МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
Федеральное государственное бюджетное образовательное учреждение высшего образования
«Пермская государственная фармацевтическая академия»
Министерства здравоохранения Российской Федерации

Кафедра иностранных языков

УТВЕРЖДЕНЫ
решением кафедры
Иностранных языков
Протокол от «26»__июня__2024 г. №_10__

МЕТОДИЧЕСКИЕ МАТЕРИАЛЫ ПО ДИСЦИПЛИНЕ

Б1.В.08 ИНОСТРАННЫЙ ЯЗЫК ДЛЯ ПРОФЕССИОНАЛЬНОГО ОБЩЕНИЯ

Индекс и полное наименование дисциплины

19.04.01 Биотехнология

(код, направление подготовки)

Год набора: 2025

Пермь, 2024 г.

1. Рекомендации по подготовке к семинарам

Обучающимся следует:

- приносить с собой рекомендованную преподавателем литературу к конкретному занятию;
- до очередного семинарского занятия по рекомендованным литературным источникам проработать теоретический материал соответствующей темы занятия и выполнить задания, определённые для подготовки к семинарскому занятию;
- при подготовке к семинарским занятиям следует использовать не только лекции, но и учебную литературу;
- в начале занятий задать преподавателю вопросы по материалу, вызвавшему затруднения в его понимании;
- в ходе семинарского занятия давать конкретные, четкие ответы по существу вопросов.

Вопросы для самопроверки

Вопросы для самопроверки по теме 1 «Биофармацевтическая промышленность»

1. What does the enterprise do with a new drug substance?
2. What is innovation?
3. What does the manufacturer ensure?
4. What does working in the pharmaceutical industry involve?
5. What are the most important spheres of application of biotechnology?
6. What does pharmacogenomics study?
7. What may be used a s targets for the development of new effective therapies?
8. What diseases will it be possible to treat and possibly cure with the help of biopharmaceuticals?
9. What studies does preclinical research involve?
10. What ethical issues do the scientists have to touch on?
11. Why do scientists have to use animals in the [preclinical studies?
12. What are the commonly evaluated parameters of a new compound in pre-formulation studies?
13. Why is the determination of the dosage form of a new drug important?
14. What does “validation” tell us when we work with documents?
15. How does GMP relate to the working place and the equipment? Give an example.
16. What principle is particularly important in the manufacturing and quality control areas?
17. What does a cross contamination mean?
18. Why my certain materials be sampled?
19. Where do the manufacturers continue to control their products?
20. What are the key characteristics of a successful health and safety management system?

Вопросы для самопроверки по теме 2 «Профессия биотехнолога»

1. What is your future profession?
2. When and why did you decide to choose a career of a bio-technologist?
3. Who advised you to be a bio-technologist?
4. How to become a bio-technologist?
5. Where do the students have practice?
6. What specialties do the students get after graduating from the academy?
7. Where may the students do after graduating from the academy?
9. What is the structure of a chemical enterprise?
10. What are the duties and the perspectives of a biotechnologist?
11. What is necessary to become a biotechnologist?
12. What traits of character are necessary for people of this profession?
13. What is more important for you in your future place of work: distance from home, psychological climate, reputation of the company, career opportunities, etc.?

14. What specialists do pharmaceutical companies employ?
15. What areas of pharmacy business do pharmaceutical engineers specialize in?
16. What positions are the undergraduate specialists mostly employed to?
17. What will you have to do if you want to move on?
18. What skills are required to hold the managerial position?
19. What degree do group leaders and managers generally have?
20. What activities are biotechnologists involved in?

2. Рекомендации по подготовке доклада

Доклад – публичное сообщение, представляющее собой развёрнутое изложение определённой темы.

Этапы подготовки доклада:

1. Определение темы доклада.
2. Подбор нужного материала, определяющего содержание доклада.
3. Составление плана доклада, отбор и первичный анализ собранного материала.
4. Изучение теоретических источников, выделение главной и второстепенной информации.
5. Уточнение плана, упорядочение материала в соответствии с его пунктами.
6. Составление текста доклада, его композиционное оформление.
7. Заучивание текста доклада.
8. Выступление с докладом.
9. Обсуждение доклада.
10. Оценивание доклада.

Доклад рекомендуется сопровождать презентацией.

Список тем для доклада по теме 1.2. Мировая биофармацевтическая промышленность

1. Global biotechnology: market size and industry analysis.
2. Brief analysis of patented biotechnology inventions worldwide.
3. General overview of biotechnology enterprises in the world.
4. The biotechnological enterprise I would like to be employed in.
5. The future of biotechnology worldwide.
6. Key trends in the global biotechnology nowadays.
7. The best countries for biotech according to the OECD.
8. Biotechnology industry in India (or any other country on your choice).
9. Goals for biotechnology and biomanufacturing today.
10. The latest biotechnology innovations. My personal contribution.
11. Understanding GMP in biotech companies.
12. GMP and validation in biotechnology worldwide.

Список тем для доклада по теме 2.2. Карьера биотехнолога

1. Drawbacks and benefits of my profession.
2. Biotechnologists: the reasons of being life-long learner.
3. The advantages of being a biotechnologist.
4. My future career path.
5. The workplace and working conditions of a biotechnologist.
6. A career in biotechnology: the pros and cons.
7. Duties and responsibilities of biotechnologist.
8. Types of biotechnologists and the one I prefer to be.
9. Challenges of a career in biotech.
10. Role of Research & Publications in biotechnology.

11. Career options and future prospects in biotechnology.
12. 5 key benefits of a biotechnology career.

3. Рекомендации по подготовке презентации

Презентация – документ или комплект документов, предназначенный для представления чего-либо (организации, проекта, продукта и т. п.).

Компьютерную презентацию, сопровождающую выступление докладчика, удобнее всего подготовить в программе MS PowerPoint. Презентация представляет собой последовательность сменяющих друг друга слайдов. Количество слайдов должно быть адекватно содержанию и продолжительности выступления (например, для 5-минутного выступления рекомендуется использовать не более 10 слайдов).

