TOGETHER FOR PATIENTS

Transforming the Regulatory ecosystem in Africa

Satellite session: How can the regulatory landscape on biosimilars be navigated?

2023 AFRICA REGULATORY CONFERENCE

ORGANIZER IFPMA

PARTNERS leem les entreprises du médicament, IPASA Innovative Pharmaceutical Association South Africa, kapi KENYA ASSOCIATION OF PHARMACEUTICAL INDUSTRY, arepi, LIPA

Satellite session: How can the regulatory landscape on biosimilars be navigated?

- Overview of biotherapeutic regulatory landscape including the revision of WHO GLs for Biosimilars and their implementation.
- A Global perspective of the changing landscape of biosimilar regulations including topics such as traceability and interchangeability

- Dr Hye-na Kang (WHO)
  - *Norms and Standards for Biological products (NSB Team), WHO HQ*
- Dr Virginia Acha (IFPMA Biotherapeutics Chair)
  - *Biosimilars: A Dynamic Regulatory Science*

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QUESTIONS AND ANSWERS

We encourage you to use the Q&A box to raise questions to the speakers.

If a question you would like to ask has already been raised, you can also “like” that question.

2023 AFRICA REGULATORY CONFERENCE

Presentation by:

Dr Hye-Na KANG
Scientist
WHO

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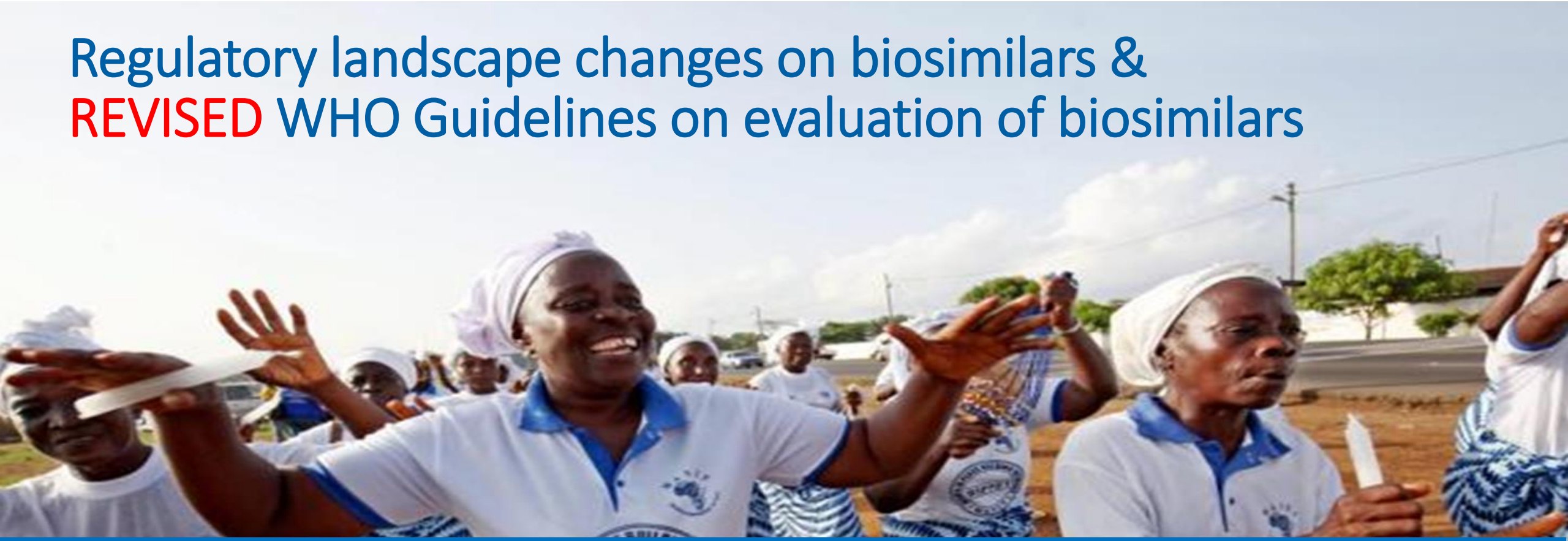
Regulatory landscape changes on biosimilars & REVISED WHO Guidelines on evaluation of biosimilars



Dr Hye-Na KANG

Norms and Standards for Biological products (NSB Team), WHO HQ

- Africa Regulatory Conference, 23 Oct 2023

World Health Organization

75 HEALTH FOR ALL

Outline:

1. **Regulatory landscape changes: Survey outcomes, 2019 & 2020**
2. **Key updates incorporated in the revised GLs, 2022**
3. **Outcomes of IPRP BWG workshop, Sept 2023**
4. **Implementation of GLs, 2023 & 2024**

Disclaimer: The speaker is a staff member of the World Health Organization. The speaker alone is responsible for the views expressed in this presentation and they do not necessarily represent the decisions, policy or views of the World Health Organization.

Survey conducted in 2019 & 2020

Aim of survey

- To describe the progress made and the regulatory landscape change for biosimilars in 21 countries during the past 10 years.
  - WHO Guidelines on evaluation of biosimilars issued in 2009
  - A survey to review the regulatory situation in countries conducted in 2010 (Biologicals 39, 2011)
- To identify challenges and areas where further support to Member States needs to be provided.

