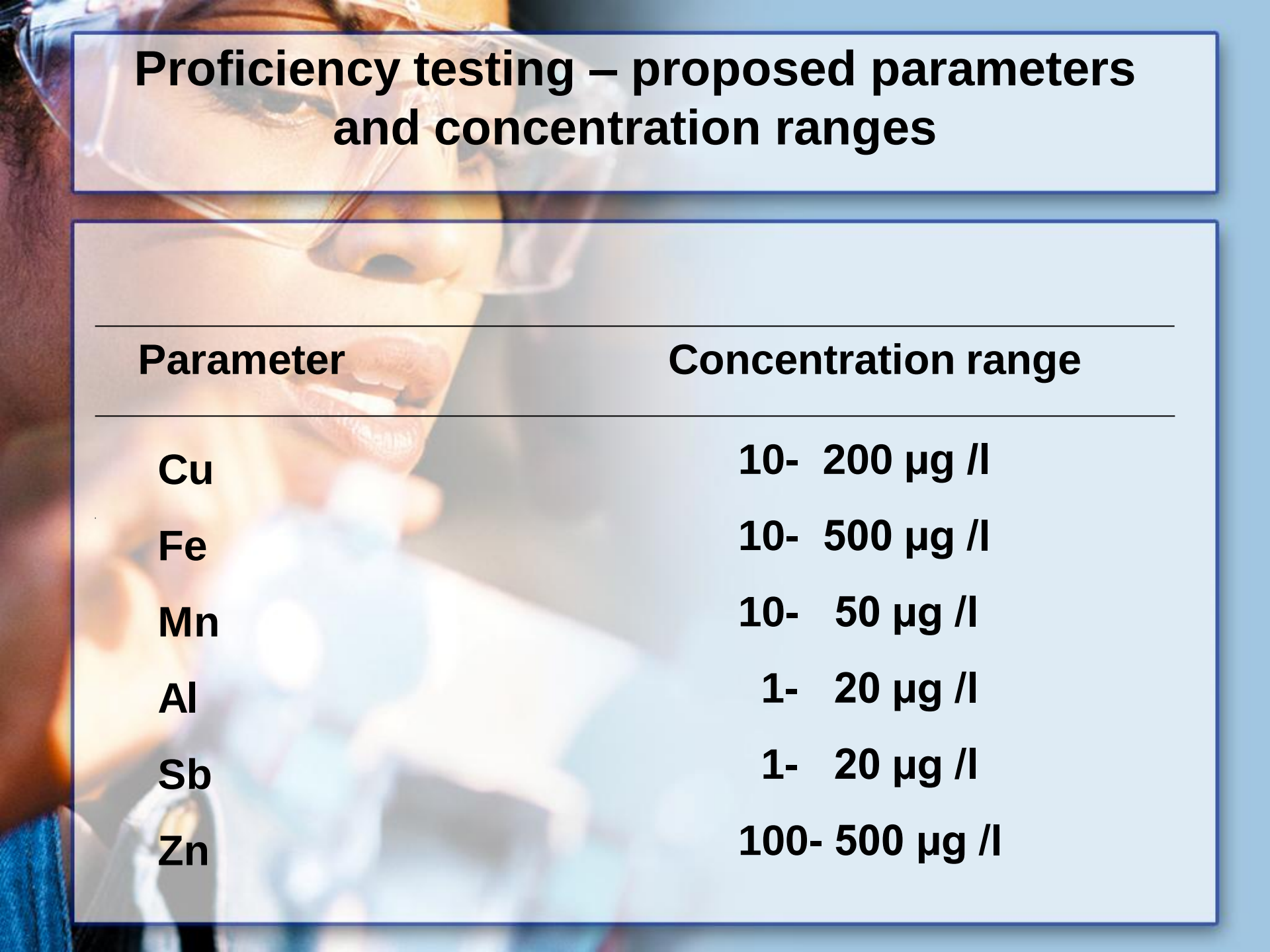
- > **trace metals determination (Pb, Cd, Hg, As, Ni, Cr, Cu, Fe, Mn, Al, Sb, Zn).**

- > **anions determination (F^- , Cl^- , NO_2^- , NO_3^- , PO_4^- , SO_4^{2-})**



Proficiency testing – proposed parameters and concentration ranges

Parameter	Concentration range
Pb	1 - 50 µg /l
Cd	1 - 10 µg /l
Hg	1 - 10 µg /l
As	1- 10 µg /l
Ni	10 - 50 µg /l
Cr ⁺⁶	10 - 50 µg /l
Cr total	10 - 100 µg /l



Proficiency testing – proposed parameters and concentration ranges

Parameter	Concentration range
Cu	10- 200 µg /l
Fe	10- 500 µg /l
Mn	10- 50 µg /l
Al	1- 20 µg /l
Sb	1- 20 µg /l
Zn	100- 500 µg /l

