Vaccines are among the most cost-effective health measures, saving millions of lives each year (WHO). Immunization has led to the eradication of smallpox and poliomyelitis. Immunization also contributes to broader economic benefits and increased cognitive abilities [1,2]. However, the benefits of vaccines are often not fully valued as evidenced by public concerns regarding vaccine safety, quality or efficacy. In addition, the spread of public misinformation via the internet and other media has the potential to impair immunization programs. Elements to improve public confidence in vaccines include evidence-based decision-making procedures and recommendations, controlled processes for licensing and monitoring vaccine safety, effectiveness, disease surveillance, and high quality education programs. Engagement of the community with appropriate communication approaches for each audience is a key factor in building trust in vaccines [3]. Vaccine safety/quality issues should be handled quickly and transparently to be effective. In order to maximize the utilization of vaccines, and thus sustain trust in vaccines, partnerships are needed between public and private health sector stakeholders. Confidence in vaccines can be improved through collaborations that concomitantly ensure (i) efficient high-level vaccine coverage; (ii) information for the public and other stakeholders concerning the benefits of vaccines; and (iii) ongoing evaluation of vaccine safety monitored by an independent expert body with full transparency. All of the above are best accomplished by insuring adequate numbers of professionals trained in the sciences of vaccinology.

Vaccinology is a multidisciplinary discipline that includes vaccine development, education, utilization, policy, and safety. As such, it combines knowledge from basic sciences, medical sciences, public health and social sciences. Vaccinology requires inputs from various basic sciences (mainly immunology, virology and genetics), clinical medicine (clinical trials development, pediatrics, internal medicine), public health (methodology, epidemiology and bio-statistics) and social sciences (psychology, communications, public health policy, anthropology). There is clearly an important need to train young scientists as vaccinologists across these areas of content, in order to create a continuous pipeline of vaccinologists for the future [4–7]. There is also a clear need for innovation in vaccine development.

Ideally, a vaccinologist grasps a general overview of all disciplines involved, but is also able to focus on a single discipline in depth, as related to vaccinology. A vaccinologist holds a clear overview of how these elements could be assembled to generate new concepts. In our point of view, the three main aspects to train vaccinologists are (1) in-depth exposure of trainees to the multidisciplinary aspects of vaccinology; (2) academic teaching in basic and clinical sciences; (3) practical vaccinology training undertaken in both public sector and industry settings. Such a program prepares vaccinologists to conceive, develop, and assess new vaccines and vaccine policy. A previous editorial in Vaccine called for educating the next generation of vaccinologists, and the clear-cut need for advanced training programs in vaccinology [4].

A new Erasmus Mundus – Joint Master degrees granted by EACEA, the Education, Audiovisual and Culture Executive Agency of the European Commission, entitled “Leading International Vaccinology Education” (LIVE), is scheduled to start in 2016. The general objective of the new LIVE program is to train the next generation of vaccinologists who will have to manage an increasing number of infectious and non-infectious vaccine targets for many important issues: unsolved and still emerging infectious diseases, immunosenescence in an era where there is exponential aging of the population, non-infectious but immune-related diseases (e.g., allergy, cancer and chronic inflammatory diseases such as atherosclerosis, obesity, diabetes, addictions, etc.), and others. Such needs parallel the global requirement to decrease health care expenses while increasing quality and health care outcomes. Meeting these needs starts with providing the funding, teachers, excellent training and career pathways for smart and dedicated students who will devote their professional careers to Vaccinology. LIVE is a novel two-year program for talented and motivated students interested in multidisciplinary studies in Vaccinology. It is a joint project between five European universities (Barcelona, Antwerp, Saint-Etienne and Lyon), each one awarding a Master degree of excellent quality. Academic internationality is enriched by a worldwide network of 12 academic universities from Brazil, Canada, China, Cuba, Europe, and USA. LIVE students will develop a trans-national appreciation for vaccine issues by in-residence participation in educational activities in at least three different countries during the program. Graduates are also well prepared for doctoral-level research in Ph.D. programs funded by associated partners.

We have identified five specific areas that must be addressed in educating future leaders in vaccinology:

1. First, vaccinologists must be well trained in immunology and in immunopathology which are the scientific core basis from
which to manipulate the immune system. The immune system is the physiological system targeted by vaccines to prevent or treat a disease, whose etiology is not necessarily related in a primary manner to the immune system. By training students in Immunology and Immunopathology via the Master in Advanced Immunology at two Barcelona Universities, vaccinologists will be able to envision novel vaccine designs cognizant of the need to minimize/prevent side-effects. Part of this training will involve the design and use of vaccine safety surveillance systems and studies.

(2) Vaccinologists must also be trained in infectious diseases. Today, the majority of vaccine applications are related to infectious diseases and Europe is a worldwide leader in this traditional field. LIVE Master degree students will benefit from this environment in Belgium and France. LIVE students will also develop a deep knowledge of infectious diseases in Antwerp and further investigate epidemiology in Lyon.

(3) The LIVE program will consolidate and enlarge an ecosystem with close contact between vaccine industry, research and clinical academics, and vaccine-related organizations. This ecosystem of vaccinology is well-developed, and actively engaged in further developing an outstanding and participative partnership.

(4) The next generation of vaccinologists should also anticipate future vaccine needs and applications. Non-infectious and chronic diseases such as cancers account for about 60% of ongoing studies of new vaccines. In the future, allergy, neurology, autoimmunity and immuno-metabolic diseases will also require trained vaccinologists.

(5) Finally, vaccine communication and education, with the demonstrated ability to inform and participate in developing national and global vaccine health policy are critical tools to educate the population and policy-makers and funders. Vaccinologists must understand the necessity of better communicating the advantages and values of vaccines in order to successfully contribute to efficient, successful, and safe public health policies and vaccination campaigns.

The LIVE program is designed as an interdisciplinary teaching approach with an internationally composed student community, and will provide students with expertise across the five fundamental areas outlined above. This expertise is critical successful careers in vaccinology and in building an international network of professionals who will help to solve current and future challenges of the field. The entire program and deadlines for applications for the first year of enrollment will be announced on the LIVE webpage in the spring 2016. Further information on this unique program can be found at:


Advanced training programs such as LIVE are critical to meeting global needs for highly trained and equipped vaccinologists. Few such programs currently exist, and the LIVE Master’s degree program is a novel and much needed answer to these needs. In addition, professional societies geared toward the continuing education and professionalization of vaccinologists [7], and annual international vaccine meetings, are critical to sustaining a cadre of highly trained vaccinologists who understand global challenges in vaccine development, policy, and practice. Finally, advanced training programs such as LIVE and others, are instrumental in the eventual establishment of vaccinology as an academic sub-specialty with professional certification. Such a career pathway, from medicine or basic science expertise, to advanced training in vaccinology, to professional certification, is an important strategy in insure the highest caliber professionals are available to meet the ongoing current and emerging global needs for the prevention of infectious and non-infectious diseases that plague contemporary society.

References


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