

REVIEWS

# One Health and Advanced Biotechnology

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## Abstract

The authors present some compelling arguments seeking to demonstrate the importance and the need of a close interrelation and cooperation between biotechnology and new global medical concept *One Health*; at the beginning, the concept was based on the idea of the existence of a single medicine including both Comparative Medicine, which connects the human medicine to veterinary one, and Zoonoses and Comparative Oncology. Over time, including a significance contribution of Romanian Association, the concept was developed by integrating other new areas: Environmental Medicine, Food and Nutrition Medicine and Occupational Medicine. These six major commands formed, in our opinion, a globalizing interdependent structure that symbolically could be found in the hexagonal pattern that is Romanian *One Health* Association logo. Clearly, in this new concept a component that is found in all the mentioned areas is biotechnology that has and will have a major contribution in the development of *One Health* structure using its latest concepts and specific methodologies. We believe that advanced biotechnology is an effective "locomotive" of the socio-medical progress in all mentioned areas; As result, biotechnology, especially in its present and revolutionary forms must become an effective and active partner of this new medical global concept *One Health*.

**Keywords:** *One Health*, advanced biotechnology, medicine

## Rezumat

Autorii prezintă câteva argumente convingătoare care să demonstreze importanța și necesitatea unor strânse interrelații și colaborări între biotehnologie și noul concept medical global *One Health*; la început, acest concept s-a bazat pe ideea existenței unei singure medicini ce include atât Medicina Comparată, care conectează medicina umană cu cea veterinară, cât și zoonozele și Oncologia Comparată. În timp, prin importanta contribuție a Asociației Române, conceptul a fost dezvoltat prin includerea altor domenii: medicina mediului, medicina nutriției și a alimentelor și medicina ocupațională. Aceste șase mari domenii au format, în opinia noastră, o structură globală interdependentă, ce se poate regăsi simbolic în logo-ul hexagonal al Asociației Române *One Health*.

Categoric, în acest nou concept, o componentă care se regăsește în toate domeniile mai sus menționate este biotehnologia, ce are și va avea în continuare un puternic impact asupra dezvoltării structurii *One Health* prin folosirea celor mai noi concepte și metodologii specifice. Credem cu tărie că biotehnologia avansată reprezintă "locomotiva" progresului socio-medical în toate domeniile menționate; așadar, biotehnologia, în special în forma ei actuală și revoluționară, trebuie să devină o componentă și un partener activ al acestui nou concept medical global *One Health*.

**Cuvinte cheie:** *One Health*, biotehnologie avansată, medicină.

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In front of this extraordinary audience and in front of this extraordinary congressional committee I wish, on the one hand, to extend my warmest thanks for being invited and, on the other hand, to declare that the present paper is not a classical scientific piece of work but an invitation to exceptional collaboration between the science of sciences or the most powerful social locomotive - BIOTECHNOLOGY and the newest global medical concept *ONE HEALTH*. Under these circumstances, I think it is pointless for me to speak anything about BIOTECHNOLOGY, a science you deal with on a daily basis day and it is extremely familiar to you. Instead, I am going to expound the most important facts about *ONE HEALTH* new global medical concept. This new global medical concept addresses itself as the most comprehensive program of human society, of social protection and welfare, as a source of rude health in close correlation with the health of the entire animal and plant biodiversity, with the health of the living environment, with food and nutritional health, with occupational health, finally generating a term of great complexity, namely *ONE HEALTH*.

## SHORT HISTORY

The merit of coagulating the various components of *one-health* concept and disseminating it in practice at large is credited to the United States and especially to the two US structures, respectively *ONE HEALTH COMMISSION* coordinated by Mrs. Cheryl Stroud and *ONE HEALTH INITIATIVE* - with the exceptional coordination of Dr. Bruce Kaplan, Dr. Laura Kahn, Dr. Lisa Conti and Prof. Gregory Gray from Duke University, Florida.