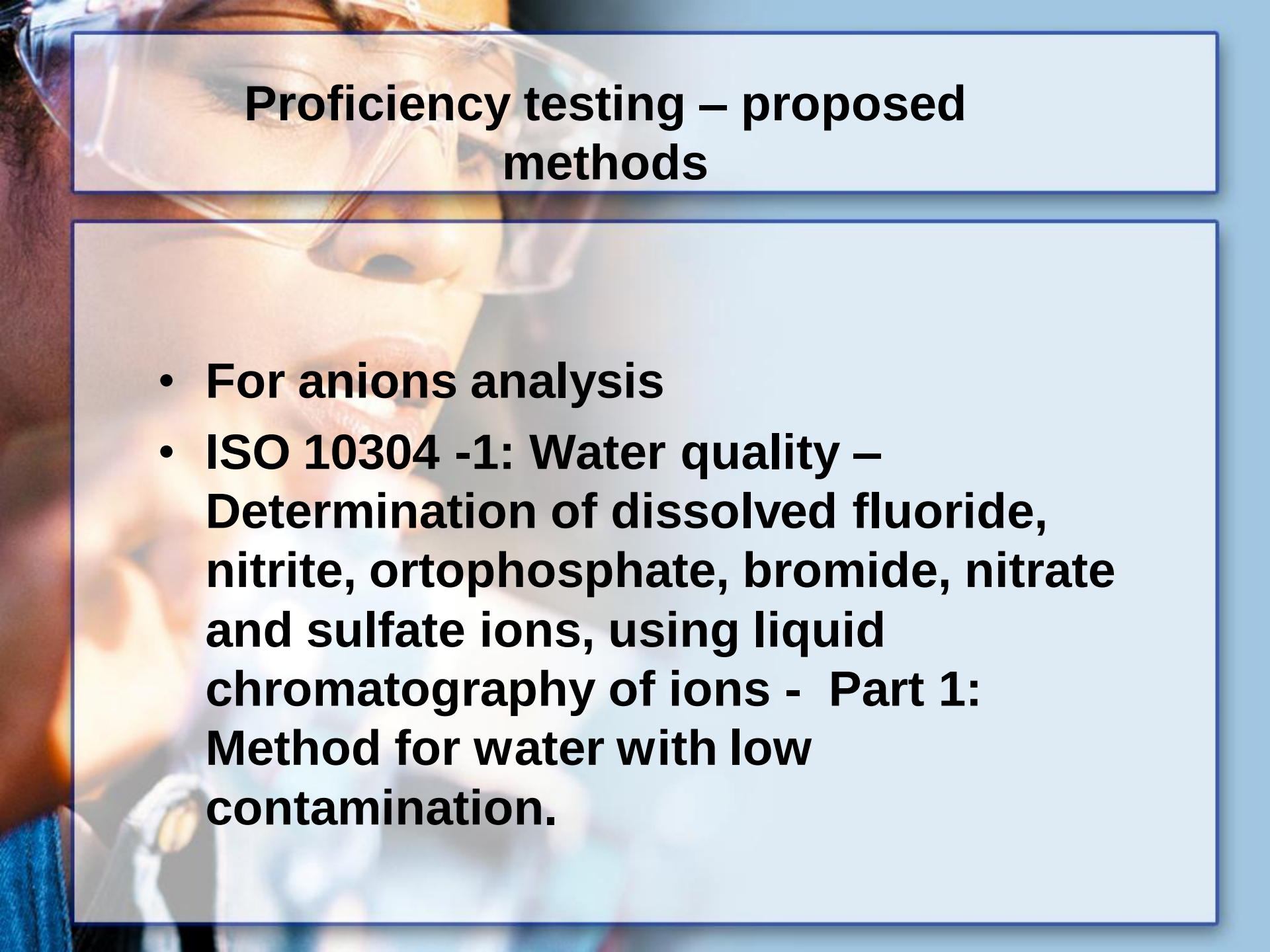
Proficiency testing – proposed parameters and concentration ranges

Parameter	Concentration range
F	1 - 3 mg /l
Cl	10- 100 mg /l
NO ₂	0,1- 1,0 mg /l
NO ₃	10 - 100 mg /l
SO ₄	10 - 100 mg /l
PO ₄	1 - 10 mg /l