На первом слайде обязательно представляется тема выступления и сведения об авторах. Следующие слайды можно подготовить, используя две различные стратегии их подготовки:

1 стратегия: на слайды выносится опорный конспект выступления и ключевые слова с тем, чтобы пользоваться ими как планом для выступления. В этом случае к слайдам предъявляются следующие требования:

- объем текста на слайде – не больше 7 строк;
- маркированный/нумерованный список содержит не более 7 элементов;
- значимая информация выделяется с помощью цвета, кегля, эффектов анимации.

Особо внимательно необходимо проверить текст на отсутствие ошибок и опечаток. Основная ошибка при выборе данной стратегии состоит в том, что выступающие заменяют свою речь чтением текста со слайдов.

2 стратегия: на слайды помещается фактический материал (таблицы, графики, фотографии и пр.), который является уместным и достаточным средством наглядности, помогает в раскрытии стержневой идеи выступления. В этом случае к слайдам предъявляются следующие требования:

- выбранные средства визуализации информации (таблицы, схемы, графики и т.д.) соответствуют содержанию;
- использованы иллюстрации хорошего качества (высокого разрешения), с четким изображением;

Максимальное количество графической информации на одном слайде – 2 рисунка (фотографии, схемы и т.д.) с текстовыми комментариями (не более 2 строк к каждому). Наиболее важная информация должна располагаться в центре экрана.

4. Рекомендации по подготовке к собеседованию

Собеседование можно отнести к многоплановой форме контроля, в ходе которой осуществляется проверка сформированности не только коммуникативной, но и лингвокультурологической компетенции. В ходе собеседования проверяется умение обучающегося создавать монологические высказывания на разные темы с соблюдением языковых норм (орфоэпических, лексических, грамматических, стилистических), а также принимать участие в диалоге. Обучающиеся должны владеть коммуникативно-речевой стратегией, помогающей не теряться в ситуации непосредственного общения, и создавать ситуативно уместные, достаточно спонтанные речевые устные высказывания, которые требуются по условиям определенного учебного задания.

В практической деятельности по подготовке обучающихся к собеседованию необходимо обратить особое внимание на обучение пересказу текстов по изучаемым темам. В процессе «говорения» обучающийся должен показать степень владения всеми коммуникативно-речевыми формами речи (повествование, описание, рассуждение), а также монологического высказывания и диалогического общения. Необходимо обращать внимание обучающихся на то, что некоторые задания опираются на их личный жизненный и учебный опыт и результат собеседования зависит также от него.

Рекомендуемая последовательность подготовки к монологическому высказыванию:

• прочитать текст и сделать необходимые пометы, например, проставить ударение в словах, объяснить значение слов;

• выделить ключевые слова и слова, вызывающие трудности при прочтении;

• сформулировать основную мысль каждого абзаца и всего текста;

• выделить главную и второстепенную информацию каждого смыслового фрагмента;

• составить план пересказа;

• пересказать текст.

По окончании монологического высказывания обучающемуся задаётся несколько вопросов по теме. Вопросы подобраны таким образом, что помогают расширить и разнообразить содержательный и языковой аспект речи обучающегося, стимулировать его к использованию новых форм речи и расширению активного словарного запаса. Это обеспечивает естественный переход от монолога к диалогу с собеседником. Цель экзаменатора-собеседника – эмоционально расположить экзаменуемого к беседе, стимулировать его речевую деятельность. Диалог оценивается в целом по всем ответам обучающегося на вопросы; учитывается речевая ситуация.

Вопросы для собеседования по теме 1.1. Биофармацевтическая промышленность в России

1. What are the largest pharmaceutical companies in Russia?
2. What is the FDA equivalent in Russia?
3. What is the drug regulatory body of Russia?
4. What are the 4 major concerns about biotechnology in Russia?
5. Can you easily get a job after getting a degree in biotechnology in Russia?
6. Does Russia have a pharmaceutical industry?
7. What are the top 10 pharmaceutical companies in the Russian market?
8. Why are foreign investors still hesitating to invest in Russian biotechnology?
9. What are the challenges facing biotechnology in Russia?
10. How does the Russian invasion affect the pharmaceutical industry worldwide?

Тексты для собеседования по 1.1. «Биофармацевтическая промышленность в России»

Text 1

According to the Russian national standard GOST R 57095, biotechnology is “the application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services”. This industry is a mixture of modern knowledge from genetics, molecular biology, biochemistry, microbiology, bioinformatics, and its practical applications for creating innovative products.

Today, biotechnology is one of the most dynamically growing areas of science and technology. Potential benefits from its use can be found in the following fields: healthcare, development of new materials and alternative fuels, agriculture, food industry, environmental protection, etc.

At the moment, the Russian Federation is not among the world leaders in the biotechnology market, but this situation may change in the future. Biopharmaceutics is considered one of the most developed biotechnological industries in our country; the most promising areas are bioenergy, industrial, food and environmental biotechnology.

The main document defining the vector of development of biotechnology in Russia is the State Coordination Program for the Development of Biotechnology in the Russian Federation until 2020 (BIO 2020). The goals of the program are:

- Boosting the development of certain areas of Biomedicine, agricultural biotechnology, industrial biotechnology, and bioenergy.
- Reaching the level of production of biotechnological products in the amount of about 1% of GDP by 2020 and 3% of GDP by 2030.
- Increase in the volume of production of biotechnological products by 33 times.

Adopted in 2012, it is a long-term formation strategy of modern bioeconomy in Russia. Along with it, the technology platform "BioTech2030" was formed, designed to unite industrial, educational and scientific–research institutes for cooperation in the field of bioindustry. The BIO2020 program was followed by several high-level documents and decisions in the areas of biotechnology and bioeconomy.

Text 2

BIOCAD is one of the largest innovative biotech companies in Russia. The company combines world-class R&D centers and modern pharmaceutical and biotechnological production with preclinical and clinical trials compliant with international standards.

BIOCAD is a full-cycle drug development company, from molecule search to mass production and marketing support. The drugs are intended for the treatment of oncological and autoimmune diseases. The current product portfolio comprises of 61 medical products, with 22 of them being biologics. There are more than 40 products at different stages of development. The research and development of anticancer drugs is one of the priorities of the company.

