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nanoschematic

DNA contains the genetic information that allows an organism to develop, grow and reproduce. However, it is unclear how long it takes a molecule of DNA to be synthesized. The DNA is synthesized in the nucleus of the cell. It has been proposed that the synthesis of DNA may have used DNA as their genetic material. [1] [2] It may have acted as the central part of many cells and molecules. It can both transmit genetic information and carry out catalytic reactions.

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Leone Peter Andrade

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JOURNAL OF BIOENGINEERING AND TECHNOLOGY APPLIED TO HEALTH

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Journal of Bioengineering and Technology Applied to Health: A New Journal of Health Institute of Technology - ITS/SENAI CIMATEC

*Leone Peter Andrade**

Editor-in-Chief

The Manufacturing and Technology Integrated *Campi* SENAI CIMATEC started the activities in March of 2002. CIMATEC is one of the most advanced *campus* for education, technology, and innovation of industry in Brazil. This is a private non-profit institution supported by the Federation Industry of Bahia that was created to upgrade the “National Technical Learning for Industries Support”. Recently, CIMATEC became a university *campus* with 33 engineering and computer science technological areas. In the present time, SENAI is supported by a staff of over 650 members to support the activities of professional and higher education, and a Technology Center, all encompassed in the same building structure.

SENAI CIMATEC School of Engineering initiated operations in 2004, and currently offers nine Undergraduate degrees courses in Engineering, and a series of Graduate programs, including *lato sensu* (specializations and MBAs) and *stricto sensu* (Master's and Doctoral degrees). In 2008, the Industrial Management and Technology (GETEC) and the Computational Modeling and Industrial Technology (MCTI) Master's Programs were inaugurated. MCTI incorporated a Doctorate in 2010, and, GETEC also opened a Doctorate Program in 2016.

SENAI CIMATEC prides on delivering highly qualified professionals to the several industrial sectors, supporting innovation and problem-solution, having earned the recognition of Brazilian Ministry of Education as the top Engineering School in the North/Northeast Regions of Brazil in the last five years, and one of the most important institutions in innovation and knowledge in the country.

Even though CIMATEC activities are carried on in a decade, it is already recognized as one of the main Science and Technology Institutions of the country. The

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National Confederation of Industry of Brazil (CNI) has acknowledged publicly that SENAI CIMATEC is a reference in the implementation of the network of SENAI Innovation Institutes (ISI) and SENAI Technology Institutes (IST). ISIs are strong allies of the Brazilian industry in the development of products, processes and applied research. In our *campus*, there are three ISIs and six ISTs installed since 2014: the ISIs in Automation, Metal Forming, and Material Unions and Logistics, and the ISTs in Civil Construction, Chemistry, Electrical and Electronics, Food Technologies, Electromechanical, Environment, and Health.

SENAI CIMATEC runs projects of high national and international impact to support companies from different regions of Brazil with a strong performance in Research, Development, and Innovation (R&D&I). Although, it maintains a network of partners that include prominent universities and organizations from all over the world in the field of Software and Supercomputing; Mobility and Infrastructure; Metrology and Development of New Products and Materials; Robotics and Automated Systems; Energy and Sustainability; Advanced Manufacturing; Micro and Small Enterprises (MSE), Biotechnology, and Health.

In this scenario, SENAI CIMATEC created the Health Institute of Technology (ITS) in 2017 under the leadership of a national and international recognized scientist medical, Roberto Badaro, MD, PhD., to organizes the interfaces of the existing engineering technology of CIMATEC, to support the health industrial and economic complex in the development of drugs, medicines, equipment, and materials that are strategic for the public health system of Brazil (Brazilian Unified Health System - SUS). For that purpose, the Institute is working on research, development, innovation, regulation, publications, education and management of economic and welfare data. The Health Institute of Technology will develop cutting-edge

technology to meet the demands of research, development, and innovation (R&D&I) projects in the area of Healthcare, Chemical and Biotechnology and Devices Applied to Health, which includes:

Chemical and Biotechnology based Industry

- Test for quality control of Generic medications;
- Development of analytical techniques applied to the analysis of active substances in pharmaceutical, cosmetic and phytotherapeutic formulations;
- Development of monoclonal antibodies, as diagnostic or therapeutic agents;
- Development of recombinant proteins;
- Development of chemically synthesized drugs;
- Development of adjuvants;
- Development of new Active Pharmaceutical Inputs (IFAs).

Equipment and Materials for Health Use

- Development of electromedical equipment;
- Assistive technology development;
- New materials applied to implants;
- Integrated systems (software, microelectronics, and embedded electronics);
- Data management software (Big Data and Telemedicine);
- The E-Health;
- The augmented reality and virtual with medical applications (IoT);
- Robotic surgery;
- Development of diagnostic kits.

Quality, Regulation, and Management

- Incorporation of technologies in SUS;
- Economic regulation: the possibility of tax alteration; attracting foreign companies to Brazil from

government incentives; certification and test of products;

- Management of economic data, epidemiological, regulatory, and development of new technologies (clinical trials).

The biotechnology and innovation market grows exponentially in Latin America. With the new purpose of incorporating 4.0 concept into the area of healthcare, an enormous number of new scientific information in technologies applied to health are available. A new journal devoted to publishing this information would help to foster collaborations in these technologies that can be applied to the development of health tools among scientists in the world.

In this sense, ITS/SENAI CIMATEC created The Journal of Bioengineering and Technology Applied to Health (JBTH) in order to open the opportunity to speed these collaborations. JBTH is a peer-review open access and multidisciplinary Journal with the aim to develop a platform for innovative researchers and scientists to explore the advanced and latest research developments in the field of Biomedical Engineering and related disciplines that are applied to the development of new tools for diagnostics and treatment in the area of healthcare.