This concept has spread throughout the world, including Europe. The year 2014 represents the formalization of this concept in Europe under the coordination of the Federation of European Academies of Medicine (FEAM), with Prof. Dr. Bernard Charpentier, Prof. André Laurent Parodi and Prof. George Griffin as chairpersons.

In Romania, there have been, for a long time, disparate elements of the future *one health* concept, starting with 1814, in Munich, when the Romanian Gheorghe Asaki defended his doctoral thesis entitled Comparative of Anatomy of the Nervous System in Fish, so we can state that this is the very moment of the birth of COMPARATIVE MEDICINE.

Another landmark is the year 1937, when the Romanian biologist, Academician Radu Codreanu defended his doctoral thesis entitled The Leukemia of Ephe-

meroid-like Insects in Paris, thus becoming the pioneer of another important component of *one health*, namely comparative oncology. In our time, both components have gone through a special development, which can be summarized as follows:

- **COMPARATIVE ONCOLOGY**- was initially set up in 1968 when it became lucrative simultaneously at the Oncological Institute in Bucharest under the guidance of Prof. Octav Costachel and at the Faculty of Veterinary Medicine in Bucharest under the guidance of Dr. Nicolae Manolescu. The year 2009 has brought about an unprecedented development due to Prof. Nicolae Manolescu from Romania and Prof. Dr. Angelo Ferrari from Italy, thus inaugurating a new stage in Comparative Oncology, namely establishing The Mediterranean Forum of Comparative Oncology in Genoa-Italy as well as its subsidiary, The National Forum of Comparative Oncology in Bucharest-Romania;
- **COMPARATIVE MEDICINE** - has gone through an outstanding development since 1999, with the establishment, by Government decision, of The Romanian Institute of Comparative Medicine, led by Professor Doctor Ion Miclăuş and Professor Doctor Nicolae Manolescu.

## THE CURRENT STRUCTURE OF "ONE HEALTH - NEW MEDICAL CONCEPT" ASSOCIATION, ROMANIA

In our association, which is over 2 years old, there are more than 300 members distributed in 7 branches (Bucharest, Constanta, Braşov, Târgu Mureş, Cluj Napoca, Iaşi and Craiova). The number of elderly people is low, therefore, the balance inclines in favour of the young and the middle-aged.

A large number of members are distinguished personalities from our country and from abroad (USA, Italy, France, Spain, etc.).

From a professional point of view, the presence of human doctors, veterinary doctors, I.T. specialists, legal experts, agricultural engineers, horticulture engineers, environmental engineers, economists, etc. is to be noted.

The association is structured in the following departments (legal, environmental, economic, occupational, internal and external relations, unconventional therapy, education, research, personnel, human medicine, veterinary medicine, management, accreditation, comparative oncology, comparative medicine, etc.). The

leadership is provided by a president, a co-president, 4 vice-presidents, a secretary general and a deputy secretary together with the members of the board of management.

The Association publishes a quarterly specialized magazine, *One Health International Journal*, in English. In 2016, we organized the first *One Health* Interregional European Conference in Bucharest together with the Federation of European Academies of Medicine (FEAM).

The Association has important links with the Academy of Medical Sciences, the National Forum of Comparative Medicine, and the *One Health* Excellency National Centre.

Starting with 2016, for 5-year term, our association is an associate member of the FEAM for coordinating *one health* problems. The association also has over 30 partnership agreements with major national and international organizations.

In June 2017 we are going to organize in Târgu-Mureş the first *One Health* National Conference with international participation.

