Utilizing OMICS, RWE, and Al on the way to personalized medicine

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Background:

With scientific knowledge and technologies advancing at a fast pace, medical practice has undergone a substantial transition. Recognizing the influence of individual genetic variations, three major research areas appear to be of great importance:

- in-depth technologies analysis of individual biological data
- Real-world evidence (RWE) leverages data from diverse patient populations to provide insights into treatment safety effectiveness
- Artificial intelligence (AI) algorithms allow faster analysis of large-scale datasets, identification of patterns, and prediction of treatment responses

The synergistic integration of these approaches opens up new opportunities in shaping the landscape of personalized medicine.

Methods:

Literature search and landscape analysis.

Goals: Create publicly accessible and ClinGen extensive databases • CPIC Improve therapeutic response Provide systematic ways to eMERGE 1990-2003 ENCODE register findings Reduce the burden of adverse reactions **Human Genome** • IGNITE Project Supporting implementation of HapMap → Enhance overall quality of life pharmacogenomics in practice PharmGKB PharmVar Advance research, conduct • [...] Personalized Medicine large-scale studies **Academic Efforts Governmental Efforts OMICS** 2023 Precision RWE Biomarker Qualification Medicine Enhance and accelerate the Program (US, EU) development of modern Critical Path Initiative Collect and evaluate information technologies DUS, PASS (US, EU) based on non-genetic causes Registries Support the development of Innovative Medicines innovative therapies Detect unmet needs in practical use

Results:

- The use of genomics in medicine allows more accurate prevention and early diagnosis of diseases as well as more targeted therapies.
- High-quality RWE including clinical-genomic data can inform precision medicine, especially in oncology.
- Al technology can support clinicians in the interpretation of medical scans.

Conclusion:

Initiative (EU)

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Pharmacogenomics in

Drug Labeling (US)

The concept of personalized medicine has the potential to:

Develop new policies to

integrate genomic data

- Improve therapeutic response
- Reduce the burden of adverse reactions
- **Enable proactive interventions**

Broadening the scope of future healthcare to include socio- economic and environmental factors and taking a more holistic approach will improve patient outcomes and enhance overall quality of life.

Acknowledgement:

POP, PSP, NIS

Clinical trials

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of medicines

Collect more information on patient

groups and adverse events

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