Proficiency testing – proposed methods

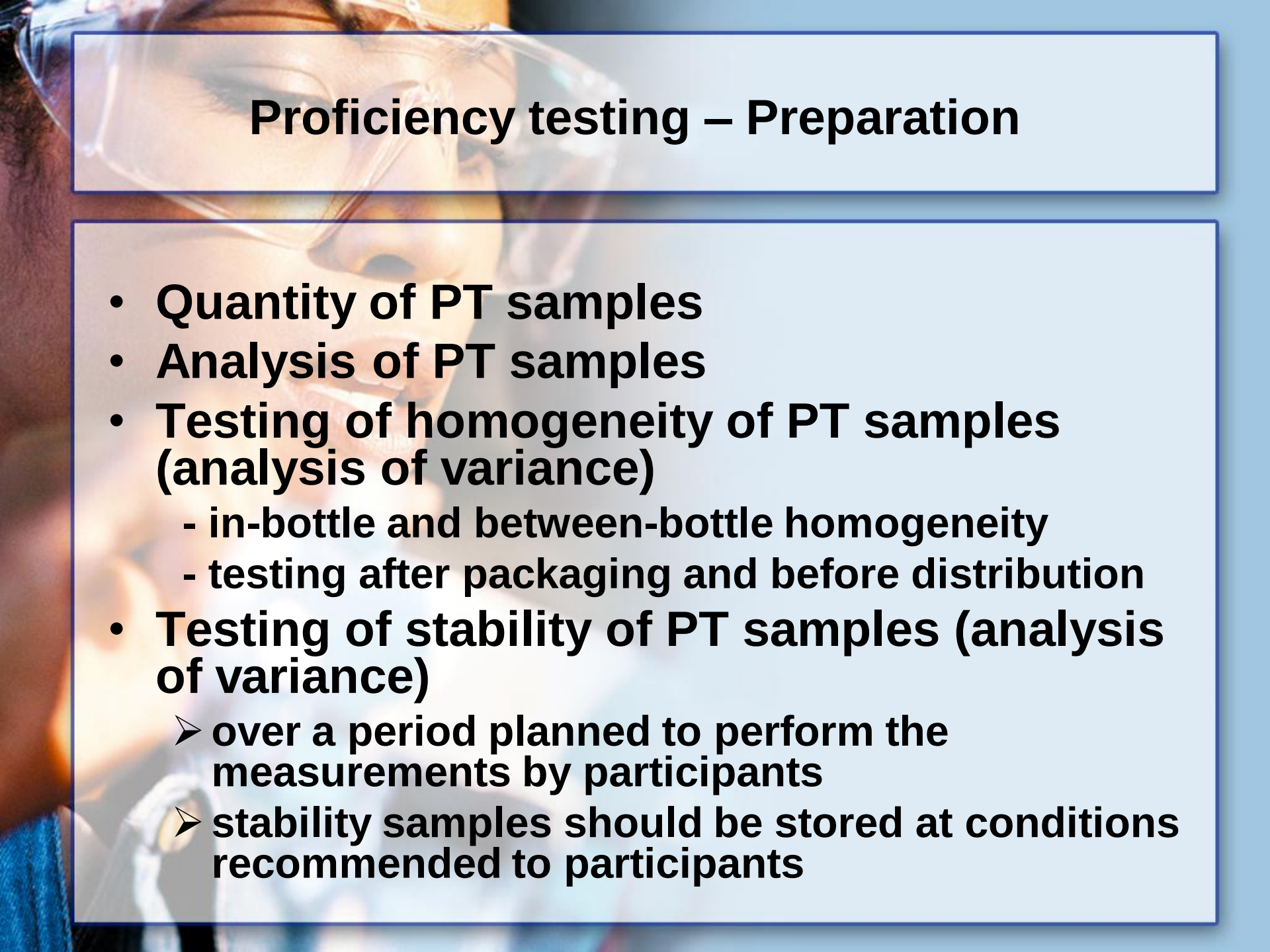
For trace metals analysis

- **ISO 5667-3 : Water quality- Sampling- Guidance on the preservation and handling of water samples.**
- **ISO 15587-2 : Water quality- Digestion of selected elements in water- Nitric acid digestion.**
- **ISO 15586: Water quality –Determination of trace elements using AAS with graphite furnace.**