## THE ORGANIZATION OF THE SCIENTIFIC RESEARCH PORTFOLIO INCLUDES:

1. Identification, quantification, necessary measurements and monitoring of the impact on human health of transmissible diseases from animals through vectors (rats, pigeons, mosquitoes, ticks, etc.) in villages, towns, and major cities.
2. Actions and measures needed to reduce the negative impact of the excessive use of antibiotics and other substances in food of animal origin and the recommendation of alternative solutions;
3. Identification, quantification, monitoring and alerting of the presence of oncogenic chemical substances in the Danube water and its main tributaries, on the territory of Romania, the DANUBE DELTA BIOSPHERE;
4. Identification, quantification monitoring and alerting of the presence of ZOONOSES (diseases common to humans and animals- poultry), sylvatic transmission vectors - Letea Forest - and cross-border migration - Ukraine;
5. The implementation in Romania of *ONE HEALTH* Global Concept - Health for People, Animals and Environment, and all that determines it: Food, Nutrition and the Occupational;
6. THE *ONE HEALTH* NATIONAL CENTRE OF EXCELLENCE - Health for Man and everything that surrounds him, Animals and Environment and all that conditions it, Food and Nutrition as well as the Occupational;
7. Social assistance, respectively treatments of diseases such as psoriasis with a range of biologically pure products, for disadvantaged categories of the population. Regional development projects.

## ORGANIZATION OF POST-UNIVERSITY ONE HEALTH EDUCATION

Starting with the academic year 2017-2018, we are organizing the first *one health* post-graduate course in Europe, with a duration of 1 year (2 semesters), at the Private Faculty of Veterinary Medicine within Spiru-Haret University. Beginning with the academic year 2018-2019, there will also be, in parallel, a course held exclusively in English and delivered by highly qualified FEAM specialists. Within this high specialization, human doctors, veterinary doctors, I.T. specialists, agricultural engineers, environmental engineers, forestry engineers, engineers of various specialties, biophysicists, biochemists, economists and bioeconomists, lawyers, etc., will all take active part in courses and workshops.

## WHICH ARE THE COMPONENTS OF ONE HEALTH CONCEPT AND

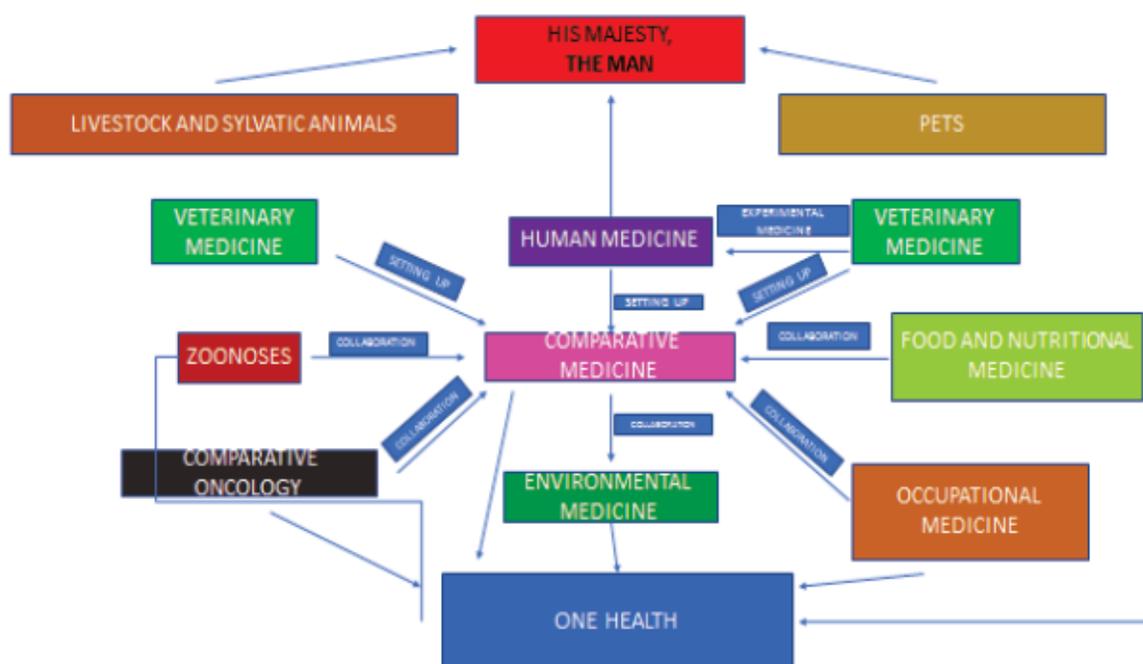
### Who is it addressed to?

