

**BIBLIOMETRIC SURVEY OF PUBLISHED ARTICLES ON THE MAIN  
BIOMODELS USED IN SCIENTIFIC RESEARCH**

**LEVANTAMENTO BIBLIOMÉTRICO DE ARTIGOS PUBLICADOS COM OS  
PRINCIPAIS BIOMODELOS DE USO CIENTÍFICO**

**ESTUDIO BIBLIOMÉTRICO DE ARTÍCULOS PUBLICADOS SOBRE LOS  
PRINCIPALES BIOMODELOS DE USO CIENTÍFICO**



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**ABSTRACT**

In this chapter, we conducted a bibliometric survey of the number of articles published in indexed databases such as PubMed Medline, LILACS and Scielo in relation to the most commonly used biomodels for scientific purposes such as zebrafish, mouse, rat, rabbit, hamster and non-human primates. We also carried out a bibliometric survey of the number of articles published in different approaches using these models. Our methodology consisted of the use of descriptors and obtaining the total number of articles published for each designated descriptor. Our results demonstrated that the LILACS platform has the highest number of articles published for the respective biomodels, with the exception of non-human primates for which the PubMed Medline platform showed the highest number of published articles. We also addressed the use of these biomodels in the study of various areas such as cancer research, cardiovascular diseases, immune response, neurodegenerative diseases, behavioral changes and infectious diseases. The data show that in cancer studies the PubMed Medline platform presents the highest number of articles published for all biomodels. The same applies to the study of cardiovascular diseases. In the area of immune response, the LILACS platform presented the highest number of published articles for all biomodels, with the exception of non-human primates. The same profile was observed for the study of neurodegenerative diseases. Behavioral changes showed a higher number of articles published in the PubMed Medline platform for the biomodels zebrafish, mouse and non-human primate. The LILACS platform, on the other hand, showed a higher number of published articles for the biomodels rat, rabbit and hamster. In the study of infectious diseases, the LILACS platform presented a higher number of articles published for all biomodels, with the exception of non-human primates. Thus, we can conclude that, in general, the LILACS platform presents the highest number of published articles for the most commonly used biomodels for scientific purposes; however, depending on the approach, the PubMed Medline platform showed a higher number of published articles in the respective biomodels.

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**Keywords:** Bibliometric Survey. Zebrafish. Mouse. Rat. Rabbit. Hamster and Non-Human Primates.

## RESUMO

Nesse capítulo realizamos um levantamento bibliométrico da quantidade de artigos publicados nas plataformas de artigos indexados PubMed Medline, LILACS e Scielo em relação aos biomodelos mais utilizados para fins científicos como o zebrafish, o camundongo, o rato, o coelho, o hamster e os primatas não humanos. Também realizamos o levantamento bibliométrico da quantidade de artigos publicados em diferentes abordagens com esses modelos. Nossa metodologia foi a utilização de descritores e a obtenção do total de artigos publicados para cada descritor designado. Nossos resultados demonstraram que a plataforma LILACS possui a maior quantidade de artigos publicados para os respectivos biomodelos, a exceção dos primatas não humanos aos quais a plataforma PubMed Medline demonstrou o maior número de artigos publicados. Também abordamos o uso dos respectivos biomodelos no estudo de diversas áreas como a pesquisa em relação ao câncer, as doenças cardiovasculares, a resposta imunológica, as doenças neurodegenerativas, alterações de comportamento e doenças infecciosas. Os dados demonstram que no estudo do câncer a plataforma PubMed Medline apresenta a maior quantidade de artigos publicados para todos os biomodelos. Assim como também para o estudo das doenças cardiovasculares. Na área da resposta imunológica a plataforma LILACS apresentou a maior quantidade de artigos publicados em todos os biomodelos, a exceção dos primatas não humanos. Mesmo perfil para o estudo das doenças neurodegenerativas. As alterações comportamentais demonstraram um maior número de artigos publicados na plataforma PubMed Medline para os biomodelos zebrafish, camundongo e primata não humano. Já a plataforma LILACS demonstrou maior número de artigos publicados para os biomodelos rato, coelho e hamster. No estudo das doenças infecciosas a plataforma LILACS apresentou uma quantidade maior de artigos publicados para todos os biomodelos, a exceção dos primatas não humanos. Sendo assim, podemos concluir que de forma geral a plataforma LILACS apresenta o maior número de artigos publicados para os modelos mais utilizados para fins científicos, porém dependendo da abordagem a plataforma PubMed Medline demonstrou uma quantidade maior de artigos publicados nos respectivos biomodelos.

**Palavras-chave:** Levantamento Bibliométrico. Zebrafish. Camundongo. Rato. Coelho. Hamster e Primatas não Humanos.

## RESUMEN

En este capítulo realizamos un estudio bibliométrico de la cantidad de artículos publicados en las plataformas de artículos indexados PubMed Medline, LILACS y Scielo en relación con los biomodelos más utilizados con fines científicos como el pez cebra, el ratón, la rata, el conejo, el hámster y los primates no humanos. También realizamos el estudio bibliométrico de la cantidad de artículos publicados en diferentes enfoques con estos modelos. Nuestra metodología consistió en el uso de descritores y la obtención del número total de artículos publicados para cada descriptor designado. Nuestros resultados demostraron que la plataforma LILACS posee la mayor cantidad de artículos publicados para los respectivos biomodelos, con excepción de los primates no humanos para los cuales la plataforma PubMed Medline mostró el mayor número de artículos publicados. También abordamos el uso de los respectivos biomodelos en el estudio de diversas áreas como la investigación del cáncer, las enfermedades cardiovasculares, la respuesta inmunológica, las enfermedades neurodegenerativas, las alteraciones del comportamiento y las enfermedades infecciosas. Los datos demuestran que en el estudio del cáncer la plataforma PubMed Medline presenta la mayor cantidad de artículos publicados para todos los biomodelos. Lo mismo ocurre para el estudio de las enfermedades cardiovasculares. En el área de la respuesta inmunológica la plataforma LILACS presentó la mayor cantidad de

artículos publicados en todos los biomodelos, con excepción de los primates no humanos. El mismo perfil se observó para el estudio de las enfermedades neurodegenerativas. Las alteraciones del comportamiento demostraron un mayor número de artículos publicados en la plataforma PubMed Medline para los biomodelos pez cebra, ratón y primate no humano. Por otro lado, la plataforma LILACS mostró mayor número de artículos publicados para los biomodelos rata, conejo y hámster. En el estudio de las enfermedades infecciosas la plataforma LILACS presentó una mayor cantidad de artículos publicados para todos los biomodelos, con excepción de los primates no humanos. Así, se puede concluir que, en general, la plataforma LILACS presenta el mayor número de artículos publicados para los biomodelos más utilizados con fines científicos; sin embargo, dependiendo del enfoque, la plataforma PubMed Medline mostró una mayor cantidad de artículos publicados en los respectivos biomodelos.