JBTH will publish articles related to the most recent advancement discoveries and applications in the field of bioengineering, biotechnologies, Big Data, nanotechnologies, molecular engineering, biochips, medical electronics, medical devices and instrument guided surgeries, biomechanics, clinical engineering, genetic engineering, photonics, new therapeutic strategies including stem cell therapies, gene therapy, new molecular biology discoveries and any scientific reliable information on advanced and very latest research topics.

History of Medicine and Advanced Manufacturing for Modernization of Health Services: The New Paradigm for the Learning and Practicing of Medicine Shortly

Roberto Badaró, Josiane Dantas Viana Barbosa and Leone Peter Andrade*

Deputy Editor, Associate Editor and Editor-in-Chief

History Perspectives

The term advanced manufacturing is closely linked to industrialization. However, the classical definition in the Manufacturing dictionaries is a production system where the production technique, despite being handcrafted, organizes the division of labor in a more complex and reproductive way that is not identified in the craftsmanship. The history of teaching is vibrant and millenarian dating from the Neolithic period 6000 BC. Today, it is a skill capable of transforming nature with its best practices and remains a practice of all civilizations. However, industrial-scale production is a consequence of manufacturing learning by transferring what is done with the hands to be performed by the machines. Therefore, advanced manufacturing is transferred to make the things with hands to make with the tools; it's a machine replacing doing it with your hands. The enormous impact caused by advanced manufacturing appeared with a industrial revolution after World War II.

Human-made devices produce consumption goods, and soon after that the concept of automation diminished or even eliminated in many sectors of the productive activity of man participation. From the didactic point of view, there are numerous publications of books and texts that classify the evolution of the manufacture in revolutionary marks, textually designating its development in the Industrial Revolution.

The first revolution, assigned Industry 1.0, characterized by mechanization in the production of consumer goods occurred in the 2nd Industrial Revolution in 1945. It was the beginning of the era of the explosion engines. The generation of energy by combustion modernized the craft, created the actual manufacture. In the 1960s, the combination of electronics and mechanization began the 3rd Industrial

Revolution. The mass production of consumer goods and the introduction of TV and radio started new manufacture to Industry 2.0. The possibilities of controlling industrialization through software and computers, as well as the domain of electronic transmission over long distances with optical fibers and electromagnetic waves, amplified the power of communication with intercontinental limits and opened the way for the construction of robotics, making possible the automation in manufacturing. Thus, the beginning of Industry 3.0. In the 1980s, the acceleration of advanced building with computers and mastery of robotics revolutionized the way of doing. Discovering wireless communication by Bluetooth, Wi-Fi, internet and digital control transferred the execution of things by the connection. The smartphones that can operate remote machines almost eliminate the strength of the human arms in the productive industry process. Thus, this inaugurated the beginning of Industry 4.0.

Summary of the Advanced Manufacturing Markings years:

- 1945** Industrial Revolution (mechanization in the production of consumer goods);
- 1960** Electronic Revolution (introduction of TV, radio);
- 1970** Communication Revolution (intercontinental transmission);
- 1980** Computer Revolution;
- 1990** Revolution of Cybernetics (internet);
- 2000** Digital Revolution: smartphones, IOT, artificial intelligence, robotics.

The Modernization of Health by the Influence of Advanced Manufacture

The Hippocratic medicine ends with the end of the handcraft in the production of surgical instruments and of medical assistance in the practice of medicine. The oldest medical device is the knife. The surgical blade dates back to the Mesolithic period, around 8000 BC. One of the earliest surgical procedures was trepanation, the art of piercing a hole in the skull. The results suggest

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that flint knives were created to perform the perforation of the head was opened to allow the release of the demons that caused headaches, melancholy or other epilepsy to escape the body. In the middle ages, practically all Aesculapius's dedicated to medical art had their suitcase, however, huge jumps have occurred in the evolution of medicine, and more and more intervals are being smaller in the modernization of medicine.

At the Stone Age 3300 years BC, in the so-called Medieval Medicine, the concept of helping sick people was through the administration of potent herbs that served as food but cause some effects on the body, and sometimes they recovered people from their evils. The other great landmark of medicine happened 420 BC. Hippocrates, considered the father of medicine, writes the code of ethics that doctors should follow in the face of the brutality that Aesculapius performed to cure illness.

The Hippocrates era goes up to 200 AD. Galen, 200 AD, influenced by the writings of illustrious physicians at the time and the knowledge of Cornelius Celsus (25BC-50 AD), wrote the first encyclopedia of medicine, beginning the era of medicine based on observation and experience. The dose of the drug makes the poison. Julian, the apostle, who was Roman emperor from 361-363 AD, in imitation of Christian charity to care for the sick inaugurates, in imitation of Christ, the place of caring for the sick, the hospital. In the year 369 AD, Basil Caesaria, bishop of Caesaria Masaca in Cappadocia, consolidates the concept of a hospital with several buildings, already with specialties, doctors, nurses, workers, and medical teaching place, creating a real hospital separating patients from their residence.