The concept focuses on two basic components: COMPARATIVE MEDICINE, which brings together human medicine with veterinary medicine, alongside with ENVIRONMENTAL MEDICINE.

But, besides these permanent components, *one health* concept has to cope with, that is, to take into consideration the permanent negative influence exerted by the secondary factors, that are represented by:

- Zoonoses
- Comparative oncology
- Food and nutritional medicine
- Occupational medicine

For a better understanding of the intrinsic functioning mechanism of *one health* concept, it is necessary to briefly review these components and describe their operating practice in an interconnecting system.



## Main Components (Basic)

### Comparative Medicine

Within the basic component of *one health* concept, comparative medicine includes, in practice, 4 components, human medicine and veterinary medicine, which represent the fundamental and correlated elements, covering anatomy, physiology and pathology, including the experimental area, zoonoses and comparative oncology, component parts of both the comparative medicine and the secondary factors, permanent providers of pathological conditions seeking to destabilize *one health* concept with unequivocal addressability both to the human population and to the population of livestock, sylvatic animals and pets.

### Environmental Medicine

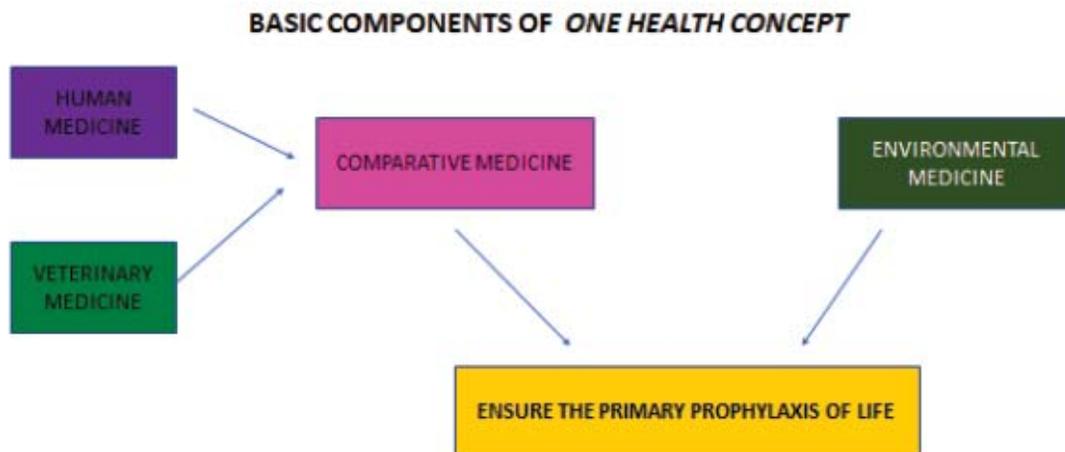
The second fundamental element of *one health* concept is the so-called environmental medicine which, in fact, is nothing else but the interpretation of all the conditions provided by the living environment from the point of view of the human and veterinary doctors, in an indestructible association. In this way, the living environment is permanently under a thorough control, therefore investigated and monitored, for the discovery, the identification and the quantification of all biotic and abiotic pathogenic inducing factors, including the identification of all diseased sylvatic animals or pathogen carriers which form a large part of the etiological

agents of zoonoses. Alongside these actions, the medical surveillance of the vector carriers as well as of the etiological agents of other important zoonoses in the living environment, also emerges as an immediate, even most urgent task. Within this category we include rats, pigeons, ticks, mosquitoes and other stinging insects, gadflies, flies, bugs, etc. Moreover, human doctors and veterinary doctors have to participate in all actions that promote the two activities in the living environment, the ecophylaxis and the ecotherapy that lead to the transformation of a hostile living environment into a propitious and healthy environment for human and animal life.

Within these activities we include the sanitation of all harmful effects present in the environment in relation to soil and plant protection against biotic and/or abiotic pollution.

