USP Dietary Supplements Standards Up-to-Date

Roundtable Meeting Report

Huy Dinh, MS.
Senior Scientific Liaison
Dietary Supplements
Roundtable’s objectives

Foster discussion among the participants to ensure that USP standards for dietary supplements are up-to-date, using current analytical procedures that are affordable, relevant, and can be effectively carried out by dietary supplement stakeholders in the next five years and beyond.
Roundtable Up-to-Date meeting

- **Date:** October 25, 2016
- **Place:** USP Headquarters, Rockville, MD
- **Co-chairs:**
  - Paula Brown (BCIT, BDSHM)
  - Aniko Solyom (GAAS Analytical, NBDS)
- **USP staff:**
  - Huy Dinh
  - Marie Temple
Roundtable Up-to-Date meeting

40+ invited, 27 attended (5 EC member)
Roundtable Up-to-Date Meeting

What is “Standards Up-to-Date”? 

Current:
• Add new monographs and general chapters in timely manner.
• Omit monographs and general chapters that are no longer needed.

Relevant:
• Update monographs and general chapters to reflect “state of the industry” practices.
• Ensure availability of relevant Reference Standards.

Suitable for the intended use:
• All components clear, complete and correct.
• Remove unnecessary tests.
• Appropriate selection of reference standards.
Up-to-Date monographs would involve:

1. Replacing titration and UV based assays
2. Eliminating hazardous reagents and solvents
3. Replacing organoleptic tests
4. Replacing flame tests
5. Updating chromatography methods
   • TLC to HPTLC
   • HPLC vs. UHPLC
   • Packed GC columns vs. capillary GC
   • Obsolete columns vs. core-shell columns
   • Long running time
   • MS friendly mobile phases
1. General chapters and monographs
   - Fit for purpose and aligned with regulatory requirements
   - Include modern methods using current science
   - Omission of old methods (wet chemistry, organoleptic)
   - Retain relevant old technologies while introducing new

2. Adulteration, consumer protection
   - UV methods vs. HPLC methods (specificity)
   - Adulteration with synthetic pharmaceuticals
   - Methods for pesticides, residual solvents
   - Adulteration Potential Database
3. Communication

- Modernization efforts were mostly unknown
- How USP prioritize monographs?
- What is the role of EC-s?
- How USP handles comments submitted by the public?
- Differences between an official monograph and monograph under review

4. USP standards

- Share characterization and stability information with the public
- Include certified concentration values, potencies and chromatograms with peaks identified
- ISO certification of the USP standards
5. New technologies

- Replace wet chemistry tests
- TLC to HPTLC
- ICP for metal analysis
- HPLC to UHPLC
- DNA analysis
- MS, LC-MS, QTOF, ATR-FTIR, NMR, chemometrics – very limited enthusiasm
Planning the compendial future for dietary supplements

- Increase transparency in the standards revision process
- Include validation data with a method
- Include HPLC chromatograms, pictures of HPTLC plates, fragmentation patterns, DNA information
- Consider providing RS-s in smaller quantities
- Seek existing methods adopted by other organizations and trade associations
- Reach out to companies and organizations to harmonize/integrate their own methods with those of USP
1. Non-Botanicals

Vitamins:

- Cyanocobalamin, Hydroxocobalamin, Beta Carotene: added organic impurities test
- Biotin: replaced titration with HPLC
- Vitamin E: replaced packed column with capillary column
- Calcium Pantothenate: replaced Nitrogen determination by Kjeldhal with HPLC Assay
1. Non-Botanicals (continued)

➢ Vitamins:
  ▪ Niacin: replaced UV + TLC with HPLC Assay and organic impurities

➢ Amino acids
  ▪ Alanine, Methionine, Glycine, Aspartic Acid, Valine, Leucine, Isoleucine: the TLC for the Related compounds test has been replaced with HPLC. Other amino acids are in the works.
2. Botanicals (cont’d)

- Identification tests
  - In agreement with Authorized Title, Definition, and Labeling
  - Must distinguish the plant material from related species that may pose potential for species substitution or adult
  - Use of new techniques
    - DNA method
    - HPTLC new chapters <203> and <1064>
    - Chromatographic and Spectroscopic procedures

- Assay/Content of marker constituents
DS Standards Up-to-Date— a continuous process

- Public standards should evolve with scientific knowledge

- For Non-Botanicals Dietary Supplements
  - Better and more specific separation methods
  - Impurity determinations
  - Isomerism
  - Performance Tests

- For Botanicals Dietary Supplements
  - DNA
  - Complementary tests,
  - HPTLC standardization
  - Fingerprinting
  - Chemometric/metabolomic techniques (MS, NMR, IR)
QUESTIONS?