BIOCAD employs 2600 people, with a third of them being researchers and scientists. The company has several international offices located in Brazil, Vietnam and the UAE.

Being a fully integrated company creates another competitive advantage via its wide range of in-house competencies. BIOCAD is one of the few full-cycle drug development and manufacturing companies, running everything from new molecule discovery and genetic engineering to large-scale commercial production and marketing support.

BIOCAD has registered products in almost 50 countries and is “growing like crazy”, says Mr Pavlovsky. Founded in 2001, it has established a global network of subsidiaries in Brazil, China, India, Vietnam, and the USA. Its medicines are dedicated to treat complex health conditions such as cancer, HIV and hepatitis C infections, multiple sclerosis and other disorders.

The company has large-scale manufacturing facilities for monoclonal antibodies, as well as a subdivision that develops and manufactures small molecule generics. It became the first company in Russia to develop and launch biosimilar monoclonal antibodies rituximab, trastuzumab, and bevacizumab, and it now has over 70% market share for these products in Russia. Although the company has recently switched focus and is no longer carrying out R&D in biosimilars, it continues to market its existing products. Its R&D now focuses on launching new original molecules.

Mr Pavlovsky believes there is no obstacle to his company’s growth, with its current 10-year plan including adding 5% or more of the European pharmaceutical market to its customer portfolio. The company is currently tackling the regulatory hurdles necessary to launch products in Europe, and is looking to move some of its operations into the EU.

Finland is a possible location for BIOCAD’s European operations, which would be convenient for a company based in St Petersburg. But the Finnish government and people are also keen to work with the company, says Mr Pavlovsky.

BIOCAD has made preparations to launch brands in the US, mostly in the areas of biologics and neurology, although this is not yet included in its current 5-10 year plan.

While the biotech market is currently booming, it could resemble a “bloody ocean” in 10 years’ time, predicts Mr Pavlovsky, as over-stretched companies go to the wall. These companies may be based in Europe and the US, but also in China and emerging countries.

The advantage will be with those companies that are faster and smarter. “Right now, a lot of companies are focused on high-price, but small-volume markets. We look broader, are more focused on development and manufacturing, and that allows us to decrease the price and increase the quantity of patients.”

Text 3

One of the biggest uses of biotechnology in Russia is for medicinal purposes. Pharmacogenomics is the study of how the genetic inheritance of an individual affects his/her body’s response to drugs. It is a coined word derived from the words “pharmacology” and “genomics”. It is, therefore, the study of the relationship between pharmaceuticals and genetics. The vision of pharmacogenomics is to be able to

design and produce drugs that are adapted to each person's genetic makeup. Pharmacogenomics results in the following benefits:

1. Development of tailor-made medicines. Using pharmacogenomics, pharmaceutical companies can create drugs based on the proteins, enzymes, and RNA molecules that are associated with specific genes and diseases. These tailor-made drugs promise not only to maximize therapeutic effects, but also to decrease damage to nearby healthy cells.

2. More accurate methods of determining appropriate drug dosages. Knowing a patient's genetics will enable doctors to determine how well the patient's body can process and metabolize a medicine. This will maximize the value of the medicine and decrease the likelihood of overdose.

3. Improvements in the drug discovery and approval process. The discovery of potential therapies will be made easier using genome targets. Genes have been associated with numerous diseases and disorders. With modern biotechnology, these genes can be used as targets for the development of effective new therapies, which could significantly shorten the drug discovery process.

4. Better vaccines. Safer vaccines can be designed and produced by organisms transformed by means of genetic engineering. These vaccines will elicit the immune response without the attendant risks of infection. They will be inexpensive, stable, easy to store, and capable of being engineered to carry several strains of pathogen at once.

Modern biotechnology can be used to manufacture existing drugs more easily and cheaply. The first genetically-engineered products were medicines designed to combat human diseases. In 1978, Genentech joined a gene for insulin with a plasmid vector and put the resulting gene into a bacterium called *Escherichia coli*. Insulin, widely used for the treatment of diabetes, was previously extracted from sheep and pigs. It was very expensive and often elicited unwanted allergic responses. The resulting genetically-engineered bacterium enabled the production of vast quantities of human insulin at low cost. Since then, modern biotechnology has made it possible to produce more easily and cheaply the human growth hormone, clotting factors for hemophiliacs, fertility drugs, erythropoietin, and other drugs. Genomic knowledge of the genes involved in diseases, disease pathways, and drug-response sites are expected to lead to the discovery of thousands more new targets.

Text 4

Scientific and Production Association "Microgen" is the largest Russian developer and manufacturer of immunobiological preparations: vaccines, bacteriophages, blood preparations, botulinum toxin A and other products, standing at the origin of the development of biomedical technologies in Russia and creating modern medicines today.

The association was founded in 2003 through the merger of key state biopharmaceutical enterprises leading its history from 19th and 20th centuries and possessing highly qualified personnel and a broad manufacturing base. The purpose of the new structure was to strengthen the scientific and production potential of the acquired assets and to provide the Russian population with vital pharmaceuticals.

Today, the company's development envisages the following areas of activity:

- Improvement of the company's product portfolio: creation of new drugs and dosage forms, expansion of indications for the use of manufactured products;
- Creation of new production facilities for immunobiologic drugs;
- Creation of modern laboratory and experimental-industrial infrastructure, concentrating the scientific potential of the enterprise and allowing to promptly develop and bring new drugs and dosage forms to clinical trials;
- Preservation and multiplication of existing unique scientific and production competencies of the enterprise.

SPA Microgen's product portfolio includes more than 250 original biologics, which are produced according to the full production cycle, from preparation of the substance (active ingredient) to the labeling and packaging stages. More than 160 products of the portfolio are included in the list of vital and essential drugs (VED). The company's products are supplied to the markets of 11 countries around the world.

SPA Microgen carries out a full cycle of biologics development - from substance development, clinical trials to release into civil circulation, which guarantees stability and affordability of medicines for Russian patients.