Ephren of Syria in the year 375 AD in Mesopotamia, consolidates the hospital by separating the types of diseases in different hospitals for different conditions and even creates a place of lodging and housing for the orphans. In 420 AD, Caelius Arelanus, a Roman physician writes the encyclopedias of medicine dividing diseases into acute and chronic. It is the beginning of specialization in medicine. Until the year 1161 AD, medicine evolved in a breakaway

attempt at surgical diseases and clinical diseases. The church with Pope Innocent III from 1203 to 1493 AD had an enormous influence on the evolution of specialization in medicine. Vocational as a Christian activity the care of the sick and creates hospitals throughout Europe and colonies of the Roman Empire were fast developed. High schools and invention in medicine arise. The anatomy allows the knowledge of the human body, the design of the lens returns the vision in myopia and farsightedness. In the period 1307-1392 AD, surgery is considered non-palliative but curative with the surgical techniques described by the English surgeon, John Ardene, considered the father of the operation. Many of his techniques are still employed today. In the year 1500 AD, Paracelsus, an alchemist who knows metals and minerals, inaugurated a new paradigm in medicine with the use of chemical substances in medical treatment. In 1543, Andreas Vesalius deepened the knowledge of anatomy, and the drug became a Cartesian activity definitely. The same wisdom of Descartes, in his discourse on method, became used in the study of the human body allowed to describe the organs and human body systems. However, the great invention that accelerates the discovery of diseases and their association with an etiology was in the period 1500 to 1600 AD with the development of the microscope. Although Zacharias Janssen was recognized in 1590, as the inventor of the lens, his real discoverer, 50 years before, is unknown. In the period from 1601-1900 many significant discoveries in medicine stems from the use of the microscope. Discovery of cells and microorganisms all occurred in this period. Some events are listed below:

- 1518** The foundation of the first college of surgeons training - the Royal College Physicians of London;
- 1774** Joseph Priestley discovered nitric oxide, ammonia, hydrogen chloride, and oxygen;
- 1775** Samuel Hahnemann discovered homeopathy;
- 1776** Edward Jenner developed the vaccine against smallpox;
- 1799** Hamphry discovered the anesthetic properties of nitrous oxide;
- 1816** Rene Laennec invented the stethoscope;
- 1818** James Blundell performed a first blood transfusion;
- 1827** Joseph Lister started the antiseptis applied to the new surgery;

- 1842 Crawford Long performed the first surgery using ethyl ether in anesthesia;
- 1845 John Hughes Bennett described leukemia and blood diseases;
- 1846 Starts painless operations with the use of general anesthesia;
- 1847 Ignaz Semmelweis created the concept of hospital infection with the association of puerperal fever with the contamination of the hands in obstetrician in the deliveries;
- 1849 Elizabeth Blackwell was the first woman trained in medicine in the United States;
- 1858 Rudolf Carl Virchow created the concept of the pathology associated with cellular alterations combating the idea of the pathology of humor;
- 1867 Lister published the principles of asepsis in the performance of surgeries based on the studies of Louis Pasteur;
- 1870 Louis Pasteur and Robert Koch created the theory of diseases caused by germs;
- 1879 The invention of the cholera vaccine;
- 1881 Louis Pasteur developed the pest vaccine;
- 1882 Louis Pasteur developed the anti-rabies vaccine;
- 1890 Emil von Behring discovered the anti-toxins and used against tetanus and diphtheria.

Electricity and Magnetism Boost New Diagnostic Methods

Breakthrough technologies began to be discovered.

- 1895 Wilhelm Conrad Rontgen discovered the X-ray and used it to realize the radiographs of the human body;
- 1910 Hans Jacobaeus performed the first laparoscopy on humans;
- 1921 Frederick Banting and Charles Best discovered insulin - essential for the treatment of diabetes;
- 1928 Alexander Fleming discovered the penicillin;
- 1929 Hans Berger discovered the electroencephalography;
- 1946 Alfred Gilman and Louis Goodman used the chemotherapy;
- 1949 Harold Ridley performed the first implant intraocular; John Emerson created a mechanical assistor for anesthesia;
- 1959 Min Chueh Chang used the *in vitro* fertilization;
- 1960 Invention of cardiopulmonary resuscitation (PCR);
- 1962 Albert Sabin discovered the first oral polio vaccine (Sabin);
- 1963 Thomas Starzl performed the first human transplant;
- 1965 Frank Pantridge installed the first portable defibrillator;
- 1967 Christiaan Barnard performed the first human heart transplant.

Computing and Software Revolutionize Diagnostic Imaging Methods

- 1971 Raymond Vahan Damadian created the magnetic resonance imaging (MRI);“ Godfrey Hounsfield discovered the computed tomography (CT or CAT Scan);
- 1972 Mani Lal Bhaumik performed the first laser eye surgery (LASIK);
- 1973 Giorgio Fischer create the liposuction;
- 1985 Leroy Hood and Lloyd Smith discovered the automated DNA sequencer; Kary Mullis discovered the polymerase chain reaction.

Molecular Biology and Genome Discovery Along with Robotics

Begins the Era of Automation in Medicine

- 1985 Yik San Kwok began the surgical robotic;
- 1988 Julio Palmaz used the first intravascular stent;
- 1996 Dolly, the sheep, was the first animal cloned;
- 1998 James Thomson started to use the stem cell therapy;
- 2000 The Human Genome Project draft was completed;
- 2013 The first Kidney has grown *in vitro* in the U.S.; The first Human liver has grown from stem cells in Japan;
- 2014 The first 3D was used for first ever skull transplant;
- 2016 The first ever artificial pancreas was created.

Significant Advances that are Modifying Medicine in the 21st Century

Each year, when we look at Google and other information research sites on the internet about what is happening in the world of medical science, the list of necessary technologies increases dramatically. Within today, the medical curriculum has lagged, bringing a fundamental issue to universities that graduate doctors and health professionals. Are we training health professionals able to care for patients in the light of the most appropriate scientific knowledge to be used in medical practice? Even with the post-graduation incentive and the professional strategies of the division of medical expertise in subspecialties, we still cannot incorporate innovation simultaneously into the practice of medicine. Besides, changes in the demographic profile of populations around the world, life expectancy and the nosological profile of diseases associated with aging make medical and hospital institutions that care for and prevent illnesses, obsolete. The forecast for demographic and socio-economic evaluation institutes

in large parts of the world is that by 2050 we will have a population of 9 billion people in the world, and 400 million people in Brazil, what will force us to dramatic changes in health systems. The European example reveals a decrease in the number of hospital beds. Thus, the new paradigm for the provision of health services was modernized to preferentially outpatient care. Using virtual medical offices, shared clinics, home care of patients and active participation of the internet in the provision of consulting and services in the health area, advances in diagnostic and therapeutic methods in medicine are considerable increasingly targeting health services for individualized therapy.