Countries

- Regulatory experts from 20 countries covered all WHO 6 regions: AF (Ghana, Zambia), AM (Brazil, Canada, Cuba, Peru), EM (Egypt, Iran, Jordan), EU (Russia, Ukraine, UK), SEA (India, Indonesia, Thailand), WP (China, Japan, Malaysia, Korea, Singapore) + USA

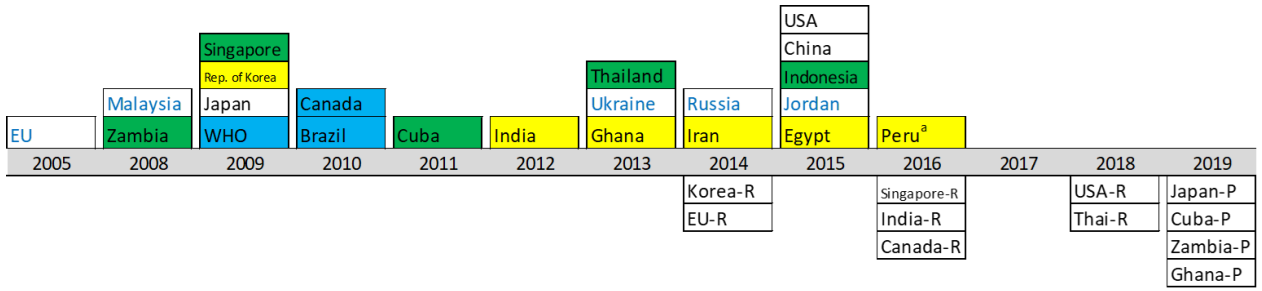
Focuses

Aug 2019: Situations	**June 2020: Challenges**
Regulation/Guidelines	Reference products
Terminologies	Resources
Approval of biosimilars	Quality of biosimilars
Biosimilars under development	Issues related to the use

NOTE

- *Assessment based on the data submitted by survey participants from 20 countries. Thus, biosimilars approved in certain countries might not have been approved following a strict regulatory process as recommended by WHO 2009 GLs.*

Survey conducted in 2019: Reg. guidelines & Terminologies



Based on/adopted	
	WHO
	WHO, EMA
	WHO, EMA, US FDA
in blue	EMA

R: Revised
P: Plan to revise
[a] Also refer other guidelines, e.g. from Korea, Canada etc

Considerable progress in ADOPTION of guidelines has been made

- All participating countries (and the USA) now have biosimilar guidelines in place.
- Most of countries in the survey adopted WHO GLs.
- It is clear that WHO GLs have contributed to setting the regulatory framework for biosimilars in these countries and increasing regulatory convergence at the global level.

		2010	2019
	WHO	similar biotherapeutic products	similar biotherapeutic products
Regulatory authorities	Canada	subsequent entry biologics	biosimilars
	Egypt		biosimilars
	EU	similar biological medicinal products (biosimilar)	similar biological medicinal products (biosimilar)
	Ghana		biosimilar products
	India	biogeneric products unofficially* used	similar biologics
	Indonesia		biosimilar products
	Iran		biosimilars
	Japan	follow on biologics	follow on biologics (as a synonym for biosimilars: indicated on the first page of guidelines)
	Jordan		biosimilars
	Malaysia	biosimilars	biosimilars
	Peru		similar biological product
	Republic. of Korea	biosimilars	biosimilar products
	Singapore	similar biological (biosimilar) products	biosimilars
	Thailand		biosimilars
	Ukraine		similar biological medicinal products (biosimilar)
	USA		biosimilars
	Zambia	biosimilar medicines	biosimilars
	Brazil	biological products developed by comparability pathway (vs. new biological products)	biological products developed by comparability pathway (vs. new biological products) biosimilars unofficially* used
	China	biosimilars unofficially* used	copy biologicals
	Cuba	known biological products (vs. biological products)**	multi-source known biological products
	Russia		bioanalogue (as a synonym for biosimilars, defined in the Federal Law)

Some progress made since 2010 in converging on consensus use of nomenclature:

- The term ‘biosimilar’, ‘similar biotherapeutic products’, and ‘similar biological medicinal product’ are used interchangeably.
- A trend is towards adopting the term ‘biosimilar’.
- The term ‘biogeneric’ has been largely abandoned.

Survey conducted in 2019: Approval and Development of biosimilars

	Brazil	Canada	China	Cuba	Egypt	EU	Ghana	India	Indonesia	Iran
2010	0	1	0	0	0	14	0	>24	7	7
2019	21	15	1	6	4	61	13	93	23	21

	Japan	Jordan	Malaysia	Peru	R. of Korea	Russia	Singapore	Thailand	Ukraine	USA	Zambia
2010	2	0	1	0	0	11	1	0	0	0	1
2019	22	10	15	4	13	31	7	13	7	23	8

Considerable progress made since 2010

- A range of biosimilars is now approved in all participating countries.
- Availability of guidelines and adoption of regulatory approval processes have been rapidly followed by approval of biosimilars.

Difficult to predict but the survey identified the following:

- mAbs: Dominant product class for development.
- Most of blockbusters have biosimilar versions at present or under development.
- In the past, certain global players dominated the market and were the major producers.
- In the future, locally produced biosimilars may become the dominant products in some countries (e.g. Egypt, India, Iran, Russia, Ukraine)

Survey conducted in 2020: Four main obstacles

Challenge 1. Reference products (RP)

- Many of obstacles related to RP issues, e.g. limited access to information of RP, high price of RP, insufficient quantities of RPs in the country.
- Possible solutions to these challenges include:
  1) exchanging information on products between NRAs;
  2) accepting foreign licensed and sourced RPs; and
  3) avoiding conducting unnecessary (duplicate) studies.
- Accepting foreign licensed and sourced RPs might contribute to expanding the availability of various product classes, since these products were not available on the market prior to approval of the biosimilar.