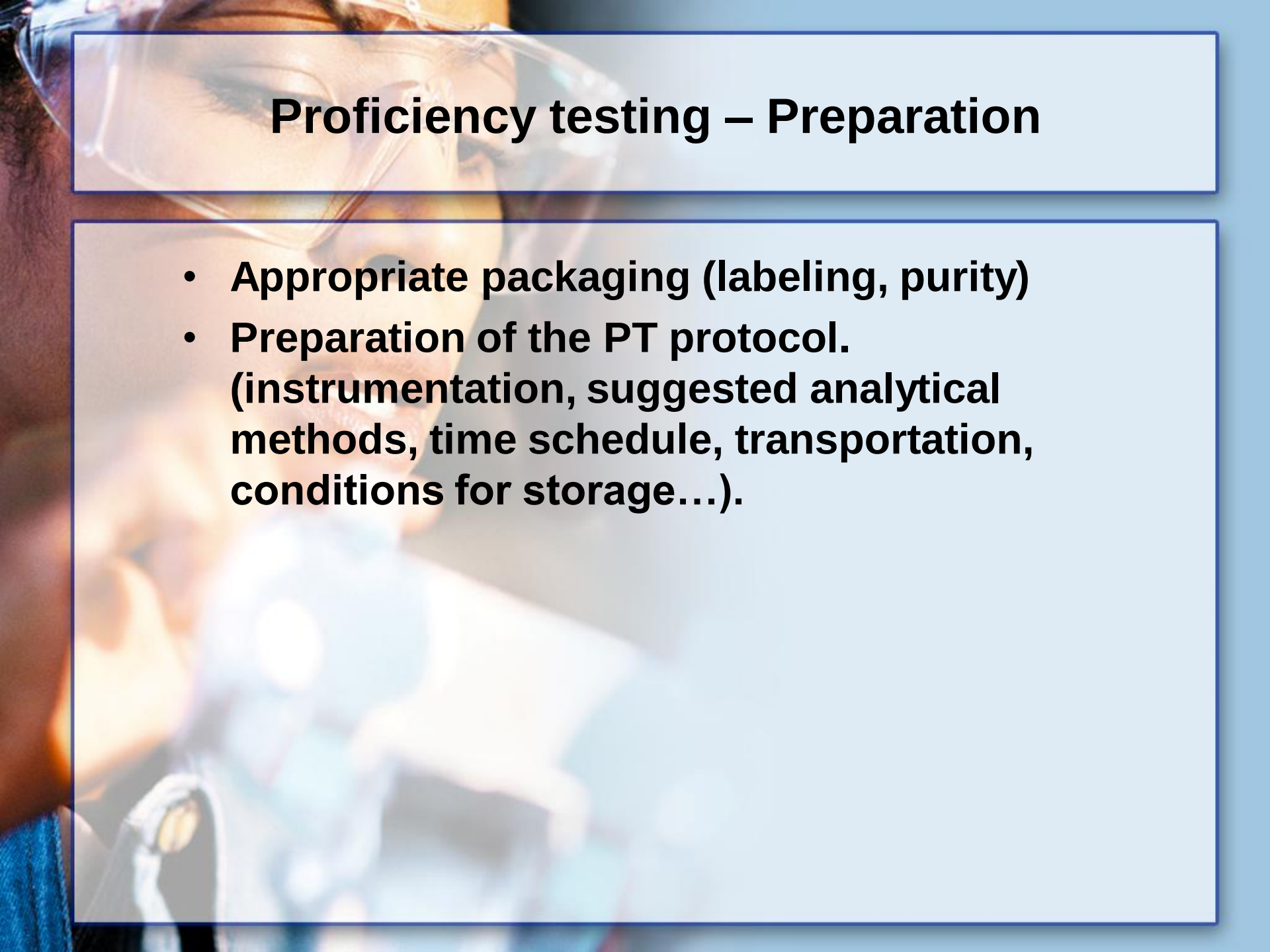
Proficiency testing – proposed methods

- **For anions analysis**
- **ISO 10304 -1: Water quality – Determination of dissolved fluoride, nitrite, orthophosphate, bromide, nitrate and sulfate ions, using liquid chromatography of ions - Part 1: Method for water with low contamination.**