There will be no more indiscriminate chemical action medications. The therapeutic approach will increasingly be through individualized protocols using individualized genomic therapy targeted to the genome of each person. Specific treatment for groups of diseases and their particular manifestations of each peculiar condition will propel a trend towards virtualization and a transition from manufacturing, to individualized drug treatment centers. Pharmaceutical companies are increasingly aiming to provide holistic services, including algorithm-driven data processing, case management, and billing guidance.

However, this should not be confused with the business models of health maintenance organizations (HMOs) that exist in the United States, which already migrated to Brazil. There is a paradigm shift in the health industry driven by new technologies and strategies. One such approach is Industry 4.0, which is not restricted to the consumer goods manufacturing industries but seems to fit the health domain well. The Hospital 4.0 concept is an extension of the Industry 4.0 concept, meaning the fourth industrial revolution that includes cyber-physical systems, the Internet of Things (IoT) and cloud computing and artificial intelligence. Through the Internet of Things, cyber-physical systems communicate and cooperate with each other and with humans in real time, and through the Internet of the Services. These aspects are increasingly becoming a reality in modern hospitals that are generally up to date with technology, which emphasizes the Hospital 4.0 concept more strongly than the Industry 4.0 concept.

These aspects are increasingly, and as consequence, healthcare will be much more related to interoperability: the ability of equipment, devices, sensors, and people to connect and communicate through the Internet of Things (IoT) or the Internet of People (IoP); in modern hospitals, the monitors and procedures for the execution of a medical service are trending to be individualized; nursing stations are frequently being transferred to automated computer-operated systems directly from the patient's room.

There are four design principles in Hospital 4.0 concept:

- a) **Virtual Hospital** - The construction of hospitals will be through information systems that create a virtual image of real hospital models through data sensors;
- b) **Maintenance** - The ability to support systems availability and help people maintain them, including the use of newer tools such as Augmented Reality and Holography.
- c) **Decentralized Decisions** - The ability to perform tasks at each level through cybernetic systems in the most independent way possible.
- d) **R & D Activities** - These systems applied to the hospital reality increasingly incorporate R & D activities in Health Engineering; Asset Management; Risk management; Infections associated with healthcare, Certifications; Energy; Sustainability and Multidisciplinary Engineering becoming a reality in modern hospitals that are generally up to date with technology, which emphasizes the Hospital 4.0 concept more strongly.

At the last Brazilian Industrial Association of Medical and Dental Articles and Equipments (ABIMO) meeting, the ideas of Industry 4.0 for the hospital system were discussed, concluding that those above principals are an extension of the original concept.

Main Technologies that are Being Applied to Healthcare

After Hippocrates (460 BC), the great innovation in medicine had happened a thousand years later. The invention of the magnifying glass to enable man to see what Galileo with his telescope perfected to understand the universe, led Robert Hooke to create the microscope to see the invisible, as well as Benjamin Franklin's electricity with the control of lightning electricity, and Thomas Edson and the dazzling light that led to Roentgen discovered the X-ray, Godfrey

Hounsfield, and Raymond Vahan Damadian made the magnetism and computer originating the computed tomography and the magnetic resonance. Now the new machines are of the 3D reality of electronically captured images. Indeed, modern medicine will be developed on the platform of 10 major technology fields:

1. 3D printers;
2. The boom of medical applications: CRISPR Genome Editing (curing disease at a genetic level); electronic skin that can read body's vital signs, cancer vaccines, brain implants, transplant polymers, ingestible sensors;
3. Telemedicine;
4. Uber model in health;
5. Nanomedicine;
6. Robotic surgery;
7. Virtual reality;
8. Food scanners;
9. Fibertronics;
10. Artificial intelligence.

The creation of JBTH now is a great opportunity for young investigators that are looking for good journals to publish a scientific paper and innovations fast and with an interface with engineering and medicine that it is not appropriated covered in the existing journals.

Scope of The Journal of Bioengineering and Technology Applied to Health

*Luciana Knop**
Managing Editor

Nowadays, it is impossible to separate technologies from our lives, and the rapid expansion of knowledge in technologies applied to health becomes from the information published in Journals. So, informing the scientific community of new technologies applied to health such as new diagnostics, therapeutics, methods is the great motivation of SENAI CIMATEC to publish a new Journal. Therefore, SENAI CIMATEC Publishing Group aims to develop into an enlightening interactive network for researchers all over the world through its scientific publications and meetings in the Journal of Bioengineering and Technology Applied to Health (JBTH).

This special issue introduces the JBTH as the new Journal of SENAI CIMATEC and brings the format, printing style, submission process, and peer-review process as well as the frequency, guidelines, and policies of the Journal. JBTH intends to be an international journal with a high impact level. The same criteria of the great impact journals, such as Nature, Science or New England, the JBTH intends to reach the credibility in the scientific world. We will publish articles related to the most recent advancement discoveries and applications in the health technologies field. We also promote the use of technological and scientific knowledge through initiatives that encourage innovation and entrepreneurship in favor of industry and social development.

This special issue presents the 4.0 health's revolution conception and the importance of a journal into this new revolution. Implementing researches and publishing results is crucial for a career in sciences. So, the importance of a scientific publication for an academic and a research center as SENAI CIMATEC, and the Health Institute of Technology (ITS) is essential.

The JBTH will be published quarterly (March, June, September, December) in English by SENAI

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CIMATEC, in press and in electronic editions by the home page www.jbthonline.com. The articles submissions to JBTH have to be made by the home page following the informations on how to subscribe and submit articles.

