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The Future of Biomedical Specialists in Mongolia

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Science is key to development, driving innovation, entrepreneurship, and the economy. In 2015, an independent assessment by the Organization for Economic Cooperation and Development (OECD) issued a ranking of countries on funds spent for research and development. Of the research funds spent around the world, Israel, South Korea, Japan ranked the highest at 4.2%, 4.1%, 3.5% of the gross domestic product (GDP), respectively [1]. In comparison, Mongolia spent 0.17-0.26% of GDP in 2015 and thus, lacks of funds needed to spark innovation for basic science research and development. Because of the insufficient budget, biomedical specialists in Mongolia lack financial support and job security. The laboratory is the main kitchen for science and the analysis of biomedical samples, and to run such a laboratory, stable funding and qualified human resources are indispensable. The Global Competitiveness Index 2014–2015 Rankings by World Economic Forum ranks countries based on the "set of institutions, policies, and factors that determine the level of productivity." The World Economic Forum ranked Mongolia as 107th of the 144 countries [2]. For increase productivity and development in Mongolia, investments to research and development funding for the sciences must be doubled or tripled over the next 50 years.

American inventor and journalist, Rob Kall, wrote, "The brain gives the heart its sight. The heart gives the brain its vision." The medical doctor is the brain of healthcare, but the biomedical specialist is heart. Biomedical specialists are fundamental to the health care system, because scientific and clinical work cannot function without biomedical specialists. Biomedical specialists are often responsible for analyzing biomedical samples, carrying out new research, developing data mining skills, and working with new techniques. Biomedical specialists are useful to clinical practice, academia, and society. Biomedicine is a frontier science that underpins much of modern science and innovation, and thus, the importance of biomedical specialists cannot be underestimated.

In Mongolia, a biomedical undergraduate program at the Mongolian National University of Medical Sciences (MNUMS) launched in 2000. The five year bachelor's degree in biomedical science aims to foster scientific discovery and development among new biomedical specialists. The two-year master's degree and three year doctoral degree are also offered at MNUMS. In the recent years, the curriculum and educational environment of undergraduate and postgraduate biomedical sciences at MNUMS have improved, and student graduate having developed

personal, interpersonal, and laboratory skills at the university. As of October 2016, there were 181 graduates of biomedical programs at MNUMS, and their employment rate was nearly 90% [3].

Of all the graduates, 74% currently work at universities or hospitals [3]. Many people agree on the necessity of biomedical specialists, but most health care organizations in Mongolia hesitate to support them. One of the reasons for such lack of support is due to a lack of policy and understanding about the role of biomedical specialists. In order to better explain the benefits of employing biomedical specialists, directors of hospitals and academic institutions, particularly in rural areas, must be given information about human resources for the biomedical sciences.

Policy for biomedical specialists in Mongolia is slowly starting to improve. In 2016, the Ministry of Health in Mongolia and the Ministry of Labor and Social Welfare issued a statement asserting that biomedical specialists are employees and confirming that they should have protected time to pursue career-development activities. Job descriptions and postgraduate training guidelines, such as the December 15, 2016's Order A/184 entitled "Postgraduate training specialty and subspecialty in biomedicine (clinical laboratory)," were approved by the Ministry of Health to be implemented accordingly. To continue to support biomedical specialists, policymakers need to collaborate with biomedical specialists, health care organizations, universities, and manufactories to create a qualified and productive strategy for the clinical, research, and public health sector.

In the United States, the median annual wage for a biomedical scientist was 65,900 USD in 2010, according to The Bureau of Labor Statistics. In the United Kingdom, the annual salary for an entry-level biomedical specialist is nearly £28,000, mid-level is up to £35,250, and senior level is up to £41,250. In Mongolia, the current annual wage for biomedical specialists is 2,400-6,000 USD. Due to financial crisis in 2015, the Mongolian Government has not been able to increase wages. The low wages following many years of studying discourage many Mongolian biomedical specialists, as they experience a decreased quality of life and find their dreams unfulfilled. Thus, policy change on wages is needed to motivate and support biomedical specialists.