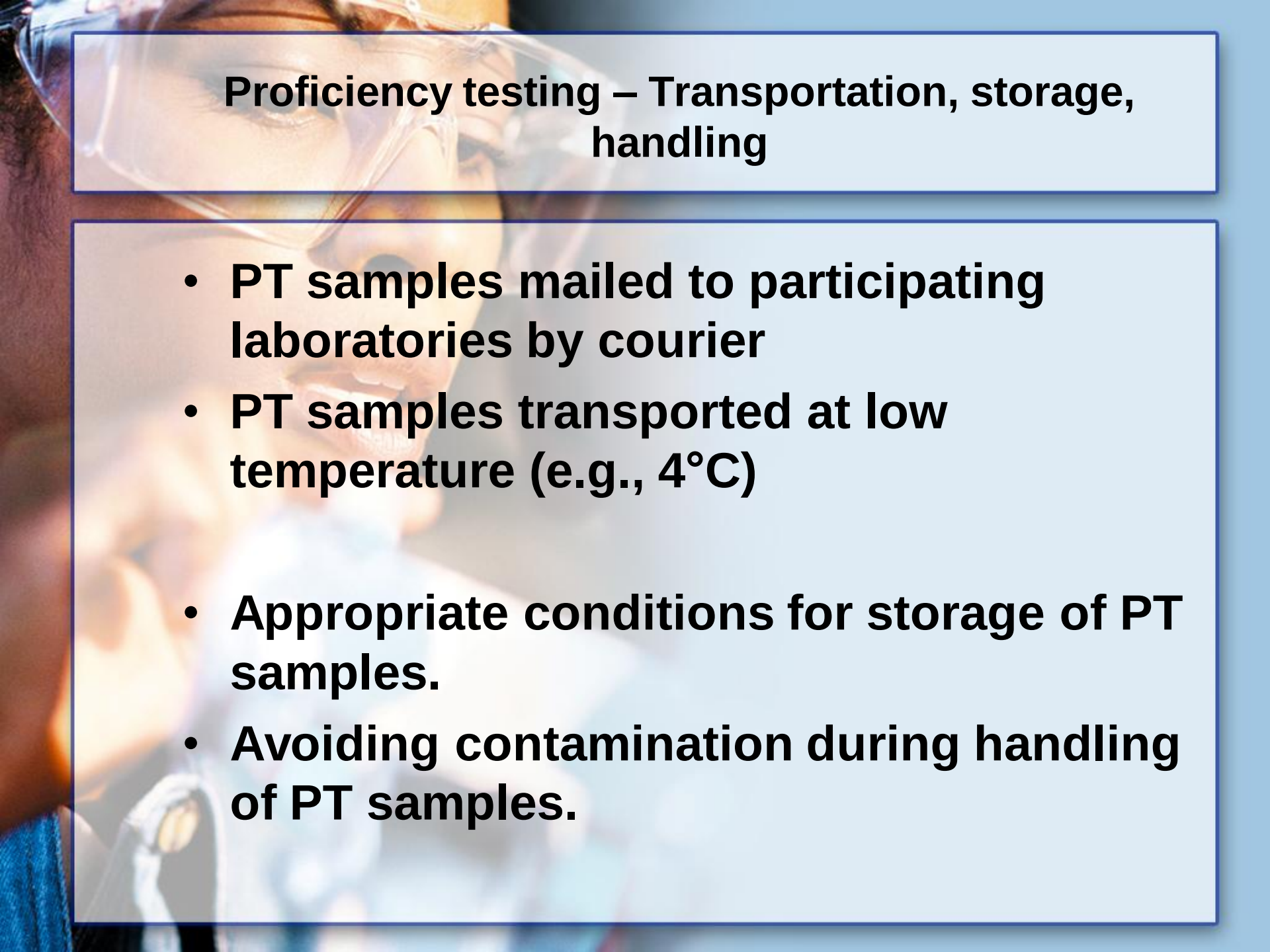
Proficiency testing – Preparation

- **Quantity of PT samples**
- **Analysis of PT samples**
- **Testing of homogeneity of PT samples (analysis of variance)**
 - in-bottle and between-bottle homogeneity
 - testing after packaging and before distribution
- **Testing of stability of PT samples (analysis of variance)**
 - over a period planned to perform the measurements by participants
 - stability samples should be stored at conditions recommended to participants