The structure of SPA Microgen includes 9 high-tech production sites located in different regions of the country. The total production capacity of the company allows it to produce more than 18 mln packs of biologics per year.

Today the association is the leader in terms of vaccine production in Russia, in physical terms it accounts for 50% of the domestic market. The company's production portfolio includes 24 vaccines, on average 14 of which are supplied under the National Preventive Vaccination Calendar program. The total annual output of the company's current portfolio of vaccines and anatoxins exceeds 50 million doses.

SPA Microgen is also the country's largest producer of human albumins and immunoglobulins, the only producer of heterologous serums, therapeutic bacteriophages and a wide range of allergens. In addition, in 2013, SPA Microgen was the first among Russian companies to develop and market domestic botulinum toxin type A – Relatox®.

The company employs more than 5,000 highly qualified specialists.

Text 5

Besides different types of pharmacies, the system of pharmaceutical service in Perm includes the Scientific Industrial Association “Biomed”.

If to speak about “Biomed”, its history began in 1898 with establishing a small bacteriological laboratory, which produced vaccines against hydrophobia.

In 1912 this bacteriological laboratory became bacteriological Institute and it organized vaccination against cholera and typhus. In 1933 on its basis the Perm bacteriological institute of epidemiology and microbiology was established. Later on it was reorganized into “Scientific Research Institute of Vaccines and Serums”.

In 1988 it got the status of the the Scientific Industrial Association. Since then “Biomed” has been producing medicinal immunobiological preparations from blood of animals, different serums, antitoxins, preparations for treatment of disbacteriosis, bac-teriophages, diagnostics, novocain, vitamin PP, Corvalol and others.

Nowadays “Biomed” is a leading producer of a wide range of medical, immunobiological and pharmaceutical preparations in our country.

“Biomed” supplies and distributes medicines to different towns of Russia and abroad. The nomenclature of medicines is about 70 names.

Currently Perm SPA Biomed is the country's largest site for full-cycle production of the DPT vaccines. The company's portfolio also includes the widest range of specific and non-specific immunoglobulins and bacteriophage preparations among Russian manufacturers.

The blood drugs production site uses the chromotographic purification technology, which allows to obtain products that meet the most modern standards of the industry. Currently, the technology is used in the production of immunoglobulins "COVID-globulin" and "Biogam" (the drug is currently undergoing clinical studies).

5. Рекомендации по выполнению тестовых заданий

Тестовые задания предусматривают закрепление теоретических знаний, полученных студентом во время занятий по данной дисциплине. Их назначение – углубить, систематизировать и проверить знания студентов по отдельным темам, а также языковые и речевые навыки и умения.

Перед выполнением тестовых заданий необходимо повторить разделы учебного материала, рекомендованные преподавателем. При подготовке следует также обращаться к грамматическим пособиям и собственным конспектам обучающегося.

В тестах предусмотрены задания различных типов: закрытые тесты, в которых нужно выбрать один верный вариант ответа из представленных; задания на сопоставление; открытые тесты, где предстоит самостоятельно заполнить пропуски или ответить на поставленный вопрос.

Пример задания закрытого типа по теме 2.2 «Биотехнолог: научно-исследовательская деятельность»:

Словами “the paper aims at…” автор статьи вводит:

1. **Цель исследовательской работы.**
2. Представление о результате исследования.
3. Конечный результат.
4. Направление научной работы.

Пример задания открытого типа по теме 2.2 «Биотехнолог: научно-исследовательская деятельность»:

What is the name of the section in research paper, which tells the reader what you found and what your findings mean?

Ответ: The name of the section is “Results and discussion”.

6. Рекомендации по переводу литературы

При переводе литературы рекомендуется следующая последовательность работы над текстом:

1. Прочитать весь текст (фрагмент) и постараться уяснить его общее содержание.
2. Каждое сложное предложение разбить на отдельные предложения: сложноподчиненные – на главное и придаточное, а сложносочиненные – на простые.
3. При анализе сложных по своей структуре предложений, в которых не сразу можно определить составляющие их элементы, рекомендуется, прежде всего, найти сказуемое главного и придаточных предложений.
4. В каждом предложении определить группу сказуемого (по личной форме глагола), затем найти группу подлежащего и группу дополнения.
5. Перевод предложения начинать с группы подлежащего, затем переводить группу сказуемого, дополнения и обстоятельства.
6. Найти незнакомые слова в общем и/или специализированном словаре, уяснив предварительно, какой частью речи они являются в данном предложении. При этом не брать первое значение слова, а внимательно изучить все значения, представленные в словарной статье, и выбрать наиболее подходящее по содержанию переводимого текста. Выписать незнакомые слова в терминологический словарь, указать перевод на русский язык.

Тексты для перевода по теме 2.2. «Биотехнолог: научно-исследовательская деятельность»

“How to become Biotechnology Research Scientist”

Biotechnology is responsible for many of the things that make our lives better. The field focuses on the intersection of biology and technology. Leading to a vast array of new products that are designed to enrich lives, make day-to-day living easier, and make us healthier. From vaccine production to genetic modification, biotechnology is everywhere- and as a result, biotechnology careers are quite promising for new graduates. Where can they get an education as a biotechnologist?

To become a biotechnologist you should study Biotechnology at Pharmaceutical or Medical Academies and Universities.

Generally, pharmaceutical companies prefer to hire people with research experience, advanced degrees (especially in organic chemistry), and at least two years of post-doctoral experience. Most chemists in traditional research careers are Ph.D. chemists, while chemists with B.S. degrees generally serve as research technicians. You can place yourself in a competitive position by getting as much industrial experience as possible, with a strong background in organic chemistry and biochemistry. A

number of universities have medicinal chemistry departments, often associated with biological chemistry, pharmaceutical chemistry, pharmacology, or pharmacy programs.

The course of training biotechnology students runs for 4 years. During this period the students study general and special subjects. General subjects are English, Maths, History, Physical Education, etc. Special ones are different branches of Chemistry, Botany, Pharmacology etc. Besides, the students can take part in different students' conferences and contests, and play sports in sport clubs. Those students who study well and take part in social work get grants.