**Palabras clave:** Estudio Bibliométrico. Pez cebra. Ratón. Rata. Conejo. Hámster y Primates no Humanos.

## 1 INTRODUCTION

Initially, we searched the indexed article platforms PubMed, Medline, LILACS, and Scielo for the number of papers published for each of the biomodels most used for scientific purposes: Zebrafish, mice, rats, rabbits, hamsters, and non-human primates. We observed that the LILACS platform was the one that maintained in its collection the largest number of articles indexed for these biomodels, with the exception of non-human primates. The Scielo platform was the one with the lowest number of articles published for the respective biomodels. The biomodels with the highest number of publications in order were non-human primates (6,485,11 articles), mice (1,031,90 articles), rats (536,830 articles), rabbits (98,459 articles), hamsters (45,557 articles) and zebrafish (36,864 articles) according to the indexed platform PubMed Medline. In the case of the LILACS platform, which contains the largest number of indexed publications, the most used biomodels were: Mice (2,174,90 articles), rats (1,899,40 articles), rabbits (407,129 articles), non-human primates (188,224 articles), hamster (139,885 articles) and zebrafish (65,030 articles). This profile was similar for the Scielo indexed article platform, where we observed the number of 4,228 articles related to the mouse biomodel, 3,550 articles related to the rat biomodel, 1,138 articles related to the rabbit biomodel, 416 articles related to the non-human primate biomodel, 263 articles related to the hamster biomodel, and 99 articles related to the zebrafish biomodel (Table 1). So, the models that contribute the most with indexed publications to the PubMed Medline platform are non-human primates and to the LILACS platform are mice, and for both the biomodel that contributes the least to indexed publications is the zebrafish biomodel. We believe that PubMed Medline has the largest number of publications for non-human primates due to the quality of its journals and its global character, LILACS has the most regional profile.

**Table 1**

*Number of articles indexed on each platform for the types of biomodels*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish</i>	36.864	65.030	99
<i>Mice</i>	1.031.90	2.174.90	4.228
<i>Rat</i>	536.830	1.899.40	3.550
<i>Rabbit</i>	98.459	407.129	1.138
<i>Hamster</i>	45.557	139.885	263
<i>Monkey</i>	6.485.11	188.224	416

We refined our search for articles indexed in different areas of biological assays. We matched each biomodel with descriptors related to cancer, cardiovascular disease, immune response, neurodegenerative diseases, behavior, and infections. Regarding the study of

cancer, the PubMed Medline platform was the one that demonstrated the largest number of publications in all biomodels in relation to the study of the various types of cancer. The number of articles indexed on the PubMed Medline platform was 1,349,87 articles for non-human primates, 268,652 for mice, 58,720 for rats, 7,098 for rabbits, 6,999 for hamsters, and 4,015 for zebrafish. On the LILACS platform, the number was 33,244 articles related to mice, 10,792 related to rats, 1,443 related to rabbits, 1,292 related to hamsters, 452 articles related to non-human primates and 338 related to the zebrafish biomodel. Scielo presented a small number of articles indexed on its platform with only 27 articles for mice, 7 for rats and 3 for non-human primates (Table 2).

**Table 2**

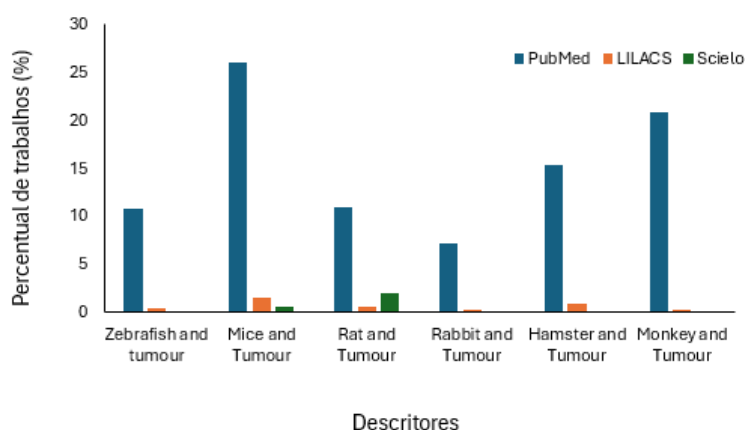
*Quantity of articles published for each biomodel in the cancer study*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and tumour</i>	4.015	338	0
<i>Mice and tumour</i>	268.652	33.244	27
<i>Rat and tumour</i>	58.720	10.792	7
<i>Rabbit and tumour</i>	7.098	1.443	0
<i>Hamster and tumour</i>	6.999	1.292	0
<i>Monkey and tumour</i>	1.349.87	452	3

Regarding the percentage of articles published in the cancer study, based on the total production of each biomodel, our results demonstrate that the PubMed Medline platform has the highest prevalence of articles published in relation to all the biomodels studied (Figure 1). It should be noted that the mouse biomodel is the one with the highest percentage prevalence of published articles in relation to the study of cancer, with approximately 26% of the total number of articles published for each biomodel. Non-human primates account for 20% of the total published papers, followed by the hamster with 15% and the mouse and zebrafish with 10% of the total published papers in the cancer study for each biomodel.

**Figure 1**

*Percentage of the total published articles of each biomodel for the study of cancer*



In the study of cardiovascular diseases, the PubMed Medline platform was once again the one that presented the highest number of articles published for all biomodels. The biomodel with the most publications was the non-human primate with 535,650 articles published, followed by the mouse biomodel with 81,864 articles published, the rat with 67,031 articles published, the rabbit with 12,156, the zebrafish with 3,665 articles published and finally the hamster biomodel with 2,274 articles published by 2026. The Scielo platform was the one with the lowest number of published articles, however it presented the mouse biomodel with the highest number of publications with about 129 published papers, followed by the mouse biomodel with 65 published papers and 16 for the rabbit biomodel. The hamster, zebrafish and non-human primates biomodels presented 3, 1 and 1 published studies respectively (Table 3).

**Table 3**

*Number of published articles of each biomodel in the cardiovascular study*

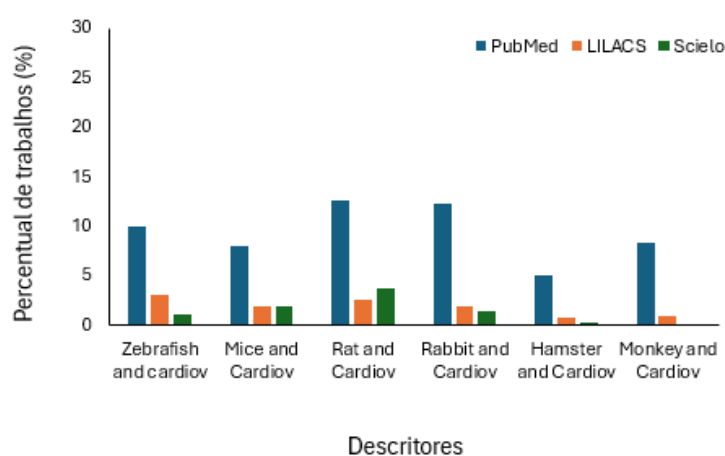
Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and immune response</i>	1.687	2.384	1
<i>Mice and immune response</i>	131.197	186.636	268
<i>Rat and immune response</i>	13.719	38.217	20
<i>Rabbit and immune response</i>	6.348	14.186	15
<i>Hamster and immune response</i>	2.912	3.897	10
<i>Monkey and immune response</i>	264.030	7.610	5

The percentage value relative to each biomodel in the study of cardiovascular diseases shows a small change in the profile of the total number of articles published. Although the PubMed Medline platform maintained the highest percentage of articles

published in all biomodels compared to the other platforms, the rat and rabbit biomodels were the ones with the highest percentage of articles published with 12% of the total publications in the cardiovascular study. Another relevant point was that 10% of the studies published in the study of cardiovascular diseases were published using the zebrafish biomodel, a value above the hamster and non-human primate biomodels. Again, the Scielo platform presented a small number of published articles when compared to the other two platforms.