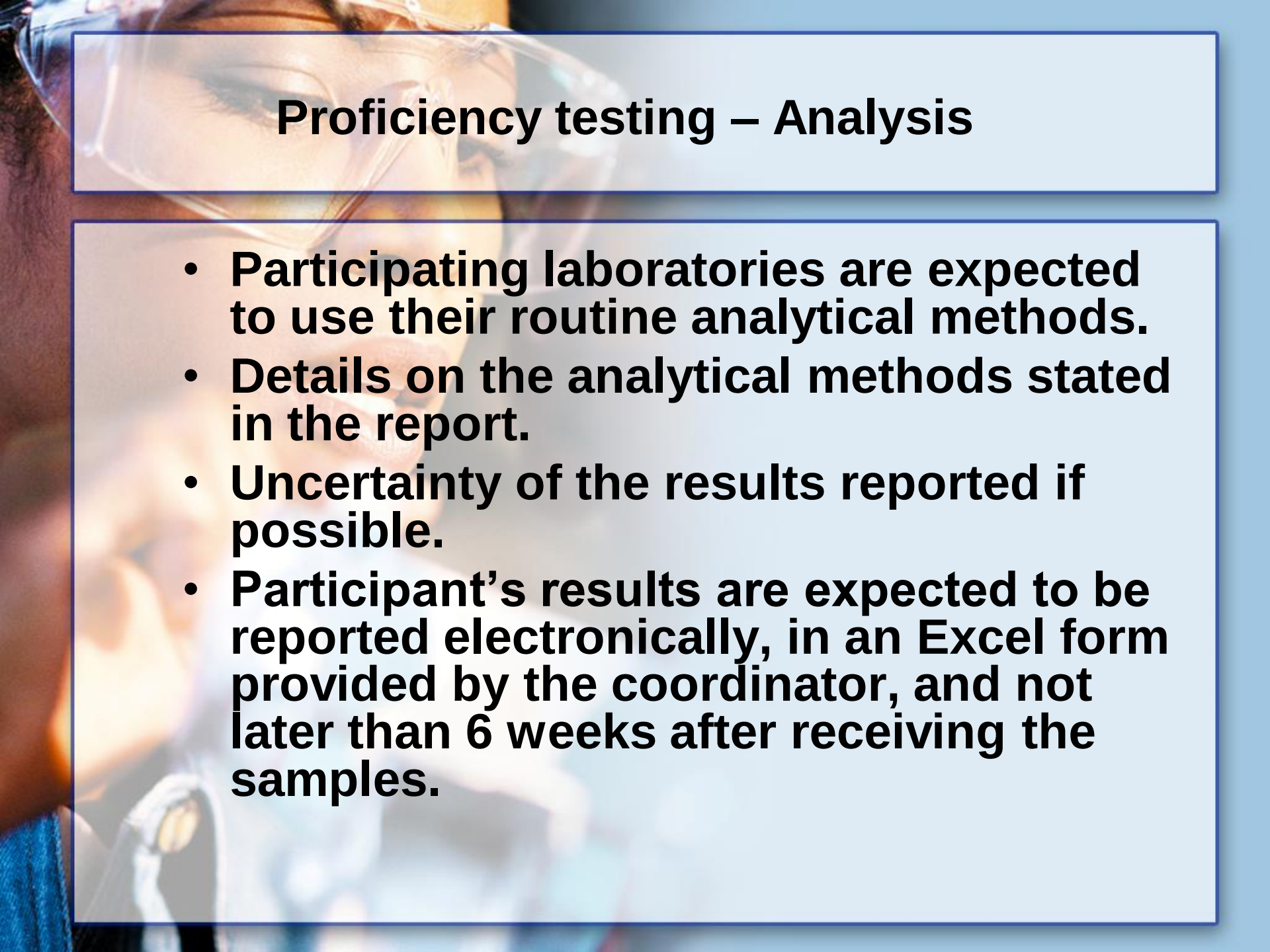
Proficiency testing – Preparation

- **Appropriate packaging (labeling, purity)**
- **Preparation of the PT protocol.
(instrumentation, suggested analytical methods, time schedule, transportation, conditions for storage...).**

A background image of a person wearing safety goggles and a lab coat, holding a test tube. The person is looking down at the test tube. The image is slightly blurred and has a warm, orange-toned filter.

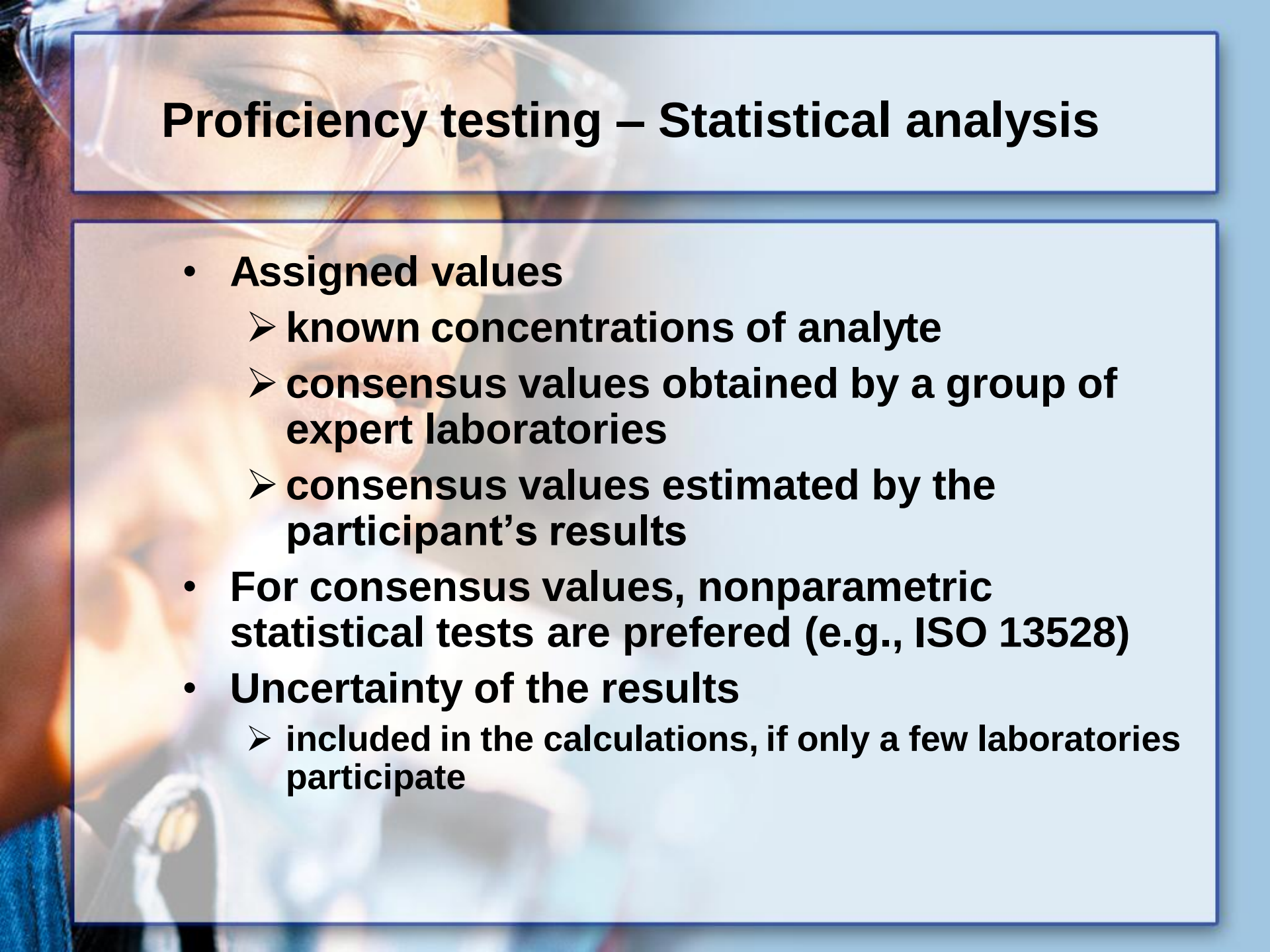
Proficiency testing – Transportation, storage, handling