After finishing the course of training graduates can choose to work for a variety of organizations, including government agencies, private companies, regulatory bodies, or clinical laboratories. Biotechnology employers range in size and type from small start-ups to global pharmaceutical leaders to federally-funded organizations such as the Department of Agriculture and National Institutes of Health.

So it becomes clear that biotechnology is a purposely broad field that covers health and agriculture and everyone who is interested in this sphere should be aware of various biotechnology degrees, jobs and expectations. With many exciting discoveries to make and new problems to solve, biotechnology professionals can make a difference in the lives of others in many ways.

"Specialists in Biotechnology"

When thinking about biotechnology, many people picture a scientist in a lab coat developing a lifesaving drug or medical device. While this image represents one common biotechnology career path, lab work is not the only option. With many exciting discoveries to make and new problems to solve, biotechnology professionals can make a difference in the lives of others in many ways.

Because biotechnology has applications in many industries, professionals can choose to work for a variety of organizations, including government agencies, private companies, regulatory bodies, or clinical laboratories. Biotechnology employers range in size and type from small start-ups to global pharmaceutical leaders to federally-funded organizations such as the Department of Agriculture and National Institutes of Health.

Biomedical engineers combine engineering and biological expertise to design solutions to problems in biology and medicine. With the goal to improve the quality and effectiveness of patient healthcare, they design biomedical equipment, devices, and medical software, such as artificial organs, prostheses, and diagnostic machines.

Biochemists study the chemical properties of living things and biological processes, such as cell development, cell growth, heredity, and disease. They conduct complex research projects and frequently isolate, analyze, and synthesize proteins, lipids (fats), DNA, carbohydrates (sugars), and other molecules. They also research the effects of drugs, hormones, and nutrients on tissues and biological processes to develop products and processes that may improve human health.

Medical scientists conduct clinical research to improve patient health by investigating diseases and prevention methods. They may also develop and test medical devices. They frequently prepare and analyze medical samples to investigate the causes and treatments of toxicity, pathogens, and chronic diseases. These scientists also help standardize drug potency, doses, and methods for the mass manufacturing and distribution of drugs and medicinal compounds.

Microbiologists study viruses, bacteria and the immune system to produce biomedical and industrial products. These professionals conduct complex research projects and lab experiments to aid in the diagnosis and treatment of infectious illnesses.

As the field continues to evolve, there's a growing need for skilled professionals to innovate and bring new technologies to market. Remember, no matter what part of the field you're in, you can truly have an impact on the world around you.

High Performance Liquid Chromatography (HPLC)
Forensic analysis

1. The potential for using HPLC in forensic science laboratories was recognized when the technique was in its infancy. This interest arose because of the difficulties encountered with the analysis of basic drugs, and it was soon to be appreciated that HPLC offered certain advantages over gas chromatography (CC). Once is was established that reproducible qualitative and quantitative analysis could be performed in several minutes there was a keenness to determine if HPLC could be used to solve other analytical problems experienced by the forensic scientist.

2. Within a forensic science laboratory, the analytical problems are often very different to those found in other laboratories. Extremely small and often aged samples, complex matrices and an extensive range of analytes are encountered by the forensic scientist and the success of any HPLC method is often very dependent upon the selectivity and/or sensitivity of the system. General developments in column and detector technology have played a major role in improving both these criteria and hence increasing the number of forensic applications of HPLC.

3. Selectively, the ability to isolate a particular analyte or separate a number of components within a mixture, has improved dramatically through the development of bonded-phase column packing materials for reversed-phase, ion-exchange and ion-pair chromatography. More recently, forensic laboratories have been introducing polymeric packing materials because of their selectivity and other physical and chemical properties which are more desirable than those of silica-based materials.

4. In its broadest sense, selectivity has also been achieved through the development of ion chromatography and indirect photometric detection. Apart from opening up a completely new application of HPLC these provide highly selective techniques for the analysis of inorganic and organic ions.

5. Other methods for improving selectivity include the use of specific detectors and detection techniques, either with or without sample derivatisation. Therefore, electrochemical, fluorescence and multiwavelenght UV/ visible detectors feature strongly in forensic applications. Combinations of two or more different types of detector linked in series are also being used more frequently as a method of improving solute discrimination/identification. Finally, gradient elution techniques can increase solute resolution but this is often at the expense of longer analysis time which is a major consideration if large numbers of samples are to be analysed. Interestingly, despite the complexity of samples many forensic methods are performed very successfully under isocratic elution conditions.

Octanol-, Chloroform-, and Propylene Glycol Dipelargonat-Water Partitioning of Morphine -6-glucuronide and Other Related Opiates.

1. Morphine is the analgesic of choice for the control of pain in cancer patients. After oral administration of morphine to adults, the two major metabolites, morphine-3-b-D glucuronide (M3G) and morphine -6-p-D-glucuronide (M6G) attain plasma concentrations exceeding that of the parent drug by significant factors. Also, in long term morphine treatment, normorphine has been reported as a minor metabolite in some patients. Before the 1970s, M3G and M6G were thought to be pharmacologically inactive; however, both M3G and M6G have unexpectedly low clearances and long plasma half-lives. M6G was also observed to be more active as an analgesic than morphine, and receptor binding studies have indicated that M6G binds to the opioid receptors in the brain and is 50-200 times more potent than morphine when injected directly into cerebroventricular fluid. M3G, on the other hand, has no intrinsic analgesic activity, but does act as an antagonist at the opioid μ receptor.

2. In order for drugs to act on the central nervous system (GNS), they must cross the blood-brain barrier. Moderately lipophilic compounds and small uncharged molecules (e.g., H_2O, O_2, and CO_2) can cross the membranes by passive diffusion. On the other hand, ions or otherwise hydrophilic molecules are generally not able to do so without the intervention of an active transport process. However, it has been shown that the zwitterions M3G and M6G can cross the blood-brain barrier. Two potential mechanisms have been identified to explain the transport of these polar compounds across the blood-brain barrier.