Challenge 2. Lack of resources

- Insufficient resources of NRAs: a common problem.
- To be reduced by relying on information available from other NRAs who have assessed particular products and also by joint review of applications.
- Use of a 'reliance' concept and/or joint review for the assessment and approval of biosimilars.
- Short-term measure: Work sharing and information sharing recognized as possible avenues for the development of expertise.
- Long-term measure: efforts to build their own capacity should be undertaken.
- WHO PQ: To assist Member States with insufficient capacity for assessing the quality, safety and efficacy of biosimilars.

Survey conducted in 2020: Four main obstacles

Challenge 3. Quality of biosimilars

Obvious problems existed in 2010, 2019 and 2020 surveys

- Biotherapeutic products which are neither originator products nor biosimilars are approved in several developing nations (non-innovator).
- The inappropriate labelling of products as biosimilars is a barrier to the uptake of biosimilars as it decreases confidence in biosimilar use.
- Difficult to distinguish between biosimilars and non-innovator products which have not been produced to the requirement of the WHO GLs.
- Non-innovators already approved before biosimilar regulations exist may need to be reassessed by NRAs, and the terminology used for such products should not be confused by calling them biosimilars.

Challenge 4. Issues related to the use

Interchangeability

- No consensus on meaning
- Most countries do not have regulatory guidelines for the interchangeability of biosimilars, but many have adopted national approaches for this.
- Good PhV is essential for establishing the safety and efficacy of interchangeability of biosimilars.

Naming and labelling

- Essential for identification of products and for phV & prescribing.
- Approaches being used for the naming of biosimilars:
  - the brand name AND/OR INN (i.e. same INN as RP) without any other distinguisher.
  - Japan, Malaysia, Peru and Thailand have a distinguisher (identifier), e.g. product-specific suffix as part of the name.

Activities to implement the 2014 Resolution

WHA* 67.21 Resolution in 2014, “Access to biotherapeutic products (BTPs) including biosimilars and ensuring their quality, safety and efficacy”

Resolution to update the 2009 GLs	1. taking into account the technological advances for the characterization of BTPs	2. considering national regulatory needs and capacities
Activities & Report to ECBS	• Current scientific evidence and experience gained reviewed in 2020 • Informal consultation held in 2021	Survey conducted in 2019 & 2020
Publications	1 article & meeting report	3 articles

Review of scientific evidence and regulatory experience in 2020

Aim of review

- To review scientific evidence and experience to identify issues/cases for further reducing nonclinical and clinical data
- To reach consensus on regulatory considerations and expectations for evaluation of biosimilars
- To update the GLs with providing more flexibility

Methodology

- Review the relevant GLs, e.g. US FDA, EMA, HC
- Review the literature for long-term experience with biosimilars, e.g. EPAR, journal publications for long-term efficacy and safety of biosimilars for the years 2017 – 2020, systematic reviews published in 2017-2020 to cover older data.
- Evaluate the roles and relevance of clinical efficacy studies for the benefit-risk assessment of biosimilars for the possibilities to reduce clinical data requirements

Key finding

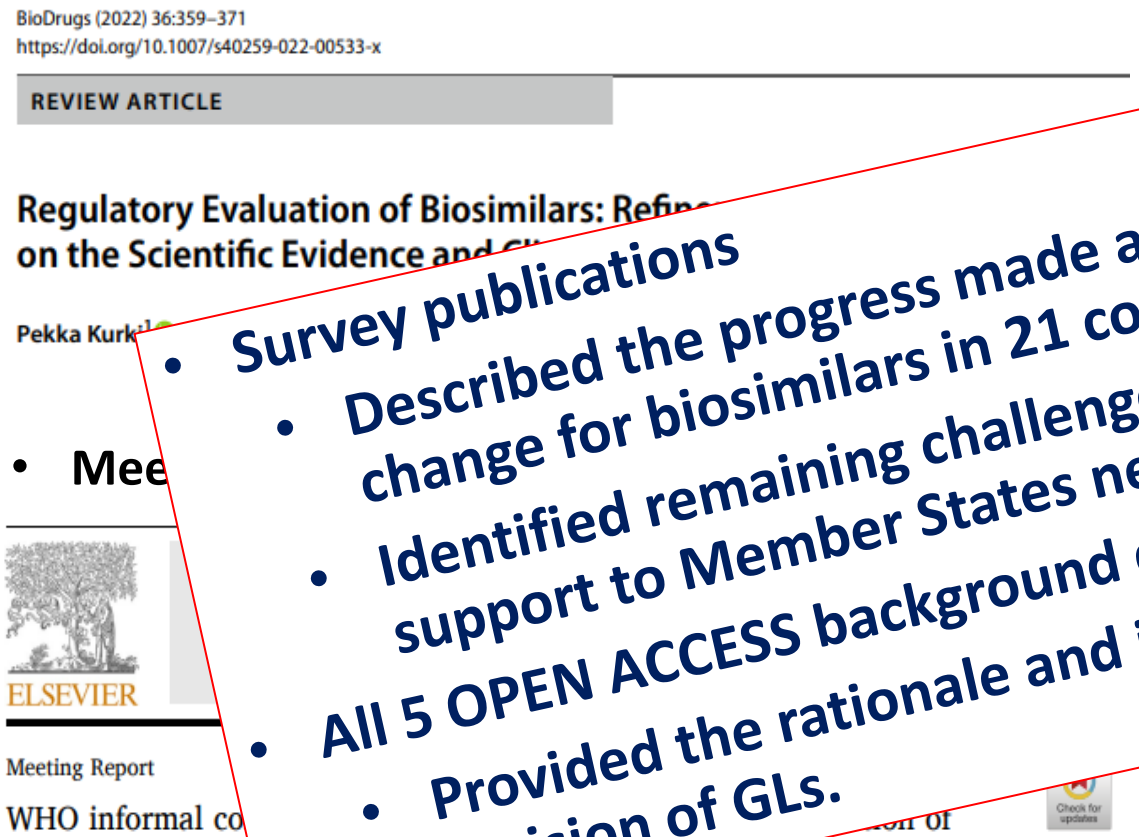
- Long-term safety, efficacy and immunogenicity data of licensed biosimilars since 2006 do not raise concerns.
- Current data could suggest that state-of-the-art analytical and functional testing and robust PK and PD studies are sufficient to demonstrate biosimilarity, whereas in vivo animal studies and large confirmatory efficacy and safety studies are generally not needed.
- WHO 2009 GLs to be updated to reflect the current scientific knowledge.