- **PT samples mailed to participating laboratories by courier**
- **PT samples transported at low temperature (e.g., 4°C)**
- **Appropriate conditions for storage of PT samples.**
- **Avoiding contamination during handling of PT samples.**



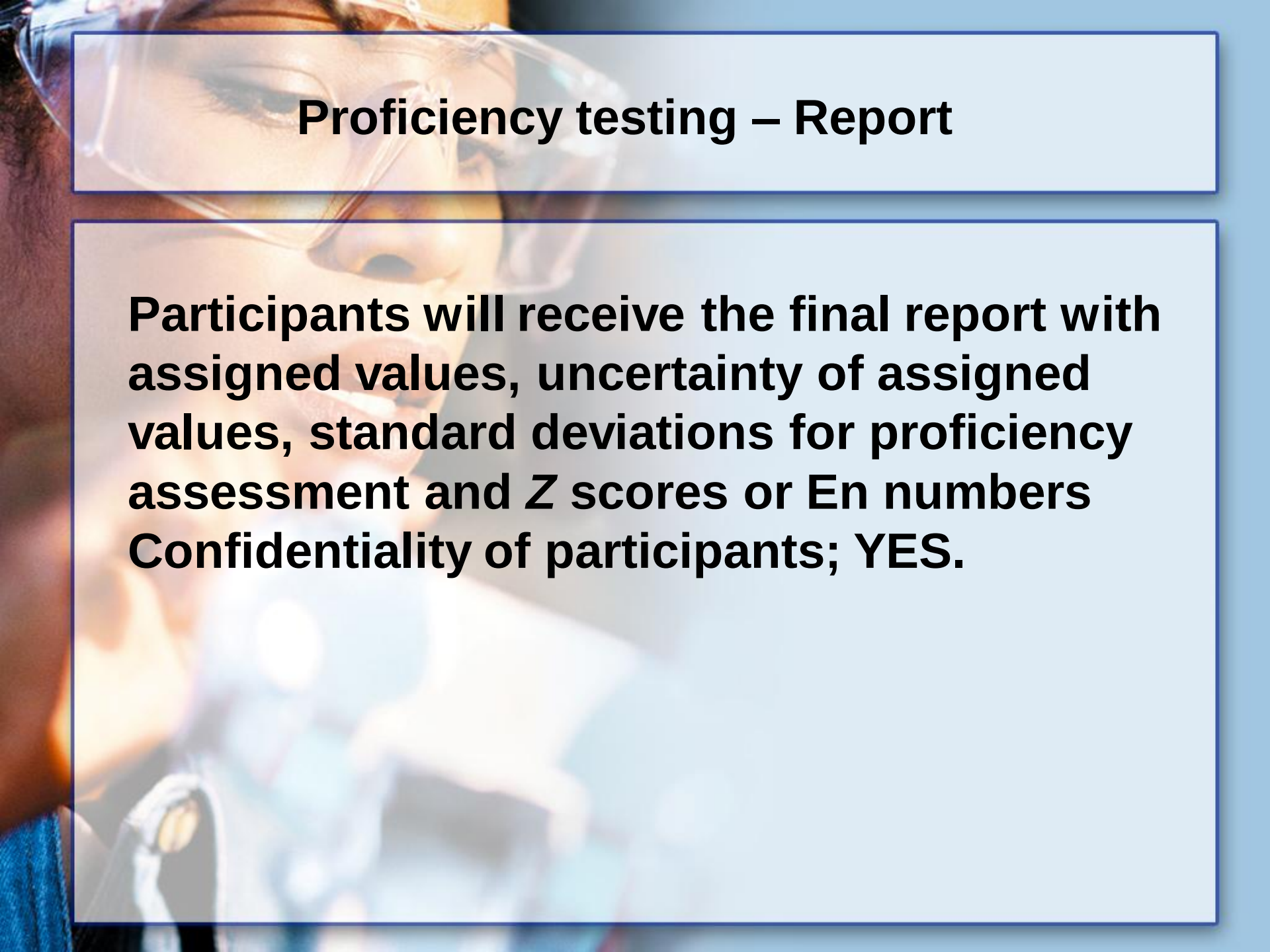
Proficiency testing – Analysis

- **Participating laboratories are expected to use their routine analytical methods.**
- **Details on the analytical methods stated in the report.**
- **Uncertainty of the results reported if possible.**
- **Participant's results are expected to be reported electronically, in an Excel form provided by the coordinator, and not later than 6 weeks after receiving the samples.**