**Figure 2**

*Percentage of total articles published for each biomodel in the cardiovascular study*



Regarding the study of immune responses, the LILACS platform presented a higher number of published articles when compared to the PubMed, Medline, and Scielo platforms. Except for non-human primates, where the largest number of publications was related to the PubMed Medline platform. The mouse biomodel presented 186,636 published articles, followed by the rat biomodel with 38,217 and the rabbit biomodel with 14,186 published articles. Non-human primates come next with 7,610 published articles, the hamster biomodel with 3,897 and the zebrafish with 2,384 published articles. On the PubMed Medline platform, non-human primates presented a total of publications with 262,030 articles published, followed by the mouse biomodel with 131,197 articles published, the rat biomodel with 13,719 articles published, the rabbit biomodel with 6,348 articles published, the hamster with 2,912 articles published and 1,687 articles published for the zebrafish biomodel (Table 4).

**Table 4**

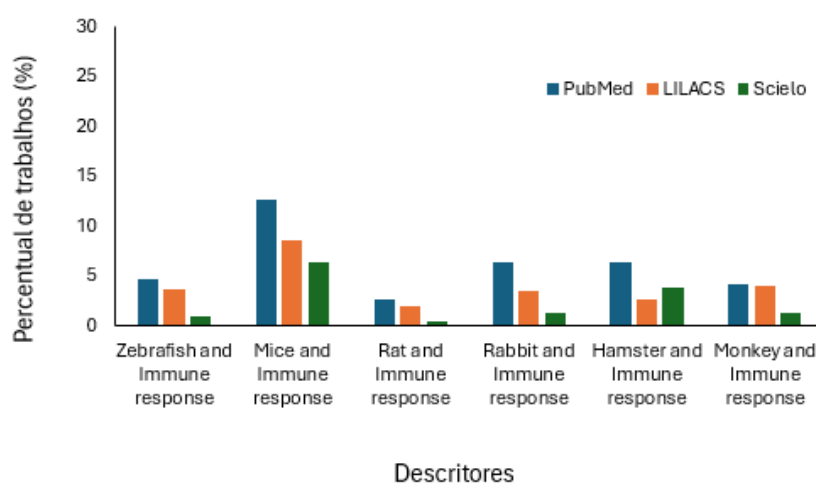
*Number of articles published for each biomodel in the study of the immune response*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and neurodegenerative</i>	781	1.026	0
<i>Mice and neurodegenerative</i>	22.638	30.136	20
<i>Rat and neurodegenerative</i>	7.971	15.456	16
<i>Rabbit and neurodegenerative</i>	171	315	0
<i>Hamster and neurodegenerative</i>	426	546	1
<i>Monkey and neurodegenerative</i>	60.360	904	0

Regarding the percentage of each biomodel in the total number of studies published for the study of the immune response, the mouse biomodel had the highest percentage of published articles, with about 12% on the PubMed Medline platform. The percentage value was followed by the rabbit and hamster biomodels with about 6% of the total articles published in the study of the immune response and 4% for the non-human primate biomodel and the zebrafish biomodel. The percentage of articles published on the LILACS and Scielo platforms were very low and not representative, except for mice, which on the LILACS platform presented 8% of the total articles published in the study of the immune response. On the Scielo platform, the mouse biomodel presented 6% of the total number of articles published in the study of the immune response (Figure 3).

**Figure 3**

*Percentage of the total articles published for each biomodel in the study of the immune response*



In the study of neurodegenerative diseases, the LILACS platform,

PubMed Medline again presented a higher number of published papers on all biomodels, except for non-human primates. It presented a total of 30,136 articles published for the mouse biomodel, 15,456 articles published for the rat biomodel, 1,026 articles published for the zebrafish biomodel, 904 for non-human primates, 546 articles published for the hamster biomodel and 315 for the rabbit biomodel in the study of neurodegenerative diseases. Meanwhile, the PubMed Medline platform presented 60,360 articles published for the non-human primate biomodel, 22,638 articles published for the mouse biomodel, 7,971 for the mouse biomodel, 781 for the zebrafish biomodel, 426 for the hamster biomodel, and only 171 for the rabbit biomodel for the study of neurodegenerative diseases. Finally, the Scielo platform presented 20 articles published for the mouse biomodel, 16 articles published for the rat biomodel and 1 article published for the hamster biomodel, with no articles published for the zebrafish, rabbit and non-human primate biomodels in the study of neurodegenerative diseases (Table 5).

**Table 5**

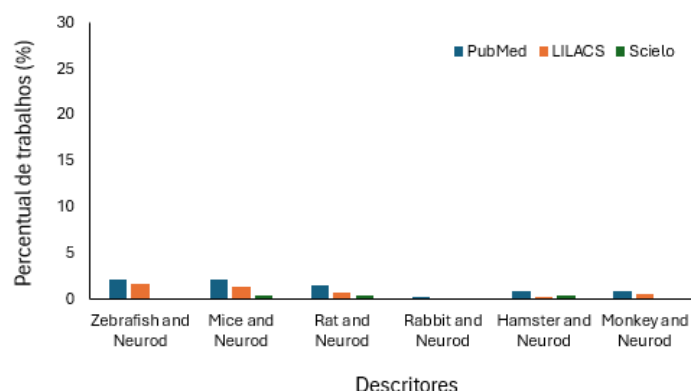
*Number of articles published for each biomodel in the study of neurodegenerative diseases*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and neurodegenerative</i>	781	1.026	0
<i>Mice and neurodegenerative</i>	22.638	30.136	20
<i>Rat and neurodegenerative</i>	7.971	15.456	16
<i>Rabbit and neurodegenerative</i>	171	315	0
<i>Hamster and neurodegenerative</i>	426	546	1
<i>Monkey and neurodegenerative</i>	60.360	904	0

Regarding the percentage of articles published for each biomodel in the study of neurodegenerative diseases in all the platforms analyzed, it showed a very low value. In LILACS, the zebrafish biomodel presented a percentage of 1.6%, followed by the mouse biomodel with 1.4% of the total articles published for the study of neurodegenerative diseases. On the PubMed Medline platform, the mouse biomodel presented a percentage of 2.2%, while the zebrafish biomodel presented a percentage of 2.1% of the total articles published in the study of neurodegenerative diseases (Figure 4).

**Figure 4**

*Percentage of the total studies of each biomodel for the study of neurodegenerative diseases*



In the behavior study, the PubMed Medline platform presented a higher number of articles published for non-human primates with 1,199,02 articles published and 138,094 articles published for the mouse biomodel, and finally, 10,602 articles published for the zebrafish biomodel. Meanwhile, on the LILACS platform, the rat biomodel presented a number of 128,369 articles published in the study of behavior, followed by 8,123 articles published for the rabbit biomodel and 4,255 articles published for the hamster biomodel in the study of behavior. On the Scielo platform, 162 articles published with the mouse biomodel, 113 articles published for the rat biomodel, 42 for the non-human primate biomodel, 25 for the rabbit biomodel, 12 for the hamster biomodel and 8 for the zebrafish biomodel were presented from the total number of articles published in the study of behavior (Table 6).