NOTE

- *The review and analysis are based on the view of authors, and they do not necessarily represent the views of WHO.*

Publications

- **Review published, *BioDrugs* 36, 2022**


BioDrugs (2022) 36:359–371
https://doi.org/10.1007/s40259-022-00533-x

REVIEW ARTICLE

Regulatory Evaluation of Biosimilars: Refin
on the Scientific Evidence and Cl

Pekka Kurki[1]

- **Mee**

ELSEVIER

Meeting Report

WHO informal co
similar biotherape

Meenu Wadhwa[a], Hye-N
participants of the WHO informal consultation on revision of guidelines on evaluation of similar

June – 2 July 2021

- **Survey outcomes published: *Biologicals* (2020), *Ann NY Acad Sci* 15 *Bi journal* (2020)**


ScienceDirect

/locate/biologicals

ts and progress made

ts from 19 countries

nn. N.Y. Acad. Sci. ISSN 0077-8923

similars: an update

Thorpe,[2] Ivana Knezevic,[1] Mary Casas Levano,[3]
ice Chilufya,[4] Parichard Chirachanakul,[5] Hui Ming Chua,[6] Dina Dalili,[7]
eddie Foo,[8] Kai Gao,[9] Suna Habahbeh,[10] Hugo Hamel,[11] Gi Hyun Kim,[12] Violeta Perez
Rodriguez,[13] Desi Eka Putri,[14] Jacqueline Rodgers,[15] Maria Savkina,[16] Oleh Semeniuk,[17]
Shraddha Srivastava,[18] João Tavares Neto,[19] Meenu Wadhwa,[20] and Teruhide Yamaguchi[21]

GaBiJournal
Generics and Biosimilars Initiative Journal

ORIGINAL RESEARCH

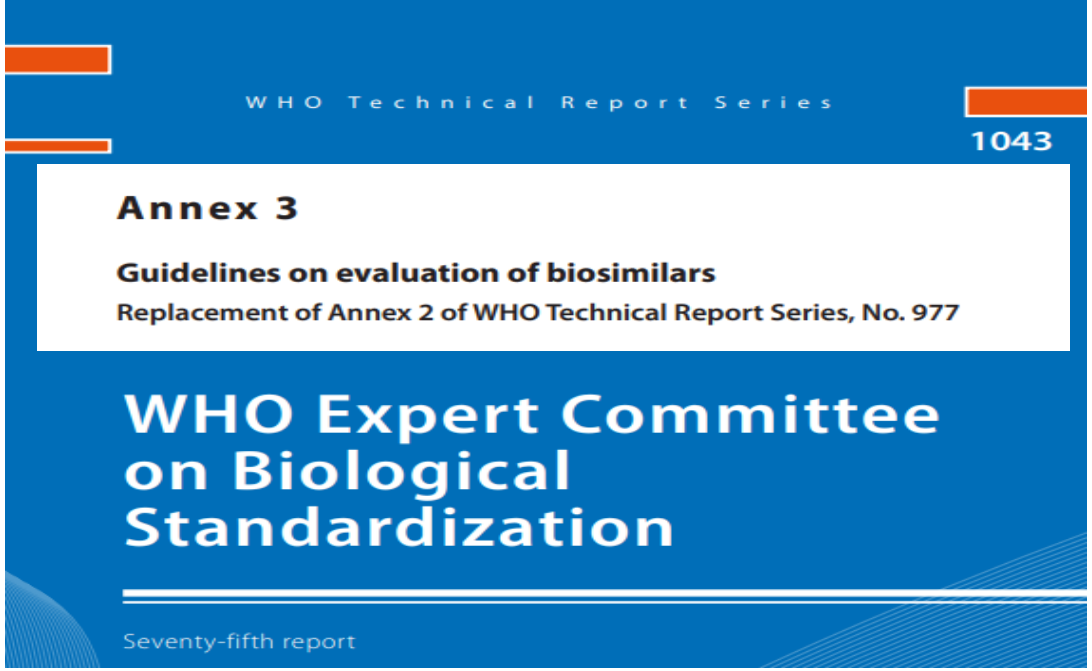
Biosimilars for Healthcare Professionals

