EFLM campaign for the harmonization of the units of measurement

To Presidents and National Representatives of EFLM National Society Members

Dear Colleagues,

following the last year survey on harmonisation activities, the EFLM Working Group on Harmonization of Total Testing Project (WG-H) intends to start a campaign for the harmonization of the units of measurement.

The campaign is articulated in various steps and, to be effective without generating confusion among patients and clinicians, it should be coordinated within each country and, possibly, among the countries. For this reason, we are proposing a series of dates for the implementation of these changes and some suggestions on how to implement them effectively (see the following document). In the document, you can find the first two steps proposed. A third step will be related to the promotion of the use of 'mmol/L' for reporting electrolytes and minerals (sodium, potassium, chloride, calcium, magnesium and inorganic phosphate), for which a specific document will be prepared and distributed afterwards.

With kindest regards,

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EFLM WG-H Chair

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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.

In the Table 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

Expected implementation date: by July 15 2016, all laboratories are asked to have in place this type of reporting.

Step 2: change to the litre for reporting protein concentrations

In the mentioned paper, 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 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 changes:

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

P-β_2-Microglobulin
P-Hemoglobin
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

[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.*

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

P-α_1-Antitrypsin
P-α_1-Acid glycoprotein
P-α_2-Macroglobulin
P-Apolipoprotein A-I
P-Apolipoprotein B
P-Complement fraction 3
P-Complement fraction 4
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 changes in two distinct moments: those causing a 10-fold increase of the numerical results first and those causing a 100-time reduction in a second phase. However, it may be considered more practical to do all the changes at the same time.

In any case, the following planning and actions should be undertaken by 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 reference intervals"*. A message such as the following 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 the intention to change units of measurement.
   - general practitioners should be communicated with either directly by a letter or by use of a newsletter.

Expected implementation date: by October 31 2016, all laboratories are asked to have in place this type of reporting.