The JBTH will bring three new approaches for regular publications and get a worthy impact factor by the following strategies:

- The editorial board of JBTH consists of prominent names of Bioengineering and Technologies applied to health in all regions of the world, which will be relevant for the reviewing process, and transfer of communications and knowledge.
- Every edition will bring a feature article with commentaries by prominent researchers, and current trends and best practices will be regularly covered in review articles and practice guidelines.
- Fast peer-review process (no more than three weeks to the reviewers) and fast revision and publication (one week). If an author sends an article, the peer-review process could not exceed three weeks; and if the author sends back the asked corrections in 15 days, and the reviewer would be satisfied with the answer, the article will be published in the next issue.

The JBTH created a specific section, called "Health Innovation Initiatives", with a partnership of the Brazilian Ministry of Health. This special section has an editorial board's specialist components and will bring innovative articles of technological production in Brazil and worldwide, within the scope and proposal of the JBTH.

The Editorial Board of JBTH is formed to prominent names of Bioengineering, Medicine, and Technologies in all regions of the world.

We will have the following scope:

- Editor-in-Chief;
- Deputy Editor;
- Assistant Deputy Editor;
- Associate Editors;
- Editorial Board Members;
- Brazilian Ministry of Health Special Board;
- Advertising Board;
- Production Staff.

This particular publication would like to arouse all investigators in the field of technology, medicine, and bioengineering to head their researches for health and to publish the results in our Journal. We also call the specialists to publish in a Journal that is specific for the revolutionary science of biotechnology presented today.

Editorial Team:

- Editor-in-Chief, Deputy Editor and Assistant Deputy: Editor will decide to how many reviewers the articles will be sent (01 from the editorial board or for associate editors and 01 for outside the editorial board). The Editor-in-Chief has the final word to decide if a conflict of interest occurs.
- Deputy Editor will compose the Advertising Board and review the contributions in the peer-review process.
- Associate Editors will contribute with articles and review process.
- Advertising Board will contribute to financing the JBTH.

- Managing Editor will receive the articles and check if they are in the style, format and if they obey the policies of the Journal to proceed to the peer-review process.

The JBTH will be completely supported by SENAI CIMATEC in the first 03 years and by an Advertisement Board, which will be composed of notorious industries and health companies approved by editors. This first three years will be very important to JBTH to be registered and publicized the brand of the Journal, time in which the Journal will be indexed in the major Index Medicus, such as Pubmed/Medline, Excerpta Medica, ISI Web of Science, Lilacs, and Scielo.

We believe that SENAI CIMATEC and the Health Institute of Technology have a sufficient number of specialists and expertise dedicated to providing the scientific contributions and opinions to achieve a successful publication.

Template for Preparing an Article

Author One¹, Author Two², Author Three^{3}*

¹ Organization Name, Department Name, City, State, Country

² Organization Name, Department Name, City, State, Country

³ Organization Name, Department Name, City, State, Country

Abstract This document gives formatting instructions for authors preparing papers for publication in the journal. Authors are encouraged to prepare manuscripts directly using this template. This template demonstrates format requirements for the Journal.

Keywords: Format, Microsoft Word Template, Style, Insert, Template.

Abbreviations: Format, Microsoft Word Template, Style, Insert, Template.

To use this template, you will need to [1] apply the embedded styles to each paragraph-level item in your manuscript or [2] use the specifications shown in Table 1 to format your manuscript, with this template as a visual guide. Information about paper submission is available from the Journal website.

Table 1. Font Sizes for Papers.

Font Size	Appearance (in Time New Roman or Arial)			
	Regular	Bold	Italic	Underline
10	Author affiliation; Abbreviations of tables, figures, box; References	Author name; Abstract body; Keywords; Abbreviations of the text	Corresponding author; Received Line	
12	Main text; Description of figures, tables box and graphics Section headlines: level 2	Section headlines: level 1	Section headlines: level 3	Section headlines: level 2

1. Ease of Use

An easy way to comply with the journal paper formatting requirements is to use this document as a template and simply type your text into it.

Received Month, Year X, XXXX; revised Month X, XXXX; accepted Month, Year X, XXXX

*Corresponding author: institution; affiliation, addresses; author3@email

The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. Your paper is one part of the entire proceedings, not an independent document. Please do not revise any of the current designations.

1.1. Page Layout

Your paper must use a page size corresponding to A4 which is 210mm wide and 297mm long. The margins are set as follows: top= 15 mm, bottom= 15 mm, right=17.5 mm, left = 20 mm. Your paper must be in two column format with a space of 1.93 characters between columns.

1.1.1. Front Matter

The title should be formatted in an hourglass style; the first line longer than the second, the second line shorter than the third. Use numerical superscript callouts as shown in this template to link authors with their affiliations.

Corresponding author should be denoted with an asterisk as shown. E-mail address is compulsory for the corresponding author.

1.1.2. Text Font

The main text should be in Times New Roman font size 12. Paper title must be centered, bold, regular font size 12. Author names must be centered, bold, regular font size 10. Author affiliation must be regular font size 10. Email address must be centered, italic, font size 10. Recommended font sizes are shown in

Table 1. No more than 3 levels of headings should be used. Level 1 heading must be left-justified, bold, regular font size 12 and numbered using Arabic numerals. Level 2 headings must be left-justified, regular, underline, regular font size 12 and numbered as subheading (i.e 1.1). Level 3 heading must be left-justified, italic font size 10 and numbered as sub-sub heading (i.e 1.1.1) and the first letter of each word capitalized.

