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# AN ENGLISH-SPANISH GLOSSARY FOR THE STUDY OF THE ARTIFICIAL PANCREAS IN MEDICAL TRANSLATION / GLOSARIO INGLÉS-ESPAÑOL PARA EL ESTUDIO DEL PÁNCREAS ARTIFICIAL EN TRADUCCIÓN MÉDICA

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**Abstract:** Type 1 diabetes is a malady that affects millions of people around the world. The latest scientific and technological advancements have designed a device that aims at improving patient's quality of life: the artificial pancreas enables them to control and manage this illness in a more automated and efficient way. Nevertheless, as a consequence of the influence of English worldwide and, in particular, in the field of science, the information available in Spanish is scarce, which also limits the dissemination of knowledge to a wider public. In the field of scientific and technical translation terminological units play a pivotal role, since they concentrate a huge part of the knowledge regarding the subject topic. However, these units are not free from synonyms and univocity is not their characteristic, which may lead to confusion. Therefore, the standardization of terms is essential so as to elaborate an adequate translation that will serve to spread knowledge, as well as to facilitate communication among experts. The present work seeks to develop a glossary of terms in English and Spanish related to the artificial pancreas that could be of great use for diverse profiles: translators, experts, patients, and people interested in the topic.

**Keywords:** specialized translation, scientific and technical translation, terminology, artificial pancreas, diabetes, type 1 diabetes.

**Resumen:** La diabetes de tipo 1 es un mal que afecta a millones de personas a nivel global. Gracias a las últimas innovaciones en ciencia y tecnología, los pacientes hoy en día disponen de un dispositivo que tiene como objetivo mejorar la calidad de los enfermos; el páncreas artificial les permite controlar y tratar esta enfermedad de manera más automatizada y eficaz. Sin embargo, como consecuencia de la influencia del inglés a nivel global y, en concreto, en el ámbito científico, no hay suficiente información en español, lo que supone un obstáculo para la difusión del conocimiento a un público más amplio. En el ámbito de la traducción científico-técnica las unidades terminológicas desempeñan un papel importante, ya que concentran gran parte del conocimiento sobre el tema en cuestión. No obstante, los términos no están libres de sinónimos y carecen de univocidad, lo que puede generar confusión. Por ello, disponer de términos normalizados es imprescindible a la hora de elaborar una traducción adecuada que sirva para difundir información, además de facilitar la comunicación entre expertos. El presente trabajo tiene como objetivo desarrollar un glosario terminológico inglés-español acerca del páncreas artificial que sea de gran utilidad para diversos perfiles: traductores, expertos, pacientes e interesados en la materia.

**Palabras clave:** traducción especializada, traducción científico-técnica, terminología, páncreas artificial, diabetes de tipo 1.

## 1. Introduction

According to the World Health Organization (WHO), in 2014 around 422 million adults were suffering from diabetes worldwide. Despite the fact that there is still no cure for diabetes, during the last decade more accurate and sophisticated devices and tools, such as the artificial pancreas, have been designed in an attempt at improving the quality of life of patients with diabetes.

The progress achieved so far has been possible due to the innumerable research that has been conducted since the discovery of insulin in 1923 and even if the field of diabetes is not something recent, it is constantly evolving. However, since English has become the language of science and most scientific advancements come from the United States, little has been written or translated to other languages.

The present work is focused on the development of a glossary of terms within the field of endocrinology and biomedical engineering, specifically regarding the artificial pancreas, a new technological tool for the treatment of type 1 diabetes mellitus (DM1). This glossary seeks to help specialized translators in the process of translating a scientific text within this field and thus, contribute to the spread of knowledge, which is crucial to avoid the risk of “reinventing the wheel”. Moreover, it aims at making accessible all the information and knowledge concerning the advancements on the artificial pancreas for patients and, in general, for people who are interested in the topic.

## 2. Background

Diabetes is a chronic illness that occurs when the levels of glucose in the blood are too high. As reported by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK, 2016), there are three main types of diabetes: type 1 diabetes mellitus (DM1), type 2 diabetes mellitus (DM2), and gestational diabetes. All types of diabetes are serious and need continuous control and treatment. The artificial pancreas is one of the latest technological devices for the treatment and control of DM1 of which little has been written in Spanish.

“An artificial pancreas (AP), known as closed-loop control of blood glucose in diabetes, is a system combining a glucose sensor, a control algorithm, and an insulin infusion device” (Cobelli et al., 2011, p.2672). Since the 1960s, numerous studies and clinical trials have been conducted towards the development of an artificial pancreas with the hope of achieving a fully automated device. Despite the achievements of recent years, this is just the beginning and much more research will be conducted with the hope of achieving a more advantageous artificial pancreas.