**Table 6**

*Number of articles published for each biomodel in the study of behavior*

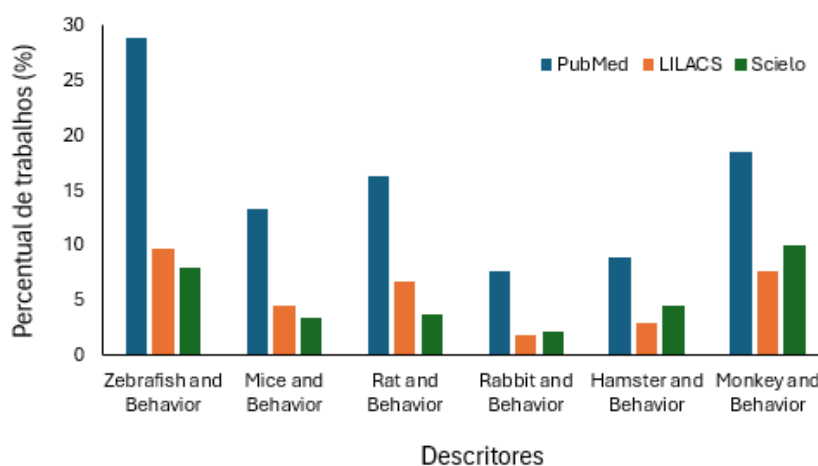
Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and behavior</i>	10.602	6.331	8
<i>Mice and behavior</i>	138.094	97.463	162
<i>Rat and behavior</i>	87.603	128.369	113
<i>Rabbit and behavior</i>	7.604	8.123	25
<i>Hamster and behavior</i>	4.088	4.255	12
<i>Monkey and behavior</i>	1.199.02	14.494	42

Regarding the percentage of articles published in relation to the study of behavior by the biomodels studied, we observed an increase in the percentage of the zebrafish biomodel to 28.8%, followed by 18.8% for the non-human primate biomodel, 16.3% for the rat biomodel, 13.4% for the mouse biomodel, 9% for the hamster biomodel, and 7.7% for the

rabbit biomodel on the PubMed Medline platform. In the LILACS platform, the percentage demonstrated was 9.7% for the zebrafish biomodel, followed by 7.7% for the non-human primate biomodel, 6.7% for the rat biomodel, 4.5% for the mouse biomodel, 3% for the hamster biomodel, and 1.9% for the rabbit biomodel in relation to the study of behavior with the respective biomodels. At this moment, we observed that most of the articles published with zebrafish are related to the study of the behavior of this species and in preclinical models for humans. In addition, the study of behavior was prevalent in two other biomodels, the non-human primate and the rat, the mouse ranked fourth in the percentage prevalence of articles published for the study of behavior (Figure 5).

**Figure 5**

*Percentage of the total work of each biomodel for the study of behavior*



The survey of articles published for the study of infections on the LILACS platform showed a higher number of articles published for all biomodels, except for non-human primates. The mouse biomodel presented 223,275 published articles, the rat biomodel presented 52,729 published articles, the rabbit biomodel presented 40,221 published articles, followed by non-human primates with 33,876 published articles, 15,940 published articles for the hamster biomodel and 2,841 published articles for the zebrafish biomodel. The PubMed Medline platform presented 1,177,25 articles published for non-human primates in the study of infections, 159,064 articles published for the mouse biomodel, 25,055 for the rat biomodel, 17,041 for the rabbit biomodel, 10,532 for the hamster biomodel, and 2,285 for the zebrafish biomodel in the study of infections for the respective biomodels (Table 7).

**Table 7**

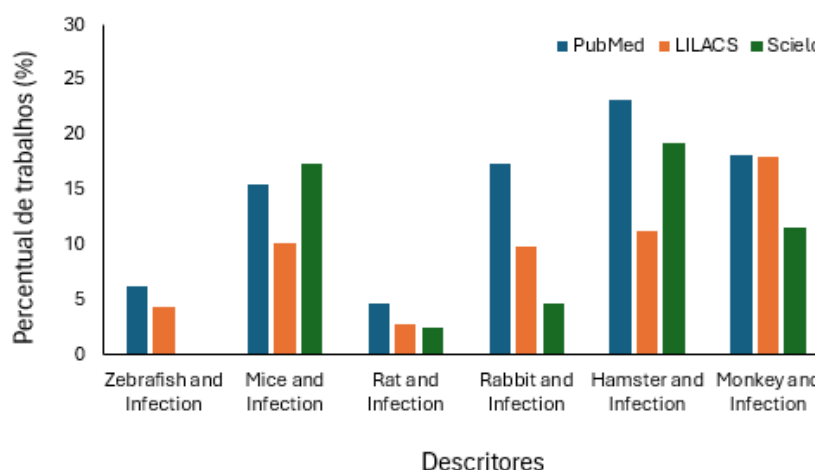
*Number of articles published for each biomodel in the study of infections*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and infection</i>	2.285	2.841	0
<i>Mice and infection</i>	159.064	223.275	736
<i>Rat and infection</i>	25.055	52.729	91
<i>Rabbit and infection</i>	17.041	40.221	54
<i>Hamster and infection</i>	10.532	15.940	51
<i>Monkey and infection</i>	1.177.25	33.876	48

The highest percentage of studies in the study of infections was in the hamster biomodel on the PubMed Medline platform, with about 23% of the articles published. Followed by the non-human primate biomodel with 18.2% of the published articles, 17.3% of the rabbit biomodel of published articles, 15.4% of the mouse biomodel, 6.2% of the zebrafish biomodel and 4.7% of the rat biomodel. In the LILACS platform, the percentage presented was 18% for the non-human primate biomodel, followed by 11.3% for the hamster biomodel, 10.2% for the mouse biomodel, 9.8% for the rabbit biomodel, 4.3% for the zebrafish biomodel and 2.8% for the rat biomodel for the study of infections in the total number of articles published with the respective biomodels (Figure 6).

**Figure 6**

*Percentage of total articles published for each biomodel in the infection study*



The survey of articles published among the three indexed manuscript platforms showed that for the study of breast cancer, lung cancer, and liver cancer in each biomodel, the PubMed Medline platform was the one with the highest number of publications. The biomodel with the highest number of articles published was the non-human primate with

164,228 articles related to breast cancer, 138,874 articles related to lung cancer and 86,662 related to liver cancer. The second biomodel with the highest number of published articles was the mouse, and the order of cancer types with the highest number of published articles changes the qualification with 20,253 for lung cancer, 26,270 for articles published for breast cancer and 20. 596 related to the study of liver cancer. In the rat biomodel, liver cancer showed the highest number of articles published with 7,492 articles published, followed by 4. 506 articles published for the study of lung cancer and 2,677 related to the study of breast cancer. Except for the number of articles published for non-human primates, the LILACS platform maintained the same profile as the number of articles published for mouse and rat biomodels, with a lower total number of indexed articles (Table 8).