Faced with the complexity of these crucial problems that underlie the activities that need to be done owing to environmental medicine, the presence two factors that act simultaneously is mandatory. These are:

- An adequate and permissive legislation;
- A multidisciplinary team, made up of:
  - Human doctors Specialized in
  - Veterinary doctors Comparative medicine
- Environmental engineers
- Pedologists
- Agricultural engineers



- Biochemists
- Microbiologists
- Virologists

As far as the analysis of secondary structures in *one health* complex is concerned, we will start with:

- **ZOONOSES STRUCTURE** with bacterial, viral, prion and parasitic etiology, which actually represents an extremely worrying percentage of about 70% of human infectious diseases of animal origin.
- **COMPARATIVE ONCOLOGY** - is the second component of *one health* concept which together with zoonoses are exclusively aggressive components towards humans and animals, so it is necessary to have, on the one hand, a good cognoscibility, and on the other hand, measures to limit aggressive actions and to counteract harmful effects. Cancer, in human and animal world today, is going at an alarming upward trend. The aggressive peril of oncology is due to the multitude of etiological agents (totally different from zoonoses, where there is only one etiological agent for each zoonosis) that all act as mutants for cellular DNA by transforming the normal cell of a tissue or viscera into a malignant cell.

The other two secondary components of the concept play a dual role. Both food and nutritional medicine and occupational medicine can play both an aggressive role for the human and animal population as well as a highly protective one.

In short, the film of the implicit events of these two structures in the implementation of *one health* concept could be summed up as follows:

- Food medicine, in close and permanent relation to nutrition, is called to check and intervene permanently to prevent the consumption of inadequate food, regarding either the normal content of each component or any accidental pollution or even an intended pollution, be it intentional or non-intentional. If, under the above conditions, food safety is decisive for preserving the good health of humans and animals, it is equally important that the nutrition typology should be designed in close connection with age and the inventory of chronic diseases suffered by man as well as by animals, aiming what *one health* concept has already launched, **PERSONALIZED NUTRITION**.

Finally, we can, in our opinion, draw the following conclusions:

1. The new global *one health* concept, outlined for the first time in the USA and then in Europe, is of inestimable value because it promotes **ONE HEALTH** for humans, animals and the living environment;
2. Romania has developed this concept by adding food and nutritional medicine as well as occupational medicine;
3. The importance of comparative medicine as an organizer of the implementation of the concept is particularly important;
4. The broad implementation into practice of this concept implies the correlative existence of several fundamental elements, as follows:
  - Specific education should start from an early age (kindergarten);

- Permanent scientific research to promote new attributes of this concept;
- The decisive intervention of biotechnology in the implementation of the concept, with the role of locomotive in the process of sanitation of all the destabilizing factors of the concept;
- Permanent control over the implementation process of the concept of BIOECONOMY, the most dynamic science of the economic branch in the life of human society;
- The need for close collaboration between biotechnology and the *one health* concept.