Proficiency testing – Statistical analysis

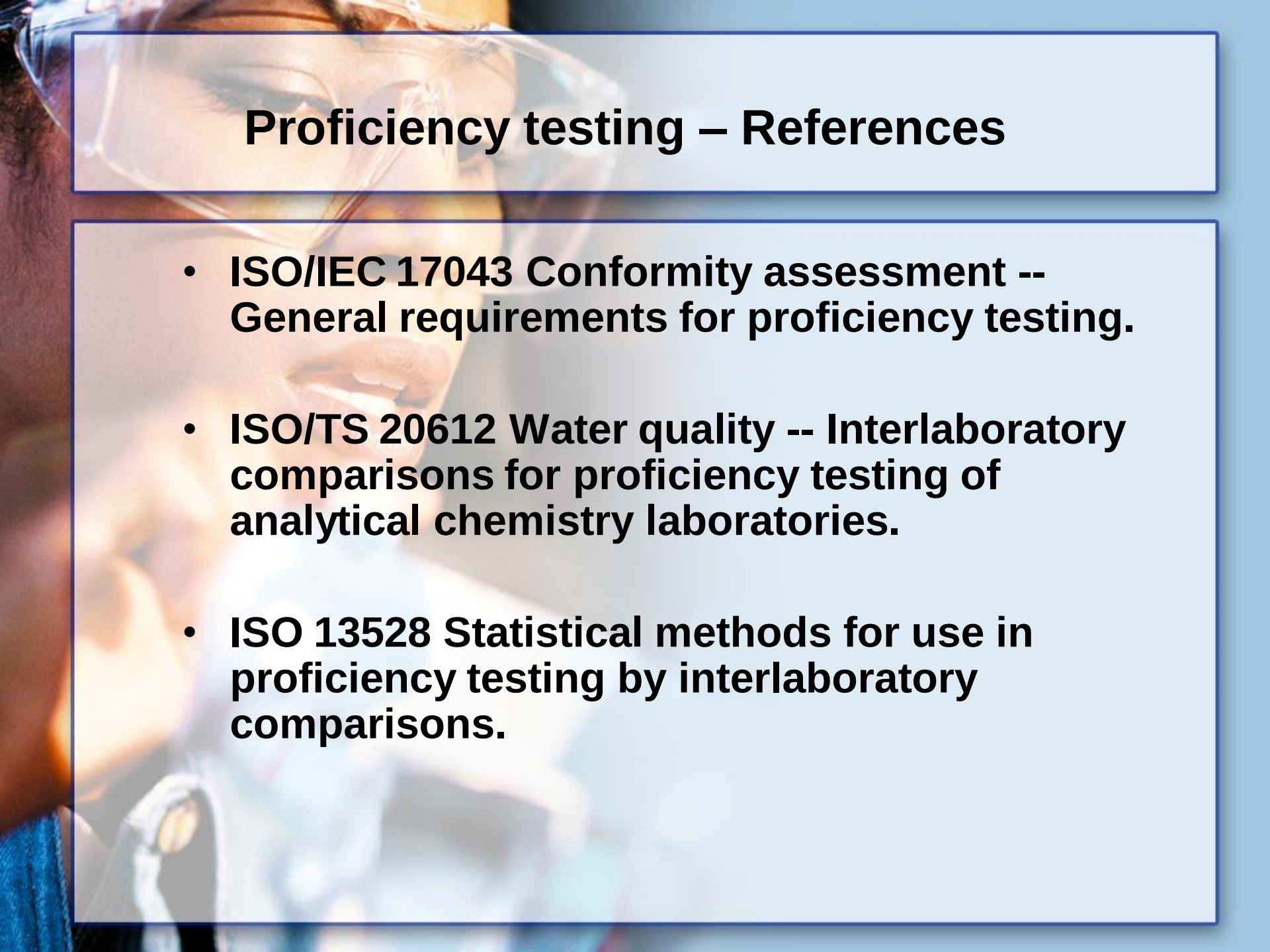
- **Assigned values**
 - **known concentrations of analyte**
 - **consensus values obtained by a group of expert laboratories**
 - **consensus values estimated by the participant's results**
- **For consensus values, nonparametric statistical tests are preferred (e.g., ISO 13528)**
- **Uncertainty of the results**
 - **included in the calculations, if only a few laboratories participate**

A background image of a person wearing safety glasses and a lab coat, looking down at a device.

Proficiency testing – Report

Participants will receive the final report with assigned values, uncertainty of assigned values, standard deviations for proficiency assessment and Z scores or En numbers

Confidentiality of participants; YES.



Proficiency testing – References

- **ISO/IEC 17043 Conformity assessment -- General requirements for proficiency testing.**
- **ISO/TS 20612 Water quality -- Interlaboratory comparisons for proficiency testing of analytical chemistry laboratories.**
- **ISO 13528 Statistical methods for use in proficiency testing by interlaboratory comparisons.**