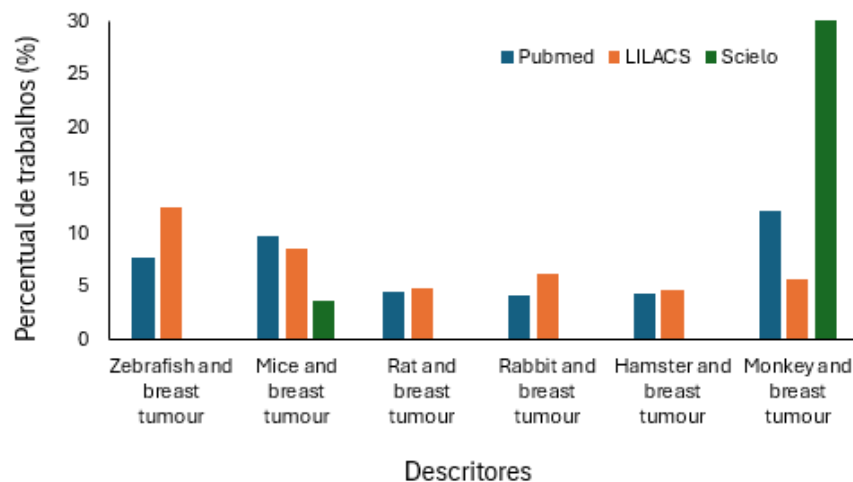
**Table 8**

*Number of articles published in the study of cancer types for each biomodel*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and breast tumour</i>	301	42	0
<i>Zebrafish and lung tumour</i>	203	23	0
<i>Zebrafish and hepatic tumour</i>	176	13	0
<i>Mice and breast tumour</i>	26.270	2.840	1
<i>Mice and lung tumour</i>	30.253	3.902	2
<i>Mice and hepatic tumour</i>	20.596	1.852	0
<i>Rat and breast tumour</i>	2.677	521	0
<i>Rat and lung tumour</i>	4.506	885	1
<i>Rat and hepatic tumour</i>	7.492	1.021	1
<i>Rabbit and breast tumour</i>	305	89	0
<i>Rabbit and lung tumour</i>	555	135	0
<i>Rabbit and hepatic tumour</i>	734	94	0
<i>Hamster and breast tumour</i>	307	62	0
<i>Hamster and lung tumour</i>	556	133	0
<i>Hamster and hepatic tumour</i>	569	45	0
<i>Monkey and breast tumour</i>	164.228	26	1
<i>Monkey and lung tumour</i>	138.874	48	0
<i>Monkey and hepatic tumour</i>	86.662	11	0

**Figure 7**

*Percentage of the number of cancer-related studies with the descriptor breast tumor*



Regarding the total number of articles published in the cancer study, the percentage of each biomodel for the breast cancer studies showed 12.4% for the zebrafish biomodel on the LILACS platform, followed by 9.7% for the mouse biomodel on the PubMed Medline platform and 12.1% for non-human primates on the PubMed Medline platform (Figure 8).

**Figure 8**

*Percentage of the number of cancer-related studies with the lung tumor descriptor*

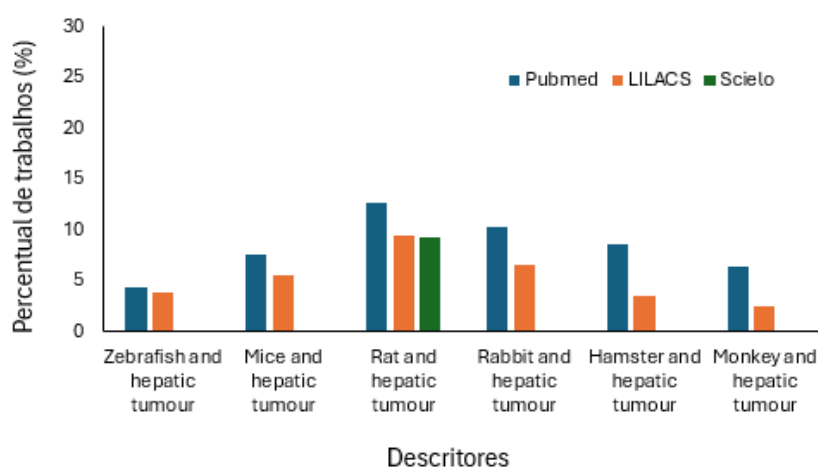


The percentage of articles published in the lung cancer study relative to the total number of studies involving each biomodel and articles published in the cancer study described 11.7 and 11.8% for the mouse biomodel on the PubMed Med, Medline, and LILACS

platforms, respectively. The non-human primate biomodel showed a percentage between 10.2 and 10.6% on the PubMed, Medline and LILACS platforms, respectively. The rats, rabbits and hamster biomodels presented a percentage of 8.2, 9.3 and 10.2% of articles published on the LILACS platform. The rat biomodel showed a higher percentage of articles published for the study of lung cancer relative to the total number of articles published in the cancer study, with 14.2% in the Scielo platform (Figure 9).

### Figure 9

*Percentage of the number of cancer-related studies with the descriptor liver tumor*



Regarding the study of liver cancer, the rat biomodel had a higher percentage of articles published in relation to the general study of cancer. On the PubMed Medline platform, this biomodel presented 12.7% of the total articles published for this biomodel in the study of cancer. Followed by the rabbit biomodel with 10.3% and the hamster biomodel with 8.5%. On the LILACS platform, this percentage was 9.4% for the rat biomodel and 6.5% for the rabbit biomodel. Describing that the mouse model contributes proportionally more than the other biomodels in the study of liver cancer.

Regarding more specific descriptors for cardiovascular diseases, such as myocardial infarction and arterial hypertension, we observed again that the non-human primate biomodel on the PubMed Medline platform had the highest number of articles published, with 93,309 for articles related to infarction and 164,091 for the study of arterial hypertension. Next, we describe the rat biomodel with 13,451 articles published for the study of myocardial infarction and 18,506 for the study of arterial hypertension. Next comes the mouse biomodel with 11,953 for the study of myocardial infarction and 11,451 for the study of arterial hypertension. On the LILACS platform, the rat biomodel continues to demonstrate the

highest number of studies published for the study of myocardial infarction and arterial hypertension, with 27,680 and 37,189 articles published, respectively. Soon after, we observed the mouse biomodel with 16,206 articles published for the study of myocardial infarction and 7,556 for the study of arterial hypertension. On the Scielo platform, the rat biomodel also has the largest number of publications, with 40 articles published related to the study of myocardial infarction and 32 articles published for the study of arterial hypertension (Table 9).

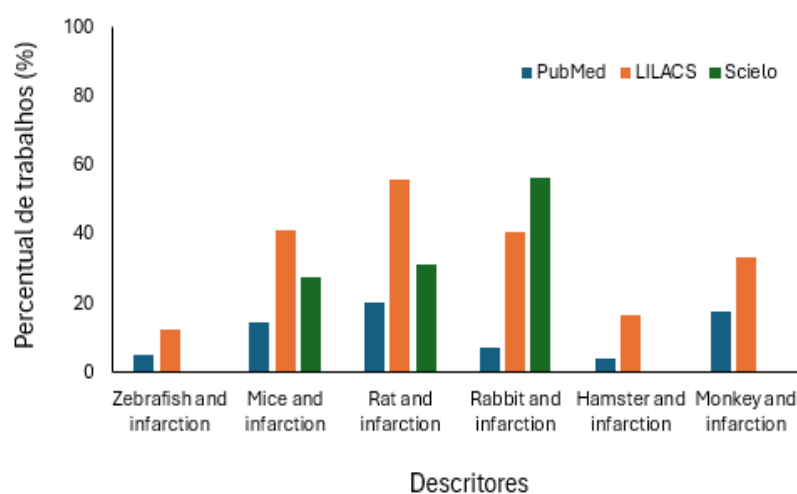
**Table 9**

*Number of studies for each cardiovascular disease-related biomodel*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and infarction</i>	197	236	0
<i>Zebrafish and arterial hypertension</i>	164	30	0
<i>Mice and infarction</i>	11.953	16.206	18
<i>Mice and arterial hypertension</i>	11.973	7.556	7
<i>Rat and infarction</i>	13.451	27.680	40
<i>Rat and arterial hypertension</i>	18.506	37.189	32
<i>Rabbit and infarction</i>	887	3.255	9
<i>Rabbit and arterial hypertension</i>	822	2.307	2
<i>Hamster and infarction</i>	88	179	0
<i>Hamster and arterial hypertension</i>	172	193	0
<i>Monkey and infarction</i>	93.309	553	0
<i>Monkey and arterial hypertension</i>	164.091	432	0

**Figure 10**

*Percentage of the number of studies related to cardiovascular diseases with the descriptor infarction*

