Harmonisation of the Units of measurement

Step 1: change from mL to L as unit of volume

As indicated by Dybkaer and Jorgensen 50 years ago ([1]), the litre (or liter), symbolized "**L**", is the recommended unit of volume. Despite this clear recommendation, very frequently the millilitre "mL" is still used as unit of volume. Changing from mL to "**L**" is very easy, the numbers will not change. A single time warning to the clinicians and general practitioners "**Please note the new units"** will be sufficient.

Here below a non-exhaustive scheme of the requested changes.

From	To
mg/mL	**g/L**
µg/mL	**mg/L**
ng/mL	**µg/L**
pg/mL	**ng/L**
µU/mL	**mU/L**
mU/mL	**U/L**
AU/mL	**KAU/L**

By July 15 2016, all laboratories are asked to have in place this type of reporting.

[1] **Dybkaer K, Jorgensen R.** *Quantities and Units in Clinical Chemistry. Including Recommendation 1966 of Commission on Clinical Chemistry of IUPAC and IFCC.* København : Munksgaard, 1967.

Step 2: change to the litre for reporting protein concentration

In the same paper of 1967 ([1]) Dybkaer and Jorgensen indicated that the "decilitre" (dL) is not a recommended unit. All the laboratories that are still reporting **plasma proteins** in mg/dL or g/dL should change to **mg/L** or **g/L**. In fact the reporting of the same protein (e.g. C-reactive protein) in mg/dL by some laboratories and in mg/L by some others may induce wrong interpretations by the clinicians, posing the patient safety at risk. This changing will introduce a 10 or 100 folds modification of the numbers and must be carefully prepared.

There are 3 groups of possible changings:

1. **from mg/dL to mg/L: results will increase 10 times**

P- β2 Microglobulin
P-Haemoglobin
P-Free Kappa chain
P-Free Lambda chain
P-C-reactive protein
P-Transferrin, soluble Receptor
P-Cystatin C

2. **from g/dL to g/L: results will increase 10 times**

P-Albumin
P-Total protein

3. **from mg/dL to g/L: results will decrease by 100 folds (x0.01)**

P-Alpha1-Antitrypsin
P-Alpha1-acid glycoprotein
P-Alpha2 Macroglobulin
P-Apolipoprotein AI
P-Apolipoprotein B
P-Complement fraction C3
P-Complement fraction C4
P-Ceruloplasmin
P-Haptoglobin
P-Immunoglobulin A
P-Immunoglobulin G
P-Immunoglobulin G - Subclasses 1-4
P-Immunoglobulin M
P-Lipoprotein (a)
P-Prealbumin (P-Transthyretin)
P-Retinol binding protein
P-Transferrin

To minimize the possible confusion, WG-H recommends to perform the changings in two separate moments: those causing a 10 fold increase of the numerical results first, and those causing a 100 reduction in a second phase, however it may be considered more practical to do all the changings at the same time.

In any case the following planning and actions are undertaken by all laboratories when changing level reporting to mg/L or g/L:

1. Synchronized adjustment of analyser and computer systems
2. Communication and liaison with all service users
3. Updating of all documentation and training materials

It is suggested that a standard comment is linked to every report sent out for a period of 12 months, the following wording is suggested: "**Please note new units and the change of the reference intervals**". A message such as that below could be reported with every report for a period of time prior to the change to provide advance notification: "**Please note: From XX.XX.XX, [protein xyz] results will be reported in mg/L (or in g/L) instead of mg/dL in line with national and international guidelines."** If deemed useful an example should be added: "**This means a [C-reactive protein] currently reported as 1.5 mg/dL will be reported as 15 mg/L**" or "**This means a [transferrin] currently reported as 300 mg/dL will be reported as 3.0 g/L**" or "**This means a total protein currently reported as 7.0 g/dL will be reported as 70 g/L**".

4. Communication to hospital users and General Practitioners

- The appropriate committees and staff within your Clinical Governance structure should be informed of your intention to change units of measurement.
- General Practitioners should be communicated with either directly by a letter or by use of a Newsletter.

By October 31 2016, all laboratories are asked to have in place this type of reporting.