Synthesis of Some Thiazole Derivatives with Prospective Local Anaesthetic Activity

1. In this paper, we describe the synthesis of some thiazole derivatives with structural characteristics that justify local anaesthetic action. These compounds have a lipophilic aromatic part, hydrophilic moiety (substituted amino group) and an intermediate chain of three carbon atoms that contains a carbonyl group, the main characteristics of most known local anaesthetics. Compounds with similar structure have been synthesized and exhibit good local anaesthetic action. The reaction series of the preparation of the final products is illustrated in the Scheme. The active aminomethylating agent with a modified *Mannich reaction* is formed by action of methylene diamine to acetyl chloride.

2. Initially, the labile salt of acetylmethylenediamine is formed which is decomposed to produce the stable salt due to resonance of the aminomethyl carbanion. Then, this electrophile reacts with the compound with the active hydrogen, the initial ketone.

3. The structures of the final products were identified both by elemental as well as spectroscopic analysis. In the UV spectra characteristic absorption corresponding to carbonyl conjugated to aromatic ring was observed.

4. In the IR spectra (in liquid paraffin) in addition to the peak assigned to the carbonyl a characteristic absorption of the protonated amino group was observed.

5. Coordination of the aromatic methyl and methylene protons was observed in the HNMR spectra and the exact number of protons was given by integration. In the MS the existence of daughter ions is assigned by the suggested fragmentation pattern, which are in agreement with the findings from pertinent studies of simpler compounds.

"My future profession is Biotechnology"

My future profession is Biotechnology. It is responsible for many of the things that make our lives better. The field focuses on the intersection of biology and technology. Leading to a vast array of new products that are designed to enrich lives, make day-to-day living easier, and make us healthier. From vaccine production to genetic modification, biotechnology is everywhere- and as a result, biotechnology careers are quite promising for new graduates. Where can they get an education as a biotechnologist?

To become a biotechnologist you should study Biotechnology at Pharmaceutical or Medical Academies and Universities.

Generally, pharmaceutical companies prefer to hire people with research experience, advanced degrees (especially in organic chemistry), and at least two years of post-doctoral experience. Most chemists in traditional research careers are Ph.D. chemists, while chemists with B.S. degrees generally serve as research technicians. You can place yourself in a competitive position by getting as much industrial experience as possible, with a strong background in organic chemistry and biochemistry. A number of universities have medicinal chemistry departments, often associated with biological chemistry, pharmaceutical chemistry, pharmacology, or pharmacy programs.

The course of training biotechnology students runs for 4 years. During this period the students study general and special subjects. General subjects are English, Maths, History, Physical Education, etc. Special ones are different branches of Chemistry, Botany, Pharmacology etc. Besides, the students can take part in different students' conferences and contests, and play sports in sport clubs. Those students who study well and take part in social work get grants.

After finishing the course of training graduates can choose to work for a variety of organizations, including government agencies, private companies, regulatory bodies, or clinical laboratories. Biotechnology employers range in size and type from small start-ups to global pharmaceutical leaders to federally-funded organizations such as the Department of Agriculture and National Institutes of Health.

So it becomes clear that biotechnology is a purposely broad field that covers health and agriculture and everyone who is interested in this sphere should be aware of various biotechnology degrees, jobs and expectations. With many exciting discoveries to make and new problems to solve, biotechnology professionals can make a difference in the lives of others in many ways.

"Career Options and Future Prospects in Biotechnology"

The advent of Biotechnology courses a few decades ago appeared to provide a better alternative to young students for their career options. The applications of Biotechnology are vast as it caters to various agricultural, animal husbandry, fishery, health, pharmaceutical, industrial sectors and more. Biotechnology includes diverse subjects apart from biology making it interdisciplinary. Along with the technical part and engineering applications, biotechnology is giving rise to various new fields with various job opportunities.

As the name suggests, biotechnology is a combination science of biology and technology. Biotechnology uses the biological systems of the living organisms or their parts to make technological advances in the welfare of the society. It is the use of biological constituents (systems or organisms) to make or modify or manipulate living organisms to develop new products useful to the mankind. Biotechnology can be defined as an assortment of tools employed by scientists to recognize and manipulate the genetic make-up of the living organisms for applications benefitting the production or processing of agricultural products by developing high yielding, nutritional rich, biotic and abiotic resistance plants.

Who Can Study Biotechnology?

• Any student with biology, chemistry, physics and mathematics in their class 12 can take up Biotechnology as their specialization in their undergraduate course.

• This undergraduate programme in biotechnology can be B.Sc. Biotechnology or B.E./ B.Tech Biotechnology.

• The B.Sc. programme is 3 years while the B.E./ B.Tech programme is for 4 years.

• Students' interested higher education can go for the master's level in biotech after their undergraduation.

• Again, masters in biotechnology can be in M.Sc., M.E./ M.Tech.

• A graduate degree in any of the life sciences is acceptable for a PG programme in biotechnology.

• Students interested in research and development can continue their studies by pursuing their Ph.D degrees in biotechnology and related field.

• Most of the colleges. Universities, IIT, NIT are offering B.Sc. Biotechnology or B.E./ B.Tech, M.Sc., M.E./ M.Tech Biotechnology.

Biotechnology uses biological systems, living organisms or parts of these to develop or create different products. This study programme covers many different disciplines such as genetics, biochemistry, molecular biology, etc. New technologies and products are developed every year within the areas of e.g. Medicine, Agriculture or Industrial biotechnology.

The Biotechnology is a research focused study area and therefore it has high demand in several industries. The new technological advances as well as the constant need for innovations in science make this field extremely important.

"The General Career Opportunities for Biotechnologists"

The domain on which a trained biotechnologist can work is vast. As there are several disciplines involved in biotechnology, there is a great demand for experts in various sectors like industrial sector, environmental sector, medical sector, food manufacturing, pharmaceuticals, health-care and pharmaceuticals, agriculture, food manufacturing etc. Owing to this diverse profile, it can have widespread applications across multiple disciplines associated with bio products, food and nutrition, textiles, chemical, environment, animal sciences, agriculture, and many more with a promise of offering ample opportunities to the aspirants in the upcoming future. Across the world, numbers are reflecting an increasing trend for the students. Biotechnological applications are used widely in the following industries:

• Pharmaceutical, Medicine Healthcare (Insulin, caccine, molecular diagnostic kit for Corona, Malaria, Dengu).