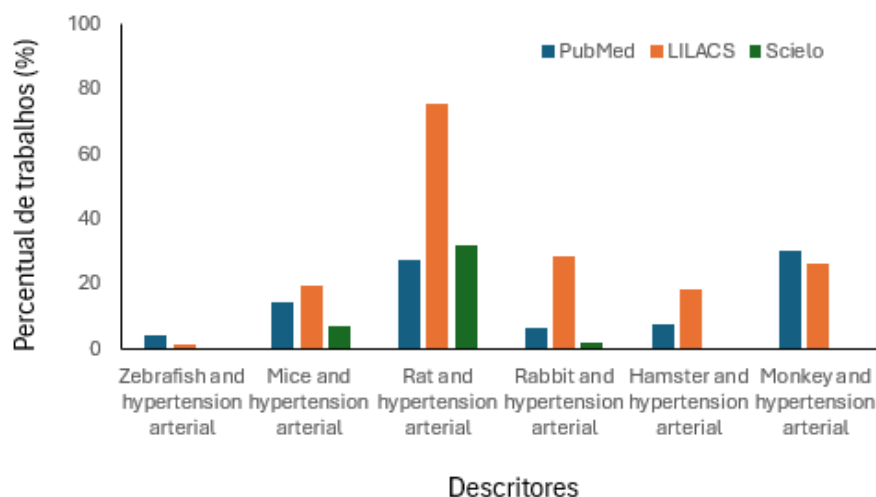


The percentage of articles published in the myocardial infarction study in relation to the total number of cardiovascular diseases in the LILACS platform showed 55.9% of the

articles published for the rat biomodel, followed by the mouse biomodel with 41.3% of the articles published and the rabbit biomodel with 40.4% of the articles published for myocardial infarction over the total number of articles published for cardiovascular diseases (Figure 10)

### Figure 11

*Percentage of the number of studies related to cardiovascular diseases with the descriptor of arterial hypertension*



Regarding the study of arterial hypertension, the percentage of articles published for each biomodel was more expressive in the LILACS platform for the rat biomodel, with 75.2% of articles published of the total number of indexed articles related to cardiovascular diseases. The rabbit biomodel presented 28.6% of published articles related to the study of arterial hypertension, and the non-human primates presented 30% and 26% on the PubMed, Medline, and LILACS platforms, respectively (Figure 11).

We refined the search for the study of the immune response through the descriptors autoimmunity, inflammation, and allergy. On the PubMed Medline platform, the non-human primate biomodel presented 79,811 published articles for autoimmunity, 295,617 published articles for inflammation, and 143,222 articles published for allergy descriptor. On this platform after non-human primates is the number of articles published for the mouse biomodel with 27,503 related to autoimmunity, 132,916 published articles are related to the study of inflammation and 30,138 is related to the study of allergy. Another biomodel with a significant number of articles published on the PubMed Medline platform was the rat biomodel with 45,371 articles published in the study of inflammation. On the LILACS platform, the biomodel with the highest number of publications is related to the mouse biomodel in the study of inflammation, with 206,709 articles published on this platform.

Similarly, the rat biomodel in the study of inflammation presented 95,532 articles published on the LILACS platform. On the Scielo platform, it was the one that presented the lowest number of articles published in the study of the immune response in the various categories. He demonstrated 338 for the mouse biomodel 338 and for the rat biomodel 257 published articles related to the study of inflammation (Table 10).

**Table 10**

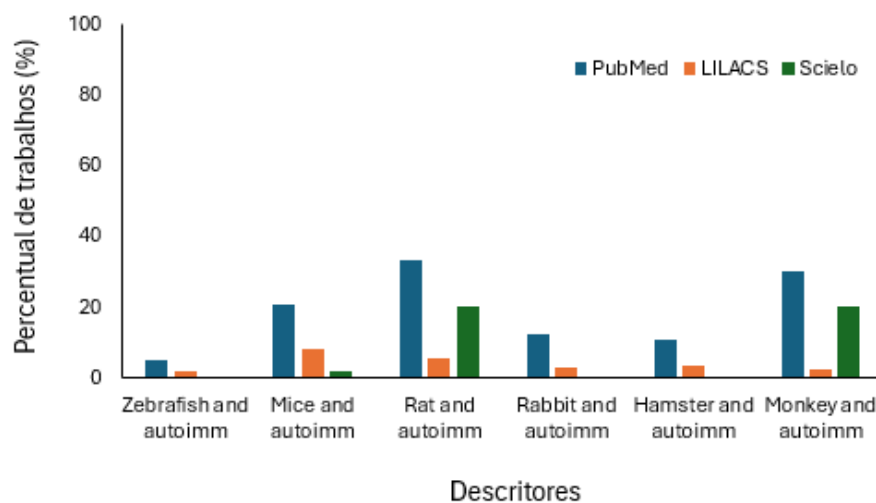
*Number of articles related to each biomodel determined for the descriptors of autoimmunity, inflammation, and allergy*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and autoimmunity</i>	90	50	0
<i>Zebrafish and inflammation</i>	1.726	2.657	1
<i>Zebrafish and allergy</i>	161	30	0
<i>Mice and autoimmunity</i>	27.503	15.560	5
<i>Mice and inflammation</i>	132.916	206.709	338
<i>Mice and allergy</i>	30.138	12.207	14
<i>Rat and autoimmunity</i>	4.602	2.121	4
<i>Rat and inflammation</i>	45.371	95.532	257
<i>Rat and allergy</i>	6.481	4.573	4
<i>Rabbit and autoimmunity</i>	805	447	0
<i>Rabbit and inflammation</i>	4.621	11.862	34
<i>Rabbit and allergy</i>	1.854	2.348	3
<i>Hamster and autoimmunity</i>	314	130	0
<i>Hamster and inflammation</i>	1.500	2.701	6
<i>Hamster and allergy</i>	805	288	2
<i>Monkey and autoimmunity</i>	79.811	192	1
<i>Monkey and inflammation</i>	295.617	3.520	3
<i>Monkey and allergy</i>	143.222	503	0

In relation to the percentage of articles published with the descriptor autoimmunity in relation to the study of the immune response, the PubMed Medline platform showed greater significance with 33.5% of the articles published related to the rat biomodel, followed by 30.2% related to the non-human primate biomodel and 20.9% related to the mouse biomodel. In the LILACS platform, the percentages were lower, with 8.3% in the study of immune response related to autoimmunity related to the mouse biomodel and 5.5% of articles published related to the study of autoimmunity in the total of articles published for immune response. On the Scielo platform, the percentage of articles published on the study of autoimmunity in the total number of articles published for immune response was 20% for non-human rat and primate biomodels (Figure 12).

**Figure 12**

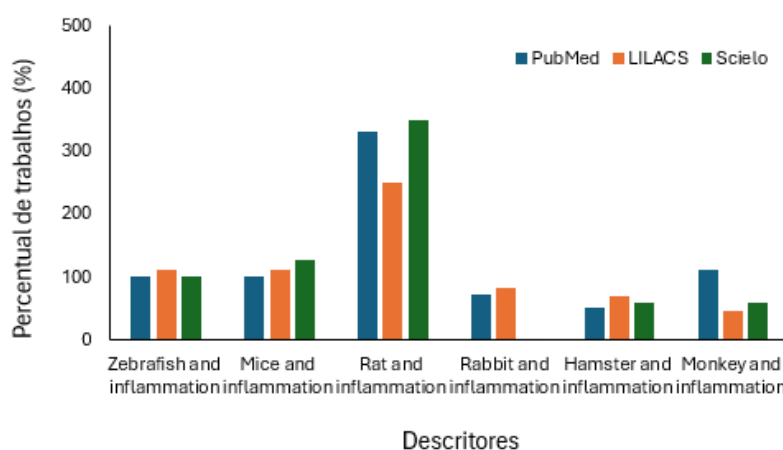
*Percentage of articles related to immune response with the descriptor for autoimmunity*



Regarding the study of inflammation, the percentage of published articles exceeded the total number of published studies with the descriptor immune response. The rat biomodel presented a higher percentage in the three platforms than the other biomodels. On the PubMed platform, Medline presented 230% more articles published when compared to the immune response descriptor. On the LILACS platform, the rat biomodel for the study of inflammation presented 149.9% more articles published than when the immune response descriptor was used. In the Scielo platform, the study of inflammation presented 250% more articles related to the immune response in the rat biomodel and 26% more articles published related to inflammation in the area of immune response (Figure 13).