Biosimilars – status in July 2020 in 16 countries

Hye-Na Kang[1], PhD; Robin Thorpe[2], PhD; Ivana Knezevic[1], PhD; Daehyun Baek[3], PhD; Parichard Chirachanakul[4]; Hui Ming Chua[5]; Dina Dalili[6], PhD; Freddie Foo[7], MSc; Kai Gao[8], PhD; Suna Habahbeh[9], PhD; Hugo Hamel[10], PhD; Edwin Nkansah[11], PhD; Maria Savkina[12], PhD; Oleh Semeniuk[13]; Shraddha Srivastava[14]; João Tavares Neto[15], PhD; Meenu Wadhwa[16], PhD; Teruhide Yamaguchi[17], PhD

- **Survey publications**
  - **Described the progress made and the regulatory landscape change for biosimilars in 21 countries during the past 10 years.**
  - **Identified remaining challenges and areas where further support to Member States needs to be provided.**
- **All 5 OPEN ACCESS background documents**
  - **Provided the rationale and improved transparency for the revision of GLs.**

Revision of GLs



- Set up Drafting group
  - 1st DrG Zoom meeting (26 Nov 2020)
- Preliminary draft
  - 2nd DrG Zoom meeting (16 April 2021)
- 1st Draft
  - 1st public consultation (27 April – 24 May 2021, 1 month)
  - 3rd DrG Zoom meeting (21 June 2021)
  - Informal consultation (virtual, 30 June – 2 July 2021)
  - WHO editorial review (22 Sept – 4 Nov 2021)
- 2nd Draft (**BS** doc)
  - 2nd public consultation (8 Nov 2021 – 7 Jan 2022, 2 month)
  - 4th & 5th DrG Zoom meetings (10 & 28 March 2022)

Adopted by ECBS, 4-8 April 2022 ⇨ Published in Annex 3, WHO TRS No. 1043

Key updates incorporated in the revised GLs 1/8

	2009	2022	Reasons for updates
Terminology and Definition	Similar biotherapeutic product (SBP): Biotherapeutic product that is similar in terms of quality, safety and efficacy to an already licensed reference biotherapeutic product (RBP).	Biosimilar: Biological product that is highly similar in terms of its quality, safety and efficacy to an already licensed reference product (RP).	In order to align with an internationally recognised harmonised terminology and to expand to include the evaluation of biological products other than biotherapeutics alone, e.g. palivizumab used prophylactically.

Key updates incorporated in the revised GLs 2/8

	2009	2022	Reasons for updates
Scope of guidelines	Apply to well-established and well-characterized biotherapeutic products such as recombinant DNA-derived therapeutic proteins. Vaccines and plasma-derived products and their recombinant analogues are excluded from the scope of this document.	Apply to biological products that can be well-characterized, such as recombinant DNA-derived therapeutic peptides and proteins. Some of the principles provided in these Guidelines may also apply to low-molecular weight heparins and recombinant analogues of plasma-derived products. Vaccines and plasma-derived products are excluded from the scope of these Guidelines.	The scope expanded and clarified. In addition, the term 'well-established' deleted to avoid confusing with the term 'well-established use' in EU and its meaning added in the definition of RP, i.e. 'marketed for a suitable period of time with proven quality, safety and efficacy'. *NOTE: Vaccines (e.g. mRNA) are excluded but may be considered in the future.*

Key updates incorporated in the revised GLs 3/8

	2009	2022	Reasons for updates
Key principles for licensing	The development of an SBP involves stepwise comparability exercise(s) starting with comparison of the quality characteristics of the SBP and the RBP. Demonstration of similarity of an SBP to an RBP in terms of quality is a prerequisite for reducing the nonclinical and clinical data set required for licensure.	Characterization of the quality attributes of the RP should be the first step in guiding the development of the biosimilar. The subsequent comparability exercise should demonstrate structural, functional and clinical similarity. Demonstration of similarity of a biosimilar to an RP in terms of structural and functional aspects, is a prerequisite for establishing comparability, with a tailored clinical data package required as needed.	'stepwise' deleted to reflect the evolution from 'stepwise' to the 'tailored' approach based on the current practices which shows that biosimilar development proceeds in a "concurrent" fashion rather than in a stepwise mode.

Key updates incorporated in the revised GLs 4/8
3 new (sub)sections added in quality evaluation

	2022	Reasons for updates
International reference standards	The role and how and where to use has been clarified.	A new section added as reference standards are now available for a wide range of substances.
Quantity	In general, a biosimilar is expected to have the same concentration or strength of the drug substance as the RP. The quantity of the biosimilar drug substance should be expressed using the same measurement system as that used for the RP.	A new subsection added since many questions on quantity issues were addressed in previous consultations held by WHO.
Comparative analytical assessment	<u>Considerations for RP batches:</u> The number of RP batches needed for the comparative analytical assessment will be influenced by the criticality of the quality attribute(s) under investigation and the approach chosen for demonstrating similarity. In general, sampling a higher number of RP batches over an extended time-period will provide a better estimate of the true batch-to-batch variability of the RP and allow for a more robust statistical comparison with the biosimilar.	A new section added. During consultation process, it had been requested to provide more details on certain topics (e.g. the number of batches required for demonstrating similarity, statistical approaches that can be used for similarity assessment) to emphasize the importance of quality assessment.