1.2. Equations

Display equations should be broken and aligned for two-column display unless spanning across two columns is essential. Equations should be centered with equation numbers set flush right. If using MathType, use the Format Equations feature to format all equations as Times + Symbol 10.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1.3. Tables

Styles for table title, table head, and table text are provided. Tables should be set in one column wherever possible and be placed near their first mention in the body. Tables, figures and graphics need to be placed on separate pages at the back of the manuscript.

1.3.1. Table Captions

Table heads should appear above the tables. Tables must be numbered using Arabic numerals. Table captions must be left-justified and in 12 pt Regular font. Captions with table numbers must be placed before their associated tables, as shown in Table 1.

1.4. Figures

As with tables and equations, figures should be set in one column if possible unless two-column display is essential. The resolution of image should be adequate to reveal the important detail in the figure (300 dpi).

1.4.1. Figure Captions

Figure captions should be below the figures. Figures must be numbered using Arabic numerals. Figure captions must be in 10 pt regular font. Captions of a single line (e.g. Figure. 2) must be left-justified whereas multi-line captions must be

justified (e.g. Figure. 1). Captions with figure numbers must be placed after their associated figures, as shown in Fig. 1 and 2.

Figure 1. (Color online) Forward single pass experimental set-up for evaluating EDFA performance.

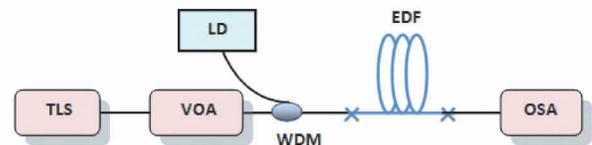
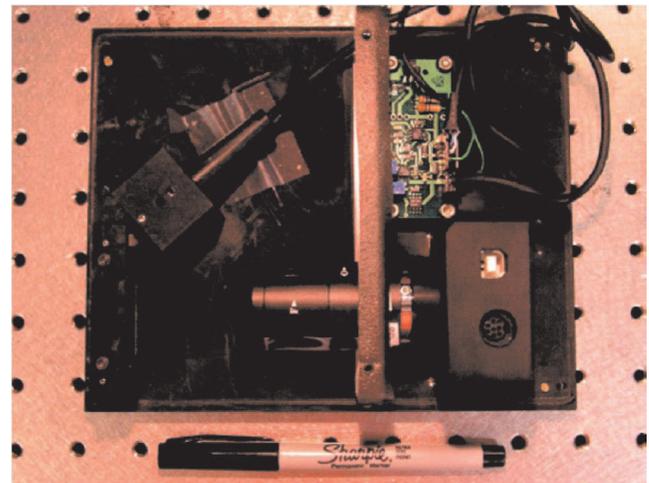
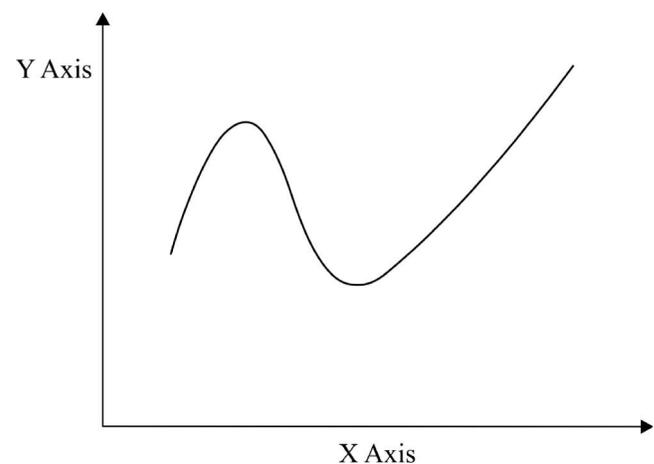


Figure 2. Biochip Reader integrated circuit (details).



Graphic 1. Diagram example



2. References Formats

The heading of the References section must not be numbered. All reference items must be in 10 pt font. Number the reference items consecutively in square brackets (e.g. [1]). When referring to a reference item, please simply use the reference number, as in [2]. Do not use “Ref. [3]” or “Reference [3]” except at the beginning of a sentence, e.g. “Reference [3] shows ...”. Multiple references are each numbered with separate brackets (e.g. [1], [2]–[3]).

A complete reference should contain the name(s) of the author(s) and/or editor(s), the title of the article, the name of the book or conference proceedings where appropriate, and bibliographic information about the article such as the name of the publisher, the city of publication, and the page numbers. The basic concept is that the reference should be sufficiently complete so that the reader could readily find the reference and can judge the authority and objectivity of the reference.

Books (Standard format)

Authors, Title (regular), Publisher, City of Publication, Year of Publication, page numbers(if appropriate).

Example:

1. Fogg, B.J, Persuasive technology: using computers to change what we think and do, Morgan Kaufmann Publishers, Boston, 2003, 30-35.

Journal articles (Standard format)

Authors, “Title of the article,” Journal name (regular), Year, Volume (Issue), Month, Pages.

Example:

Hirsh H., Coen MH., Mozer, MC, Hasha R., Flanagan, JL. Room service, AI-style. IEEE intelligent systems, 2002;14 (Jul 2):8-19.

Conference Proceedings (Standard format)

Authors, “Title of the article,” in Title of conference (regular), Publisher, Pages.

Example

Leclercq, P. and Heylighen, A. 5,8 Analogies per hour: A designer’s view on analogical reasoning, in 7th International Conference on Artificial Intelligence in Design, Kluwer Academic Publishers, 2016:285-303.

E-Books (Standard format)

Authors, Title of E-book (regular), Publisher, Date of original publication. [Format] Available: Source.

Example

T. Eckes, The Developmental Social Psychology of Gender, Lawrence Erlbaum, 2000. [E-book] Available: netLibrary e-book.

E-journal (Standard format)

Authors, Title of Article, Title of Journal (regular), Year, Volume (Issue), month, pages. [Format]. Available: Database Name (if appropriate), article number (if given), internet address. [Accessed date of access].