**Figure 13**

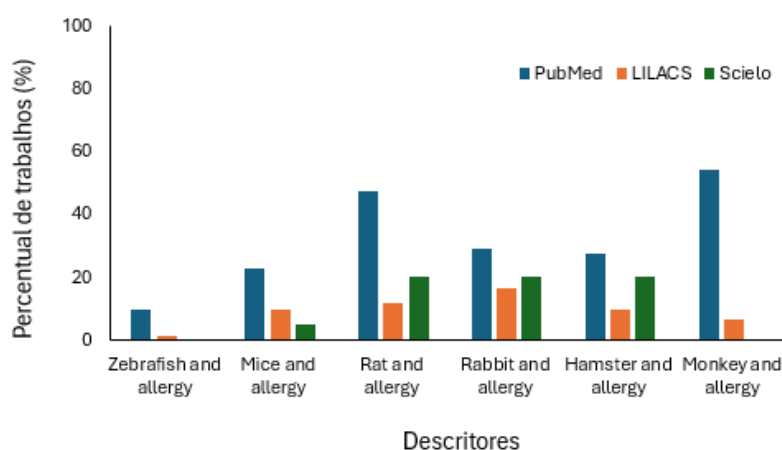
*Percentage of articles related to immune response with the descriptor for inflammation*



The percentage of articles published in the allergy study in the total number of articles published in the immune response was more significant in the PubMed Medline platform with 54.2% in non-human primates, followed by 47.2% for the rat biomodel and 29.2% for the rabbit biomodel of articles published in the allergy study within the total of articles published for the immune response.

**Figure 14**

*Percentage of studies related to the immune response with the descriptor for allergy*



**Table 11**

*Number of articles related to each biomodel related to neurodegenerative diseases*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and Alzheimer disease</i>	344	564	0
<i>Zebrafish and Parkinson disease</i>	290	677	0
<i>Mice and Alzheimer disease</i>	21.904	36.356	6
<i>Mice and Parkinson disease</i>	8.981	21.444	3
<i>Rat and Alzheimer disease</i>	6.635	16.571	5
<i>Rat and Parkinson disease</i>	5.464	15.316	9
<i>Rabbit and Alzheimer disease</i>	222	601	0
<i>Rabbit and Parkinson disease</i>	56	342	0
<i>Hamster and Alzheimer disease</i>	536	989	0
<i>Hamster and Parkinson disease</i>	114	298	0
<i>Monkey and Alzheimer disease</i>	76.149	1.078	1
<i>Monkey and Parkinson disease</i>	42.458	2.208	1

Regarding the study of neurodegenerative diseases, we refined our search with descriptors for Alzheimer's disease and Parkinson's disease. On the PubMed Medline platform, the biomodel that contributed the most articles published in this area was the non-human primate, with 76,149 articles published for Alzheimer's disease and 42,458 articles published for Parkinson's disease. On the LILACS platform, the mouse biomodel stands out with 36,356 articles published on the study of Alzheimer's disease and 21,444 articles

published for Parkinson's disease, followed by the mouse biomodel with 16,571 articles published for Alzheimer's disease and 15,316 articles published for Parkinson's disease. On this platform, the non-human primate biomodel demonstrated a number of 1,078 articles published in the study of Alzheimer's disease and 2,208 articles published for the study of Parkinson's disease. We highlight that Scielo contributed little to the publication of articles in the study of neurodegenerative diseases, with 9 articles published in the rat biomodel in the study of Parkinson's disease and 6 articles published in the study of Alzheimer's disease (Table 12).

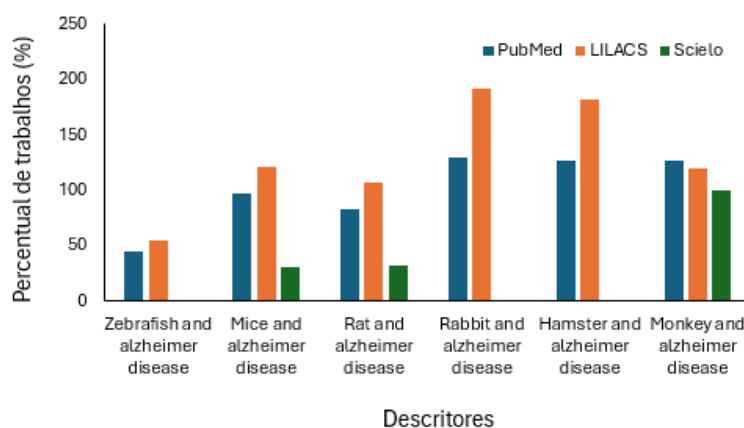
**Table 12**

*Number of articles related to each biomodel determined for the descriptors of Alzheimer's and Parkinson's disease*

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
<i>Zebrafish and stress</i>	3.054	6.565	13
<i>Zebrafish and depression</i>	193	326	0
<i>Zebrafish and anxiety</i>	583	1.237	4
<i>Mice and stress</i>	86.363	165.172	242
<i>Mice and depression</i>	14.770	26.841	42
<i>Mice and anxiety</i>	10.079	19.332	51
<i>Rat and stress</i>	58.896	156.066	315
<i>Rat and depression</i>	14.742	39.694	34
<i>Rat and anxiety</i>	6.943	18.394	42
<i>Rabbit and stress</i>	3.210	11.146	20
<i>Rabbit and depression</i>	1.144	4.473	4
<i>Rabbit and anxiety</i>	54	410	1
<i>Hamster and stress</i>	1.618	6.500	7
<i>Hamster and depression</i>	348	892	1
<i>Hamster and anxiety</i>	90	238	0
<i>Monkey and stress</i>	285.340	4.889	10
<i>Monkey and depression</i>	171.803	1.438	1
<i>Monkey and anxiety</i>	105.136	836	0

**Figure 15**

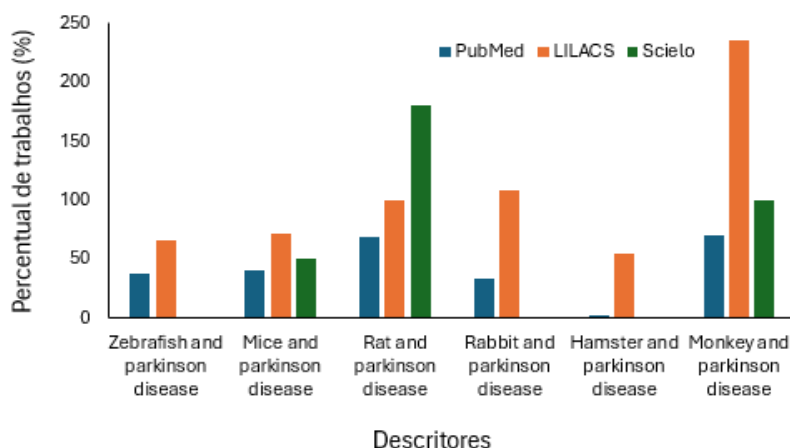
*Percentage of articles related to neurodegenerative diseases with the descriptor for Alzheimer's disease*



When we evaluated the percentage of articles related to the study of Alzheimer's disease of the total number of articles published for neurodegenerative diseases, we observed that these descriptors were quantitatively higher. On the PubMed Medline platform, the rabbit biomodel showed a higher percentage of articles published in the study of Alzheimer's disease, with 29.8% more studies than with the use of the descriptor neurodegenerative disease. The hamster biomodel showed a percentage of 25% more articles published when compared to the descriptor neurodegenerative disease, the same value was for non-human primates. On the LILACS platform, the rabbit biomodel showed 90% more articles published than those found with the descriptor neurodegenerative diseases, and the hamster biomodel had 81% of articles published above the descriptor neurodegenerative disease (Figure 16).