There are many career options for biomedical science degree graduates, but graduates in Mongolia often have insufficient access to information about future career trajectories and opportunities. Providing access to such information would be as simple as creating a booklet. For example, a Royal Society of Biology booklet entitled "Next Steps: Options After a Bioscience Degree" contains advice and information about bioscience career planning, including job seeking strategies, the importance of skills, postgraduate educational opportunities, filling out applications, and so on [4]. In the booklet, the possible career options are divided to education options and employment options, which is then further divided into science jobs and non-science jobs (Figure 1, 2). By showing the range of opportunities, young biomedical specialists in Mongolia can work with motivation and seek to further develop the field.

The biomedical sciences can provide more lucrative jobs if more professionals sought to create more opportunities outside the normal university and hospital context. Thus, biomedical science graduates should not only be job seekers, but also job creators. For example, founding a start-up company making diagnostic kits or a consulting company can create alternative jobs for biomedical specialists. Another path is to develop public and private partnerships by launching translational medicine, bench-to-bed research initiatives. To be a job creator, graduates must develop an entrepreneurial mindset, cultivating creativity and diligence during their studies at university.

Governmental and non-governmental laboratories and companies have a demand for experienced biomedical laboratory professionals in Mongolia. Though there is a demand, there is no organized infrastructure to meet those demands effectively. The relationships between biomedical sciences and universities, industry, and government systems have been underdeveloped until now, thus we must look to success stories from other countries to discover ways to cultivate the relationships and create the infrastructure necessary. Fruitful discussion and consensus are required to understand the main role of biomedical specialists for all level of the healthcare system and society in Mongolia.

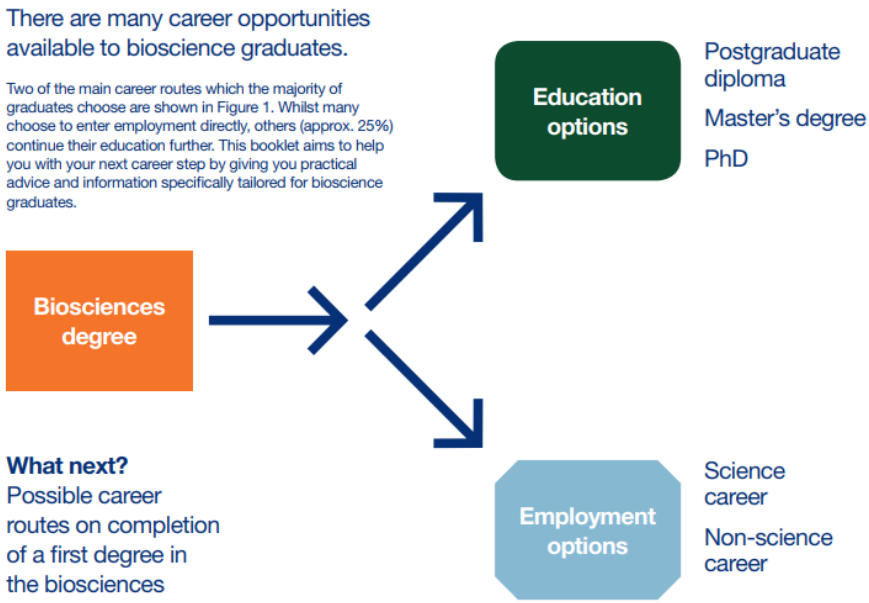

Figure 1. Next Steps – Options after a Bioscience Degree. Booklet produced by Royal Society of Biology. p2, 2015

Bioscience-related jobs include:

- Research & development (induslry/academia)
- Lecturer (university)
- Clinical biochemistry/Immunology/microbiotogy
- Technical e.g. quality control, research technician
- Specialist e.g. ecdogist. pollution control, bbinformatician
- Medical doctor/nurse/physiotherapist
- Patent attorney
- Regulatory affairs/technology transfer
- Teaching (school/college/university)
- Science communication/)ournalisnVpublishing
- Research management and administration
- Scientific sales and marketing

Non-bioscience jobs include:

- Accountancy/finance
- Management e.g. retail, operations
- Administration e.g. university. Civil Service
- Sales and marketing (non-medicaVscientrfic}
- Librarian/tfiformation management
- Security/armed forces
- Legal services
- Personnel
- Non-scienc«communication/pHjblish"ng/journalism/PR
- Market research/analyst
- Self-employment

Figure 2. Next Steps – Options after a Bioscience Degree. Booklet produced by Royal Society of Biology. p5, 2015

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