Example

Steiner A., Understanding hypertext in the context of reading on the web: Language learners’ experience. Current Issues in Education, 2013;6(July12):2015-219. [Online].

Available: <http://cie.ed.asu.edu/volume6/number12/> [Accessed Dec. 2, 2013].

Acknowledgement

The heading of the Acknowledgment section and the References section must not be numbered.

References

1. Fogg B.J. Persuasive technology: using computers to change what we think and do, Morgan Kaufmann Publishers, Boston, 2003, 30-35.
2. Hirsh H., Coen, M.H., Mozer M.C., Hasha R., Flanagan J.L., “Room service, AI-style,” IEEE intelligent systems 2002;14(2):8-19.
3. Eckes T. The Developmental Social Psychology of Gender, Lawrence Erlbaum. 2000. [E-book] Available: netLibrary e-book.

Instructions for Authors

The Authors must indicate in a cover letter the address, telephone number and e-mail of the corresponding author. The corresponding author will be asked to make a statement confirming that the content of the manuscript represents the views of the co-authors, that neither the corresponding author nor the co-authors have submitted duplicate or overlapping manuscripts elsewhere, and that the items indicated as personal communications in the text are supported by the referenced person.

Manuscripts may be submitted within designated categories of communication, including:

- **Original basic or clinical investigation** (original articles on topics of broad interest in the field of bioengineering and biotechnology). We particularly welcome papers that discuss epidemiological aspects of international health, clinical reports, clinical trials and reports of laboratory investigations.
- **Case presentation and discussion** (case reports must be carefully documented and must be of importance because they illustrate or describe unusual features or have important practice implications).
- **Brief reports** of new methods or observations (short communications brief reports of unusual or preliminary findings).
- **State-of-the-art presentations or reviews** (reviews on topics of importance to readers in diverse geographic areas. These should be comprehensive and fully referenced). However, review articles only will be accepted after an invitation of the Editors.
- **Letters to the editor or editorials** concerning previous publications (correspondence relating to papers recently published in the Journal, or containing brief reports of unusual or preliminary findings).
- **Editor's corner**, containing ideas, hypotheses and comments (papers that advance a hypothesis or represent an opinion relating to a topic of current interest).
- **Innovative medical products** (we would like to invite submission of high-quality, interesting and instructive images, such as clinical and other photographs, figures or diagrams, photomicrographs, or diagnostic imaging).
- **Review article** (this category will only be published if the editors invite the author).
- **Health innovation initiatives articles** (this is a new section of the Journal that has a proper editorial board and review policies, within the scope and proposal of the Journal, bringing innovative articles of technological production in Brazil and worldwide).

The authors should checklist comparing the text with the template of the Journal.

Supplements to the JBTH include articles under a unifying theme, such as those summarizing presentations of symposia or focusing on a specific subject. These will be added to the regular quarterly publication as appropriate, and will be peer reviewed in the same manner as submitted manuscripts.

Statement of Editorial Policy

The editors of the Journal reserve the right to edit manuscripts for clarity, grammar and style. Authors will have an opportunity to review these changes prior to creation of galley proofs. Changes in content after galley proofs will be sent for reviewing and could be required charges to the author. The JBTH does not accept articles which duplicate or overlap publications elsewhere.

Peer-Review Process

All manuscripts are assigned to an Associate Editor by the Editor-in-Chief and Deputy Editor, and sent to outside experts for peer review. The Associate Editor,

aided by the reviewers' comments, makes a recommendation to the Editor-in-Chief regarding the merits of the manuscript. The Editor-in-Chief makes a final decision to accept, reject, or request revision of the manuscript. A request for revision does not guarantee ultimate acceptance of the revised manuscript.

Manuscripts may also be sent out for statistical review or *ad hoc* reviewers. The average time from submission to first decision is three weeks.

Health Innovation Initiatives

In this section, the revision of the papers will be done by the experts of "Brazilian Ministry of Health

Special Board”, which have to follow the scope of the Journal, policies, styles, and time of revisions. This editorial board will be free to choose the articles reviewers and will be responsible for the articles’ approvals. The opinions expressed in this section are those of the authors and contributors, and do not necessarily reflect those of the JBTH and ITS/SENAL-CIMATEC, the editors, the editorial board, or the organization with which the authors are affiliated.

Revisions

Manuscripts that are sent back to authors for revision must be returned to the editorial office by 15 days after the date of the revision request. Unless the decision letter specifically indicates otherwise, it is important not to increase the text length of the manuscript in responding to the comments. The cover letter must include a point-by-point response to the reviewers and Editors comments, and should indicate any additional changes made. Any alteration in authorship, including a change in order of authors, must be agreed upon by all authors, and a statement signed by all authors must be submitted to the editorial office.

Style

Manuscripts may be submitted only in electronic form by www.jbthonline.com. Each manuscript will be assigned a registration number, and the author notified that the manuscript is complete and appropriate to begin the review process. The submission file is in OpenOffice, Microsoft Word, or RTF document file format for texts and JPG (300dpi) for figures.

Authors must indicate in a cover letter the address, telephone number, fax number, and e-mail of the corresponding author. The corresponding author will be asked to make a statement confirming that the content of the manuscript represents the views of the co-authors, that neither the corresponding author nor the co-authors have submitted duplicate or overlapping manuscripts elsewhere, and that the items indicated as personal communications in the text are supported by the referenced person.

Manuscripts are to be typed as indicated in Guide for Authors, as well as text, tables, references, legends.