## 3. Literature review

### 3.1. *Scientific and technical translation*

Scientific and technical translation can be understood as a type of specialized translation that deals with texts exclusively within the field of Pure Sciences, or as Aixelá (2015) puts it, “‘hard’ sciences (mathematics, physics and natural science, computer science, biomedicine, industrial technology, and related fields)” (p. 3). However, many scholars remain skeptical about the grouping of these two terms to refer to a specific field of translation. For instance, for Byrne (2012) there is a clear distinction between scientific translation and technical translation, suggesting that “scientific translation relates to pure science in all of its theoretical,

esoteric and cerebral glory while technical translation relates to how scientific knowledge is actually put into practical use, dirty fingernails and all” (pp.7-8). Since establishing a clear boundary between two fields as interrelated as science and technology are is not an easy task, many scholars prefer to bind them together.

### *3.2. Characteristics of scientific and technical translation*

Overall scientific and technical texts are characterized by the specificity of the subject matter within the field of Pure Sciences, and by the specialized terminology. Cabré (2004) distinguishes three conditions a text should fulfil in order to be considered specialized and in this case, scientific or technical. According to this author, these conditions are classified from different perspectives: cognitive, grammatic, and pragmatic.

### *3.3. Importance of scientific and technical translation. Historical background*

From antique times to our days, translation has been the tool that has made possible the dissemination of knowledge across language barriers and cultural differences and has proved to be crucial for its preservation. “Due to its role both in collecting and disseminating knowledge, translation has been no less integral to scientific progress than teaching and research” (Montgomery, 2010, p. 299). For instance, one of the major periods of translation, which date us back between the 7th and 5th centuries B.C.E., brought the huge majority of astronomical and medical knowledge that emerged in Egypt and Asia Minor. Definitely, scientific progress would have been unimaginable without translation. The world as it is today is the result of the many scientific and technological contributions that have been made throughout history, and which still are being made.

### *3.4. Scientific and technical translation nowadays*

The field of scientific and technical translation has not been considered as relevant as literary or Bible translation and thus, little research has been conducted on the field. One of the reasons behind this lack of interest is based on the idea that the language of scientific and technical texts is not creative, and that the translation process consists merely on the exchange of one specialized term for its fixed equivalent. For instance, Schleiermacher considered it as a “mechanical task” (2016, p. 212). However, the reality concerning this type of translation is rather different, especially considering the multiplicity of specialized terminology.

### *3.5. Terminology in scientific and technical translation*

“Terms are linguistic units which convey conceptual meaning within the framework of specialized knowledge texts” (Benítez, 2009, p. 109). For this reason, terminology proves to be essential for scientific and technical translation in order to transmit specialized knowledge. At the same time, it is necessary so as to acquire the knowledge a specialized translator needs to produce a high-quality translation, since “knowing the terminology of a field implies acquiring knowledge of it” (Cabré, 2010, p. 358).

### *3.6. Profile of a specialized translator*

Nowadays the most developed translation competence is the one proposed by PACTE (2003), a research group of the Autonomous University of Barcelona that has been conducting research

into translation competence and its acquisition since 1997. Hurtado et al. (2003) claim that the models proposed so far by scholars do not include the strategic and psycho-physiological components. This model constitutes of five sub-competences that shape the concept of translation competence, which in this model is considered to be “expert knowledge” (Hurtado et al., 2003, p. 6): language sub-competence in both languages, extra-linguistic sub-competence, transfer sub-competence, professional/instrumental sub-competence, strategic sub-competence, and psycho-physiological sub-competence.

#### 4. Methodology

The main goal of this paper is to develop a glossary of terms in English and Spanish related to the artificial pancreas. For this purpose, 15 scientific articles have been selected, from which 9 are in English and 6 in Spanish. The articles have been selected according to two main aspects: subject matter and date of publication. Articles that are more recent have had priority since the glossary seeks to contain terminological units that are used currently. In order to conduct the terminological work, a free software corpus analysis tool, AntConc, has been used.

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Table 1. Selected articles. Source: Own elaboration.

## 5. Analysis of results

The glossary of terms is divided in four columns and it includes the 20 most frequent terminological units that have been extracted from the scientific articles mentioned in the previous section. It provides the original term in English, its definition, the equivalent term in Spanish and, finally, the frequency.

### 5.1. *Equivalents: Difficulties*

The equivalents included in the glossary have been extracted from the texts in Spanish. However, not all equivalents were appropriate since some of them did not follow the linguistic conventions in Spanish and others were grammatically incorrect. In order to use the most appropriate equivalent, in the case of synonyms, I have included the most frequent one and I have modified it in case it was not grammatically correct or in case it did not respect the linguistic conventions.

For the following equivalents an explanation has been included: artificial pancreas (AP), HbA1c, continuous subcutaneous insulin infusion (CSII), fuzzy logic control algorithm (FL), hyperglycemia, hypoglycemia, SAP, type 1 diabetes (T1D).