• Agriculture (Bt Cotton, Swarna Sub1 submergence resistant variety, Golden, Banana tissue culture).

• Animal husbandry (Diagnostic kits, Vaccine etc.)

• Genetic engineering (Herbicide resistance variety).
• Environmental conservation (Genetically modified microbe to clean oil spills)
• Fishery
• Textile industry
• Cosmetics
• Biotechnologists can find jobs in both private and government undertakings with specializations in different sub-disciplines. They are engaged in various sectors as Research Associate, Lecturer or Professor, Sales Manager, Quality Analyst, Plant Breeder, Environment Specialist, Medical scientists, Biological technicians, Medical and Clinical Lab Technologists & Technicians, Biochemists and Biophysicists, Biomedical Engineers, Microbiologists, Epidemiologists, R&D and Process Development Scientists, Bio-manufacturing Specialists, Bio-production Operators.

"Top Industries Who Hire Biotechnologists"

Here is the least of such industries and some facts about them:
• Biocon
• Panacea Biotech
• Rasi seeds
• Serum Institute of India
• Machyo Monsanto Biotech
• Novo Nordisk
• Indian Immunological
• Venkateshwara Hatcheries
• Ranbaxy
• Dr. Reddy's Lab
• Primal Healthcare
• Aventis
• Indian Immunological

1. Biocon

This Bangalore based company is the largest biopharmaceutical company in India. Founded in 1978 with a budget of Rs. 10,000.00, Biocon started as a compan y selling the enzyme papain. In the 1990's, founder KiranMazumdar-Shaw decided to change the focus of the Company from selling enzymes to selling biopharmaceuticals. Subsequently, Shaw became one of the richest women in India. Today, Biocon sells insulin and monoclonal antibodies, among other products. The Company had an annual revenue of Rs. 4,709 crores in 2018.

2. Sea6 Energy

This start-up was founded in 2010 by four IIT Madras graduates and works towards the development of scalable solutions to solve the problem of overconsumption of energy in India. The Company is developing techniques to convert photosynthetic biomass like plants and algae to fuels, in an effort to battle the increasing commercial use of energy in the Country. Incubated at the Centre for Cellular and Molecular Platforms (C-Camp) and funded by the Department of Biotechnology, the start-up has patented techniques to facilitate large scale cultivation of selected sea plants.

3. **Bharat Biotech**

Headquartered at Hyderabad, this Company was founded in 1996 by an Indian scientist, Krishna Ella. One of the leading biopharmaceutical companies in India, Bharat Biotech was the first to develop and patent vaccines for the Zika virus, Zikavac, in the world. It is the first pharmaceutical company to develop a generic drug in India. Now this company has developed Corona vaccine named "Covaxin".

4. GANIT Labs

Founded in 2010 in Bangalore by Dr. Vinay Panda and Dr. Vijaya Chandru, Genomics Application and Information Technology Labs (GANIT Labs) is an independent government funded startup. GANIT Labs studies genomes related to oral cancer and helps in mapping their genes. It is also

involved in creating analytical tools which effectively analyze and manage large scale genome data, mainly from genome sequencing of disease tissues like cancer.

5. MedGenomes

Founded by Sam Santosh in 2013, MedGenomes provides personalized genetic tests and medicines for a range of ailments like cancer, diabetes and neurological ailments. The Company has headquarters in the U.S.A., and India and claims to operate the largest next gen sequencing lab in Southeast Asia. In 2017, the Company secured a whopping Rs. 192 crores in funding. In 2018, MedGenomes was given the MedTech Breakthrough Award for Biomedical Research. With the growth of the biotechnology industry and a renewed interest of investors in it, the success story of these biotechnology startups will inspire many biotechnology entrepreneurs out there who are aspiring to start their own company one day.

"What Skills Must One Have to Adopt A Career in Biotechnology?"

Once you are targeted and poised, you are anticipated to boost a few attributes to work as foundation stones to gain a balanced success. One must possess, if not all, but most of the following skills to excel in the Biotech sector.

- Quick learning abilities.
- Complex problem-solving approach.
- Efficiency to work as a team player with excellent communication skills.
- A dynamic personality.
- An investigative and creative mind.
- Innovative and creative thinking.
- Management and Analytical skills.
- Flexibility having the ability to adapt to changes.
- Firm desire to attain success in career.
- Academic institutes are always open to offer the lectureship.
- Chemical Industries also offer employment for biotechnologists.
- Aquaculture Industries may also provide openings to techniques expertise.

What is the Salary Range for these Professionals? The remuneration here, depends on your academic qualification and skills like other job profiles. Fresh graduates can expect a monthly salary in the range of Rs. 8,000.00 to Rs. 20,000.00. With increase in level of experience, there is abundant scope for getting better salary.

Thus, when thinking about biotechnology, many people picture a scientist in a lab coat developing a lifesaving drug or medical device. While this image represents one common biotechnology career path, lab work is not the only option. With many exciting discoveries to make and new problems to solve, biotechnology professionals can make a difference in the lives of others in many ways. There's more good news for job seekers. The biotechnology industry is a major economic driver, generating approximately $ 140 billion in revenue. Currently, U.S. biotechnology firms employ over 1.66 million people, but with the need for rapid innovation, the demand for skilled professionals will continue to rise.

"Pros of choosing a career in biotechnology"

Meaningful impact

Naturally, biotech is at the forefront of scientific innovation. This means that professionals who work in the industry have the opportunity to make a significant contribution to society, as they will often be working at the cutting edge of research and development, ultimately contributing to advancements in healthcare, as well as in areas like agriculture and sustainability.

Stella Vnook, founder of Oral Bio Life, who began her career at Merck & Co and is now focused on building biotech startups, said: "Many individuals find working in biotech rewarding due to the direct impact on human health and quality of life, as well as contributions to addressing global challenges such as disease outbreaks and climate change."