## References

1. Balint Emilia, Manolescu N., Panait Marieta, Mateescu C., Predoi G., Fecioru Carmen – Compared oncology's place in context of the general oncology science, Romanian Journal of Comparative Oncology no.21/2011, p 1389, ISSN 1582-0807
2. Comișel V., Begnescu R., Manolescu N. – Relationships between environment pollution and cancerous disease in humans and animals - Romanian Compared Oncology Magazine, vol. 3/2000, Timișoara
3. Manolescu N. and colab. – Eco-oncology, science of the 3rd millennium, Medical UPDATE Bucharest, vol.V, p. 66, 1998
4. Manolescu N., Balint Emilia, BelcNastasia, Roatis R., Cinca S., Lăcătușu R. - „Food safety and potential cancer-inducing factors from food products”, Agriculture, Strategic domain for food safety and security, Ed. Romanian Academy, ISBN 978-973-27-2363-0, pag 199-209
5. Manolescu N., Balint Emilia, Mateescu Corneliu, “Compared Oncology, a complex structure of Compared Medicine”, Romanian Academy's Academica Magazine, nr. 7-8, July-August 2013, ISSN 1220-5737
6. Manolescu N., Balint Emilia, Nitulescu Ana-Maria, Mateescu C., Predoi G., Mihailuliana, Supeanu A., “Compared Oncology – operational niche in medical sciences” 29-30 May, Timisoara 2014
7. Manolescu N., Balint Emilia, Predoi G., Mateescu C. -“Comparative medicine-a new field of medical sciences”, “Contribution of the scientific research to veterinary medicine progress” Symposium, Bucharest, 22-23 Nov 2012 –Timisoara 2014
8. Manolescu N., Balint Emilia, Roatis R. - „POTENTIAL CANCER INDUCING FACTORS IN FOOD PRODUCTS”, Romanian Academy, First International Conference of Compared Medicine, 18-20 oct.2012
9. Manolescu N., Comișel V., Miclăuș I., Mateescu C., Begnescu R., Encuț I., Cinca S., Alexandru N., Ciocnitu V., Codreanu Doina- Polluted environment and cancer disease in animals and humans – Romanian Environment Magazine, vol. 1, nr. 2, p.11, 1999, Bucharest
10. Manolescu N., Miclăuș I., Alexandru N., Comișel V., Begnescu R., Crînganu D., Militaru Manuela, Dinescu Georgeta, Ciobotaru Emilia, Țerbea I.– The environment pollution in an area, a sustaining factor of oncoproliferations and oncodifferentiations in humans and animals – Romanian Compared Oncology Magazine, (supl.), p. 5,2000, Timișoara
11. Manolescu N., Miclăuș I., Alexandru N., Comișel V., Mateescu C., Balint Emilia –Battle plan against human and animal cancer in an environment – Oncology National Conference, 23-24.11.2001, IOB
12. Manolescu N., Miclăuș I., Baba A.I., Bolte S., Maltezeanu Gr., Comișel V., Crânganu D., Roman V. – The biotope importance in cancerous disease evolution. Preliminary note – Romanian Veterinary Medicine Magazine, vol. 8, p. 9, 1998
13. Manolescu N., Miclăuș I., Baba A.I., Bolte S., Maltezeanu Gr., Comișel V., Crânganu D., Terbea I. – Human and animal eco-oncology aspects – University Symposium of Compared Oncology, March 1998, Bucharest
14. Manolescu N., Miclăuș I., Comișel V., Begnescu R., Alexandru N., Balint Emilia –The study of the environment – a maximal requirement for understanding animal cancer disease –Romanian Compared Oncology Magazine, vol. 1, p. 45, 1999
15. Manolescu N., Miclăuș I., Savu C., Pop Aneta, Stănculeanu Dana, Militaru Manuela, Balint Emilia, Zisu Daniela – Integrated monitoring of an environment in relation with the econcotherapy and econcoprofilaxy of cancer disease in humans and animals - Romanian Compared Oncology Magazine, vol.5/2001
16. Manolescu Nicolae, Balint Emilia, Bogdan A.T., Lastofka D. – „Compared Oncology, a new concept, a new way of medical practice”, Annual science session, Timisoara, 24-25 May 2012
17. Manolescu Nicolae, Balint Emilia, Mateescu C. – „ Compared Oncology in Romania –1968-2010 – 42 years of activity” – Romanian Compared Oncology Magazine, vol18/2010, pag. 1173, Bucharest, ISSN 1582-0807
18. Manolescu Nicolae, Balint Emilia, Mateescu Corneliu – The influence of the environment – a determining element of cancer disease development (Experience from Romanian Territory) – Romanian Compared Oncology Magazine , vol. 17, Bucharest, 2009
19. Manolescu Nicolae, Popescu Irinel, Cepoi Vasile, Irimie Alexandru, Baba Alecsandru Ioan, Balint Emilia, Supeanu Alexandru, “Half of Century of Comparative Medicine– component part of the new *one health* medical concept in Romania”, WVA/WMA Global Conference on *One Health*, 20-21 May, Madrid, Spain.