## 6. Conclusion

For documentation purposes as well as for term extraction, there was a large amount of information available in English, which has been an essential tool during the whole process. However, the number of scientific articles written in Spanish was considerably less and indeed, from the 15 texts that have been used for term extraction, only 6 are in Spanish. Moreover, the influence of the English language worldwide, and more specifically in the field of science, has resulted in anglicisms becoming the preferred option. At the same time, the use of anglicisms has also an impact on the way Spanish terminological units are written". Finally, while analysing different texts from different experts, it can be noted that terminological units have also numerous synonyms and therefore, the use of one term or another depends on factors such

as the place the experts come from, the group they belong to or the year of publication of a specific scientific article, among others.

The task of developing a glossary has been a laborious process that has allowed me to analyze and verify what it has been exposed throughout the theoretical framework: the little information available in Spanish regarding the artificial pancreas, the influence of English in scientific language and the multiple synonyms of terminological units.

## Appendix: The glossary

ENGLISH	DEFINITION	SPANISH	FREQUENCY
Artificial pancreas (AP)	A system constituted by three different devices (continuous glucose monitor, control algorithm and insulin pump) that is used to control blood glucose levels and to deliver insulin automatically.	Páncreas artificial (PA)	372
Beta cell ( $\beta$ cell)	A type of cell which is found in the islets of Langerhans in the pancreas which is responsible for the production of the hormone insulin.	Célula beta (célula $\beta$ )	27
Blood glucose (BG)	It refers to the type of sugar that is obtained from food and used by the body as a source of energy.	Glucosa en sangre	124
Closed-loop control (CLC)	It refers to a type of second or third generation AP system that is fully automated.	Control en lazo cerrado	134
Continuous glucose monitoring (CGM)	It is one of three components of an AP whose main function is to control glucose levels in real time. It is composed of three elements: a sensor, a transmitter and a device (i.e. smartphone).	Monitoreo continuo de glucosa (MCG)	321
Continuous subcutaneous insulin infusion (CSII)	It is a method that enables patients to continuously administer insulin to the subcutaneous tissue. Pumps using this method infuse “short-acting insulin into	Infusión continua subcutánea de insulina (ICSI)	50

	subcutaneous tissue at preselected basal rates, with user-determined bolus dosing for meals and hyperglycemic episodes.” (Turksoy, Cinar, 2018, p.17)		
Control algorithm	It is one of the three components of an AP. This computer software is connected to both the CGM and the insulin pump. It interprets the data that the CGM sends about glucose levels and based on that information, it instructs the pump to deliver or adjust insulin.	Algoritmo de control	33
Dual-hormone AP	An AP system that infuses two different types of hormones: insulin and glucagon.	Control bihormonal	45
Fuzzy logic control algorithm (FL)	It is a type of control algorithm that calculates insulin doses a patient might need based on how a clinical expert would make real-time adjustments depending on the data provided by the CGM.	<i>Fuzzy logic</i> o de lógica difusa	23
Glucagon	A hormone secreted by the pancreas which main function is to increase blood glucose level. This hormone is usually used to minimize the risk of hypoglycemia.	Glucagón	77
Glucose	It is a type of sugar that the body gets from food and it uses it for energy.	Glucosa	580
HbA1c	HbA1c refers to the term glycohemoglobin, the combination of blood glucose with a protein called	HbA1c / glucohemoglobina	57



	hemoglobin. It is usually used for the management and monitoring of diabetes.		
Hyperglycemia	A condition that occurs when blood glucose levels are too high.	Hiperglucemia	36
Hypoglycemia	A condition that occurs when blood glucose levels are too low.	Hipoglucemia	188
Insulin	A hormone secreted by the pancreas which main function is to control and regulate blood glucose levels.	Insulina	777
Insulin pump	It is one of the three components of an AP which aims at mimicking the function of a human pancreas. It is a small device that delivers insulin through a cannula that is subcutaneously implanted. It delivers insulin doses according to the instructions received from the control algorithm.	Bomba de insulina	207
Model Predictive Control (MPC)	It is a type of control algorithm that instructs the pump based on a prediction of glucose levels at a specific time point in the near future.	Control predictivo basado en modelo (MPC)	75
Proportional Integral Derivative (PID)	It is a type of control algorithm that instructs the pump based on measured glucose levels. It evaluates “how far the current glucose is from the desired glucose, the rate of change in glucose, and how long the glucose has	Algoritmo proporcional integral derivativo (PID)	33

	remained above or below target. The sum of these factors is then used to determine an insulin dose for a specific point in time”. (Forlenza et al., 2016, p.16)		
Sensor-augmented pump (SAP)	It is a type of pump in which there is a direct communication between the CGM and the pump.	Sistema integrado de bomba-sensor (SAP, por sus siglas en inglés)	48
Type 1 diabetes (T1D)	It is an illness in which the immune system destroys the cells in the pancreas that are responsible for producing insulin, a hormone that helps glucose enter the cells to be transformed in energy. Without insulin, glucose cannot be transformed in energy and remains in the blood increasing the risk of hyperglycemia.	Diabetes mellitus de tipo 1 (DM1) o diabetes sacarina de tipo 1	255

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