Key updates incorporated in the revised GLs 5/8
3 new (sub)sections added in quality evaluation

	2022	Reasons for updates
Comparative analytical assessment	<u>Considerations for biosimilar batches:</u> The exact number of biosimilar batches required will be influenced by several factors, such as the criticality of the quality attribute(s) under investigation and the approach applied for similarity evaluation. In general, the risk of a false-positive conclusion on similarity will decrease with increasing number of batches. <u>Considerations for similarity assessment:</u> Prior to initiating the comparability exercise, it is recommended to conduct a quality attribute criticality assessment of the RP and risk assignment to guide the data analyses and the similarity assessment. The most frequently used approach for similarity assessment relies on demonstrating that the quality attributes of the biosimilar batches lie within the predetermined similarity ranges established based on characterization data from multiple batches of the RP.	

Key updates incorporated in the revised GLs 6/8

	2009	2022	Reasons for updates
Nonclinical evaluation	A head-to-head repeat-dose toxicity study should usually constitute a minimum requirement.	A stepwise approach should be applied. At first, in vitro studies should be conducted and then a decision made on whether or not additional in vivo animal studies are required. The 3Rs principles for animal experiments (Replace, Reduce, Refine) should always be followed to minimize the use of animals in testing. Repeated dose toxicity studies in non-human primates are not recommended and nor are toxicity studies in non-relevant species.	From regulatory review as well as developers' experience it is evident that state-of-the-art analytical and in-vitro functional tests should be sufficient to demonstrate biosimilarity in the majority of cases. Only in rare cases are additional in vivo animal studies required. In line with the outcomes of review and implementation of the 3Rs principles, the nonclinical part was revised.

Key updates incorporated in the revised GLs 7/8

	2009	2022	Reasons for updates
Clinical evaluation	PK, PD, and efficacy studies: The clinical comparability exercise is a stepwise procedure that should begin with PK and PD studies and continue with the pivotal clinical trials. Similar efficacy of the SBP and the chosen RBP will usually have to be demonstrated. In certain cases, however, comparative PK/PD studies may be appropriate. Safety studies: Pre-licensing safety data should be obtained in a sufficient number of patients to characterize the safety profile of the SBP.	PK, PD, and efficacy studies: Clinical studies are a valuable step in confirming similarity. A comparative bioequivalence study involving PK and/or PD comparability is generally required for clinical evaluation. A comparative efficacy and safety trial will not be necessary, if sufficient evidence of biosimilarity can be drawn from other parts of the comparability exercise. Safety studies: Safety data should be captured throughout clinical development from PK/PD studies and also in clinical efficacy trials when conducted.	Clarified the goal of clinical studies and presented the considerations related to the amount and type of clinical data required for biosimilar evaluation. Articulated that the regulatory perspective about comparative safety and efficacy studies is gradually shifting from a strict inflexible requirement to a case-by-case manner depending on the molecule and the data submitted for demonstration of biosimilarity based on the knowledge and the evidence accumulated to date.

Key updates incorporated in the revised GLs 8/8

	2009	2022	Reasons for updates
Clinical evaluation	Immunogenicity: Immunogenicity of biotherapeutic products should always be investigated preauthorization. In the case of chronic administration, one-year data will usually be appropriate pre-licensing to assess antibody incidence and possible clinical implications. Extrapolation of indications: If similar efficacy and safety of the SBP and RBP have been demonstrated for a particular clinical indication, extrapolation of these data to other indications of the RBP may be possible.	Immunogenicity: Immunogenicity studies may not be necessary for well-characterized biological substances (for example, insulin, somatropin, filgrastim, teriparatide), where an extensive literature and clinical experience indicate that immunogenicity does not impact upon product safety and efficacy. Authorization of indications: The decision to authorize the requested indications will be dependent upon the demonstration of similarity between the biosimilar and RP.	Clarified that the decision to authorize the requested indications depends on the adequate demonstration of similarity between the biosimilar and RP.

IPRP Biosimilars Working Group Workshop: "Increasing the efficiency of biosimilar development programs-re-evaluating the need for comparability clinical efficacy studies" (1)*

Public session, 12-13 Sept 2023

- Regulator perspectives
  - Regulators discussed moving on from having a default expectation of CES, but noted that CES may be warranted based on uncertainty.
  - Regulators noted the difficulty of providing different advice regarding the need for a CES when the question is asked when only early analytical data are available.
  - Regulators also noted that ability to streamline in biosimilar development programs also depended on clarity about what type of framework or data could be used instead of default CES to resolve residual uncertainties.

- Stakeholder perspectives
  - Developers believe that CES is less sensitive compared to analytical data in detecting the differences but provide it anyway because it is being expected
  - Global regulatory consistency and predictability is needed
  - Developers are confident in relying on analytical and quality data but believe many Regulators depend on CES for safety and efficacy confirmation
  - Streamlined duration of development is a key for developers in the biosimilar space

*Note: slides (1-3) borrowed from what presented by the Chair country (US FDA)

IPRP Biosimilars Working Group Workshop: "Increasing the efficiency of biosimilar development programs-re-evaluating the need for comparability clinical efficacy studies" (2)*

Regulator Poll on comparative efficacy studies in biosimilar development programs

- Poll collection period: May – Aug 2023
- 38 responses (either collated or individually)
- Summary of observations
  - About 66% of responders believe that the law or guidance required a comparative efficacy study (CES) to support an approval of a biosimilar.
  - Most common reasons (67%) for providing recommendations for a CES were **related to timing**: residual uncertainties were not known because the comparative analytical assessment was at an early stage.
  - Up to 20 - 30% of responders may believe that the comparative analytical assessment is insufficient on its own to draw conclusions that there are no clinically meaningful differences between a biosimilar and its reference product.