All pages are to be numbered with the order of presentation as follows: title page, abstract, text, acknowledgements, references, tables, figure legends and figures. A running title of not more than 40 characters should be at the top of each page. References should be listed consecutively in the text and recorded as follows in the reference list, and must follow the format of the National Library of Medicine as in Index Medicus and “Uniform Requirements for Manuscripts Submitted to Biomedical Journals” or in “Vancouver Citation Style”. Titles of journals not listed in Index Medicus should be spelled out in full.

Manuscript style will follow accepted standards. Please refer to the JBTH for guidance. The final style will be determined by the Editor-in-Chief as reviewed and accepted by the manuscript’s corresponding author.

Approval of the Ethics Committee

The JBTH will only accept articles that are approved by the ethics committees of the respective institutions (protocol number and/or approval certification should be sent after the references). The protocol number should be included in the end of the Introduction section of the article.

Publication Ethics

Authors should observe high standards with respect to publication ethics as set out by the International Committee of Medical Journal Editors (ICMJE). Falsification or fabrication of data, plagiarism, including duplicate publication of the authors’ own work without proper citation, and misappropriation of the work are all unacceptable practices. Any cases of ethical misconduct are treated very seriously and will be dealt with in accordance with the JBTH guidelines.

Conflicts of Interest

At the point of submission, each author should reveal any financial interests or connections, direct or indirect, or other situations that might raise the question of bias in the work reported or the conclusions, implications, or opinions stated - including pertinent commercial or other sources of funding for the individual author(s) or for the associated department(s) or

organizations(s), and personal relationships. There is a potential conflict of interest when anyone involved in the publication process has a financial or other beneficial interest in the products or concepts mentioned in a submitted manuscript or in competing products that might bias his or her judgment.

Material Disclaimer

The opinions expressed in JBTH are those of the authors and contributors, and do not necessarily reflect

those of the ITS/SENAI CIMATEC, the editors, the editorial board, or the organization with which the authors are affiliated.

Privacy Statement

The names and email addresses entered in this Journal site will be used exclusively for the stated purposes of this journal and will not be made available for any other purpose or to any other party.

Brief Policies of Style

Manuscript	Original	Review	Brief Communication	Case Report	Editorial ; Letter to the Editor; Editor' s Corner	Innovative Medical Products	State-of-the-Art	Health Innovation Initiatives
Font Type	Times or Arial	Times or Arial	Times or Arial	Times or Arial	Times or Arial	Times or Arial	Times or Arial	Times or Arial
Number of Words - Title	120	90	95	85	70	60	120	90
Font Size/Space- Title	12; double space	12; double space	12; double space	12; double space	12; double space	12; double space	12; double space	12; double space
Font Size/Space- Abstracts/Key Words and Abbreviations	10; single space	10; single space	10; single space	10; single space	-	-	10; single space	10; single space
Number of Words - Abstracts/Key Words	300/5	300/5	200/5	250/5	-	-	300/5	300/5
Font Size/Space- Text	12; Double space	12; Double space	12; Double space	12; Double space	12; Double space	12; Double space	12; Double space	12; Double space
Number of Words - Text	5,000 including spaces	5,5	2,500 including spaces	1,000 including spaces	1,000 including spaces	550 including spaces	5,000 including spaces	5,500 including spaces
Number of Figures	8	3	2 (title font size 12, double space)	2 (title font size 12, double space)	-	2 (title font size 12, double space)	8	8
Number of Tables/Graphic	7	2	2(title font size 12, double space)	1(title font size 12, double space)	-	-	7	4
Number of Authors and Co-authors*	15	10	5	10	3	3	15	10
References	20 (font size 10,single space	30(font size 10,single space	15 (font size 10,single space)	10 (font size 10,single space)	10 (font size 10,single space	5(font size 10,single space	20 (font size 10,single space	20

*First and last name with a sequencing overwritten number. Corresponding author(s) should be identified with an asterisk; Type 10, Times or Arial font, single space.

Checklist for Submitted Manuscripts

- 1. Please provide a cover letter with your submission specifying the corresponding author as well as an address, telephone number and e-mail.
- 2. Submit your paper using our website www.jbthonline.com. Use Word Perfect/Word for Windows, each with a complete set of original illustrations.
- 3. The entire manuscript (including tables and references) must be typed according to the guidelines instructions.
- 4. The order of appearance of material in all manuscripts should be as follows: title page, abstract, text, acknowledgements, references, tables, legends of figures, figures.
- 5. The title page must include a title of not more than three printed lines (please check the guidelines of each specific manuscript), authors (no titles or degrees), institutional affiliations, a running headline of not more than 40 letters with spaces, a name and complete address to which correspondence and reprint requests should be sent, and footnotes indicating sources of financial support and changes of address.
- 6. Acknowledgements of persons who assisted the authors should be included on the page preceding the references.
- 7. References must begin on a separate page.
- 8. References must be cited on (not above) the line of text and in brackets instead of parentheses, e.g., [7,8].
- 9. References must be numbered in the order in which they appear in the text. References not cited in the text cannot appear in the reference section. References only or first cited in a table or figure are numbered according to where the table or figure is cited in the text. For instance, if a table is placed after reference 8, a new reference cited in table 1 would be reference 9.
- 10. Reference citations must follow the format established by the “Uniform Requirements for Manuscripts Submitted to Biomedical Journals” or in “Vancouver Citation Style”.
- 11. If you reference your own unpublished work (i.e., an “in press” article) in the manuscript that you are submitting, you must attach a file of the “in press” article and an acceptance letter from the journal.
- 12. If you cite unpublished data that are not your own, you must provide a letter of permission from the author of that publication.
- 13. Please provide each figure in high quality (minimum 300 dpi: JPG or TIF). Figure must be on a separate file.
- 14. Provide a figure legend for each figure.
- 15. If the study received a financial support, the name of the sponsors must be included in the cover letter and in the text, after the author’s affiliations.
- 16. Provide the number of the Ethics Committees (please check the guidelines for authors).