Amy Reichelt, chief innovation officer at PurMinds Neuropharma, also pointed out that biotech companies often operate on a global scale, meaning they need to collaborate with researchers, healthcare professionals, and organizations all over the world. “This provides opportunities for professionals to work on international projects and contribute to solving global health issues.”

Ultimately, whether you are working in a lab, an office, or in sales within biotech, you will be playing a role in helping people live healthier and happier lives.

Competitive salaries

Salary is always an important factor when choosing a career path, and the good news is that biotechnology companies typically offer high wages that reflect the specialized skills and knowledge required to work within the industry.

“Biotech careers typically offer competitive salaries and benefits, especially for individuals with a PhD – an entry position in biotech pays more than a postdoc,” said Reichelt. “Moreover, biotechs understand that they need to retain their talented employees as well as attract talent; they typically do this via the award of company shares or equity, which fosters a sense of ownership among their staff, along with generous bonus schemes (often ranging 12%-30% of annual salary) to reward staff for their hard work, commitment, and skills.”

Jared Auclair, director of the biotechnology and bioinformatics programs at Northeastern University, commented in a blog on the Northeastern website: “I would say that the typical starting salary for one of our students with a master’s is [between] $75 and $85,000 per year…I anticipate that we’ll see that go up a bit in coming years, but overall that’s pretty good for a first job.”

Career growth opportunities

A priority for many people when choosing a career path is having the opportunity to advance within their field. Luckily, there are plenty of career growth opportunities available in the biotech industry.

“The biotech industry is rapidly expanding, offering ample opportunities for career advancement, as well as being able to apply your skills across different types of companies, e.g. from CNS [central nervous system] to oncology,” said Reichelt.

Additionally, with the right educational background and experience, you can be prepared for opportunities for advancement to a managerial or executive-level position, especially as many companies offer leadership development programs.

Collaborative environment

Vnook said that another perk within the biotech industry is that it offers numerous opportunities to work as a member of a team: “Biotech often fosters a collaborative culture, where multidisciplinary teams work together to solve problems, leading to a dynamic and supportive workplace.”

Furthermore, because the field is brimming with bright, motivated people, it can make each workday intellectually fulfilling, as well as being a good way to meet new, like-minded individuals.

So, if you happen to be passionate about working with others to solve complex issues, a career in biotechnology could be a good fit for you purely on that basis.

“Cons of choosing a career in biotechnology”

Biotech products often require approval from regulatory bodies like the U.S. Food and Drug Administration (FDA), and navigating these regulations can be quite tricky, often requiring significant resources and expertise.

Vnook explained: “Biotech products and innovations are subject to rigorous regulatory approval processes, which can be time-consuming, costly, and uncertain, delaying time to market and increasing the risk of failure.”

In addition, the regulatory environment is constantly changing, which means that you and your organization must put in the time and effort to stay up-to-date on the latest regulations and requirements.

Risk of failure

Speaking of the risk of failure, this is also a downside to working in the field. Vnook said: "Biotech research and development involve high levels of uncertainty, with many projects failing to reach commercialization despite significant investment of time and resources."

Reichelt agreed that projects often have high failure rates, particularly in drug discovery and clinical trials. She added: "Investing significant time and resources into a project that ultimately fails can be disheartening, and being 'let go' from a role can be difficult emotionally."

Financial instability

Despite the competitive salaries that a career in biotech can offer, financial instability is potentially a big concern when wondering whether to get into the industry. This issue has been very noticeable of late since the economic downturn has led to multiple layoffs, budget cuts, and even bankruptcies in the last couple of years.

"Biotech startups and small companies often face financial challenges, including limited access to funding, cash flow issues, and dependence on external investors, which can lead to volatility and instability in employment," said Vnook.

And, as biotech jobs rely heavily on technology – which is always expanding – you or your company may fall behind if it cannot keep up with the times. For example, artificial intelligence (AI) has been widely incorporated into many companies within the industry. Gideon Ho, co-founder and chief executive officer (CEO) of HistoIndex, told Labiotech in a previous interview that the people who use AI will "definitely" replace people who don't use AI. "It's a natural evolution of things. If you have new tools and you do not use them, you're basically rendering yourself obsolete. If it is a good tool, we should use it and embrace it so that we will continue to remain relevant to the industry."

High competition

Another potential downside of looking to get into a career in biotech is simply that breaking into the field can initially be very challenging due to high competition.

Vnook explained: "The biotech industry is highly competitive, with numerous companies vying for funding, talent, and market share, leading to pressure to innovate quickly and differentiate from competitors."

However, this is the case for many skilled professions, and as long as you have the correct qualifications and experience, and know how to hone your CV and interview skills, there is no reason why you should not stand a chance at securing a job within the field.

The Effect of Carbamate Local Anesthetics on Artificial Lipid Membrane

Introduction

1. It is generally known that local anesthetics (LA) produce a wide variety of effects on biological membranes which strongly depend on their lipophilic properties. These catamphilic drugs easily bind to the phospholipid membranes and intercalate between the lipid molecules.

2. The effects of LA on the physico-chemical properties of the lipid bilayer in the biological as well as in the model membranes have been intensively studied. One of the important physical parameters which determine properties of the model membranes is the temperature of the phase transition from a gel to the liquid-crystalline state (phase transition temperature T_c). The lipid ionization and the cation absorption, owing to changes in the electrical interactions between lipid heads, shift the temperature of membrane phase transition.

3. LA have been found to decrease T_c in different phospholipid model membranes. This ability very well correlates with the intensity of local anesthetic activity. In order to employ these important facts in pharmacological evaluations of new synthesized compounds with local anesthetic or other membrane activity the authors decided to investigate the effect of a homologous series of ten ortho-isomers of piperidinoethylesters of alkoxyphenylcarbamic acids.

4. The effects of the potent carbanilate LA pentacaine and carbisocaine on the T_c in phosphatidylcholine model membranes using the newly developed method of polarization microscopy were also studied. The effects observed were correlated with the biological and physico-chemical properties of the tested compounds.