- 74% of responders expressed being likely comfortable with not having a CES when there is comparative data utilizing a PD marker known to be a validated surrogate for clinical efficacy.
- In contrast, only 20% of responders expressed being likely comfortable with not having a CES when there is comparative data utilizing a PD marker that is **not a validated surrogate for efficacy**, but the PD marker can support comparisons with respect to functional activity or structural/functional correlations.
- 63% of responders expressed comfort with not having a CES when there **is sufficient understanding/experience with structural and functional correlations of analytical differences** and there is little to no residual uncertainty.

IPRP Biosimilars Working Group Workshop: "Increasing the efficiency of biosimilar development programs-re-evaluating the need for comparability clinical efficacy studies" (3)*

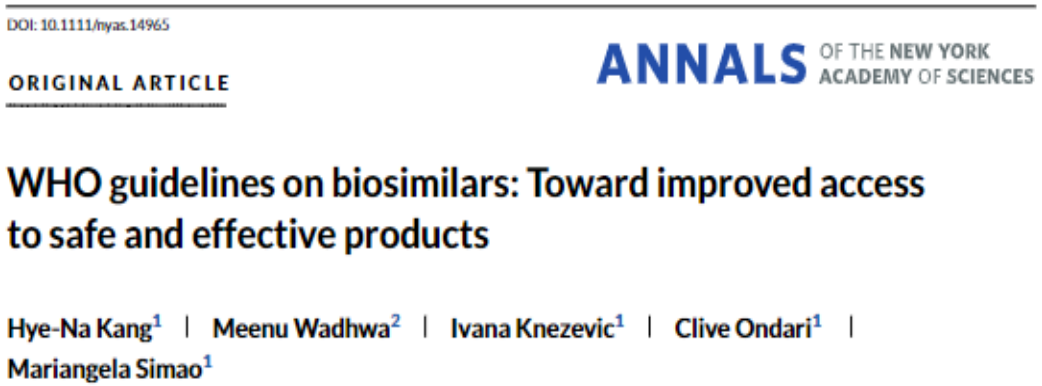
Regulators only session, 19-21 Sept 2023

- Discussion of Regulators Poll Results
  - Majority responded that CES was expected by law or guidance
    - Discussion: In most countries, guidance is not legally binding and there was no legal requirement for CES
  - Majority responded that advice regarding CES was given because the company proposed it or the question was asked at a time when not much comparative analytical data was available
    - Discussion: Acknowledging timing issues, it is ultimately responsibility of developers to provide strong quality and analytical data in a timely manner
    - Discussion: Limited sensitivity of CES, limited or no examples of CES resolving uncertainties in the analytical assessment

- Overview of analytical assessment and discussion of potential risk framework
  - Comparative Analytical Assessment is comprehensive and based on decades of experience with comparability assessments of biologic product manufacturing changes
    - Uncertainties in analytical data are typically resolved by additional analytical data (orthogonal assays, additional lots, etc.)
  - Potential Risk Framework: When do CES clarify uncertainties or concerns versus how are CES actually being used?
    - Discussion: CES are not currently being used to address specific uncertainties or risks.
    - Discussion: It may be possible to identify the specific risks or scenarios where a CES may be informative, based on risks related to uncertainties, product factors, or clinical factors.
    - Discussion: High risk patient populations or organ- specific concerns may justify use of CES even without other risks.

Implementation of the revised GLs

- **Article published, Ann NY Acad Sci 1521, 2023**
  - To facilite the implementation of WHO written standards, i.e. Revised GLs


DOI: 10.1111/nyas.14965

ORIGINAL ARTICLE

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

WHO guidelines on biosimilars: Toward improved access to safe and effective products

Hye-Na Kang[1] | Meenu Wadhwa[2] | Ivana Knezevic[1] | Clive Ondari[1] | Mariangela Simao[1]

- **Article submitted for publication, 2023**
  - To facilitate the implementation of WHO measurement standards, i.e. Reference standards
  - Title: The role of WHO international reference standards throughout the product life-cycle of biosimilars

- **2 topics identified and case studies under development, 2023**
  - Small molecules (Insulins)
    - CMC and non-clinical aspects (also cover device issue)
    - Clamp trial – the pivotal clinical trial (also cover immunogenicity issue)
  - Large molecules (mAbs)
    - CQA and streamlined evaluation
- **Implementation workshop, 2024**
  - In EMR including some countries in AFR
  - Review country situation
  - Hand on training for regulators by using the developed case studies

Thank you for attention!

Acknowledgement: WHO drafting group

General comments for entire doc:

1. Dr Patricia Aprea (ANMAT, Argentina)
2. Dr Pekka Kurki (WHO Consultant, Finland)
3. Dr Maria Savkina (the FSBI «SCEEMP» of MOH, Russia)
4. Dr Robin Thorpe (WHO Consultant, UK)

Quality part:

5. Dr Niklas Ekman (FIMEA, Finland): Lead the quality part
6. Dr Sean Barry (HRPA, Ireland)
7. Dr Jeewon Joung (MFDS, Korea)
8. Dr Edwin Nkansah (FDA, Ghana)
9. Dr Junzhi Wang (NIFDC, China)
10. Dr Joel Welch (US FDA, USA)
11. Dr Teruhide Yamaguchi (PMDA, Japan)

Nonclinical part:

12. Dr Hans-Karl Heim (BfArM, Germany)

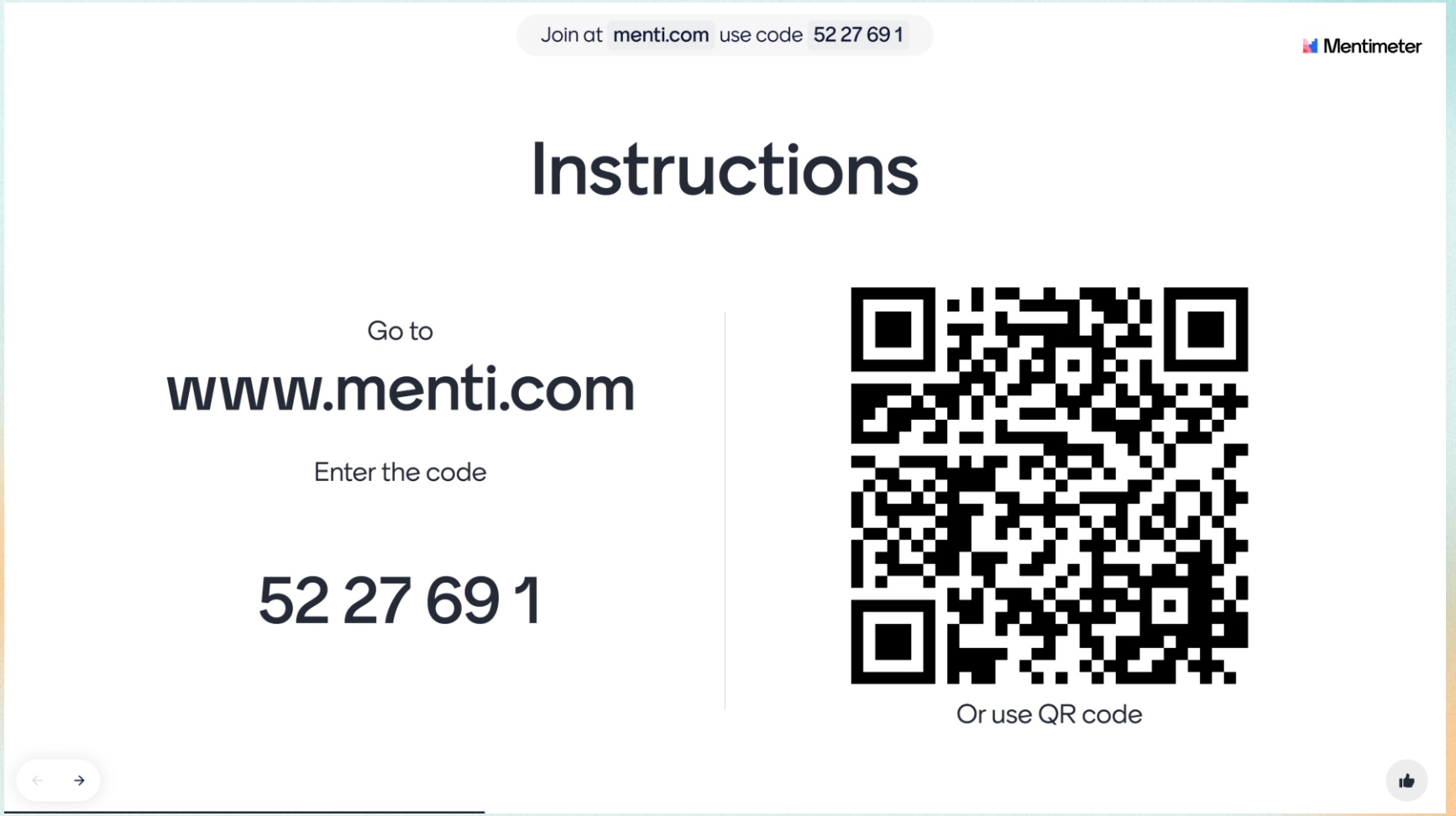
Clinical part:

13. Dr Elena Wolff-Holz (PEI, Germany): Lead the clinical part
14. Dr Marie-Christine Bielsky (MHRA, UK)
15. Dr Emanuela Lacana (US FDA, USA)
16. Dr Catherine Njue (HC, Canada)
17. *Dr Elkiane Macedo Rama (ANVISA, Brazil)*
18. Dr Meenu Wadhwa (NIBSC MHRA, UK)
19. Dr Jian Wang (HC, Canada)
20. Dr Martina Weise (BfArM, Germany)

WHO Secretariat:

21. Dr Hye-Na Kang (WHO, Switzerland)

INTERACTIVE POLL and Importance of Q&A function



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QUESTIONS AND ANSWERS
For both experts

We encourage you to use the Q&A box to raise questions to the speakers.

If a question you would like to ask has already been raised, you can also “like” that question.

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THANK YOU!

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