**Figure 16**

Percentage of articles related to neurodegenerative disease with the descriptor for Parkinson's disease



In the percentage of articles published, the LILACS platform showed 134% of articles published in the study of Parkinson's disease for the non-human primate biomodel when compared to the total number of neurodegenerative diseases, followed by 8% of published articles, a value above the total number of articles published for neurodegenerative diseases. The Scielo platform for the rat biomodel presented a percentage of 80% of articles published in the study of Parkinson's disease, above the total number of articles published for neurodegenerative diseases (Figure 17).

**Table 13**

Number of articles for each biomodel in relation to behavior types

Descriptors	Jobs No.		
	PubMed	LILACS	Scielo
Zebrafish and viral diseases	302	560	0
Zebrafish and bacterial diseases	930	743	3
Zebrafish and parasitic diseases	71	30	1
Mice and viral diseases	44.531	32.076	8
Mice and bacterial diseases	44.138	20.194	13
Mice and parasitic diseases	17.029	3.284	20
Rat and viral diseases	4.703	10.639	2
Rat and bacterial diseases	6.060	6.324	5
Rat and parasitic diseases	2.237	1.229	1
Rabbit and viral diseases	3.396	9.385	1
Rabbit and bacterial diseases	5.371	3.474	2
Rabbit and parasitic diseases	1.300	475	0
Hamster and viral diseases	4.028	3.055	0
Hamster and bacterial diseases	1.165	769	0
Hamster and parasitic diseases	990	265	0
Monkey and viral diseases	581.922	7.412	1

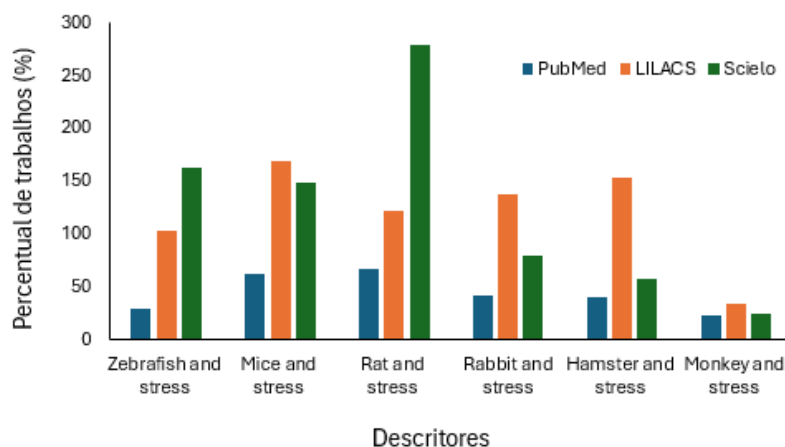
<i>Monkey and bacterial diseases</i>	278.982	1.361	0
<i>Monkey and parasitic diseases</i>	81.943	442	2

Regarding the number of articles published related to the types of behavior with the descriptors for stress, depression or anxiety, we observed in the PubMed Medline platform the largest number of articles published in the non-human primate biomodel, presenting 285,340 articles published related to the study of stress, 171,803 articles published related to the study of depression and 105,136 articles published when related to the study of anxiety. On the LILACS platform, the study of stress in the mouse biomodel presented 165,172 published articles and for the rat biomodel 156,066 articles published in the stress study. In this platform, the rat biomodel also presented a greater number of articles published in the study of depression with 39,694 articles published, however the mouse biomodel in relation to the study of anxiety presented the largest number of articles published with 19,332 articles published related to the study of anxiety. The Scielo platform presented a reduced number of published articles when compared to the other two platforms. In this platform, the rat biomodel in the study of stress presented a higher number of articles published with 315 articles published, followed by the mouse biomodel with 242 articles published related to the study of stress in the Scielo platform.

In relation to the percentage of articles published relative to the total number of articles published for the study of behavior, the stress descriptor presented a higher number of articles published than when the behavior descriptor was used in the LILACS and Scielo platforms. In the LILACS platform for the mouse biomodel, it presented a higher number of published articles than the behavior descriptor: about 69% more articles published. The hamster biomodel presented a 52% higher number for the study of stress when compared to the simple study of behavior. The rabbit biomodel had about 37% more articles published related to stress when compared to the term behavior. The rat biomodel, on the other hand, presented 20.1% more published articles related to the study of stress when compared to the behavior descriptor. On the Scielo platform, the rat biomodel had 178% more published articles related to the study of stress when compared to the simple descriptor for behavior. The zebrafish biomodel comes next with the highest number of articles published with about 62% more articles published when compared to the simple descriptor for behavior. The mouse biomodel presented 49% more published articles related to the study of stress when compared to the behavior descriptor (Figure 17).

**Figure 17**

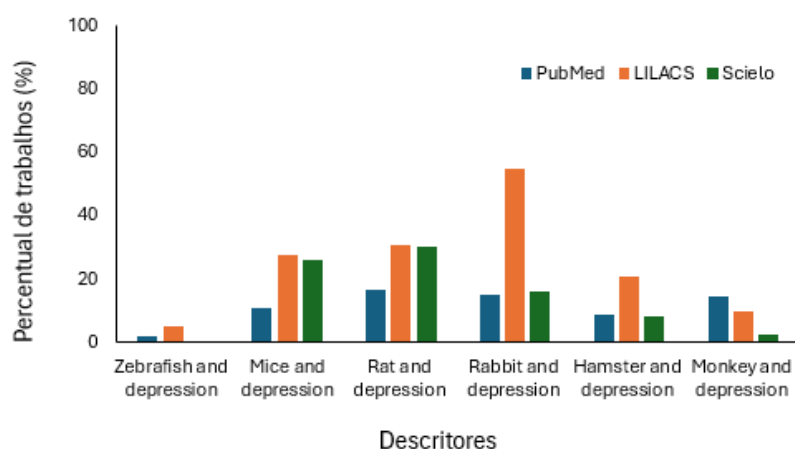
*Percentage of articles related to behavior with the descriptor for stress*



In the study of depression, the percentage values of published articles were within the total number of articles published in the study of behavioral changes. The LILACS platform was the one with the highest percentage of published articles when compared to the behavior descriptor. The rabbit biomodel presented 55% of the articles related to behavior directed to the study of depression. The rat biomodel, on the other hand, presented 30.9% of the published articles related to the study of depression of the total number of the study of behavior. The mouse biomodel presented 27.5% of the percentage of articles published in the study of depression relative to the total number of articles published for the behavior. Finally, the hamster biomodel presented a percentage of 20.9% of articles published related to depression when compared to the total number of articles published for the study of behavior. On the Scielo platform, the rat biomodel presented 30% of the published articles related to the study of depression when compared to the behavior descriptor. As for the mouse biomodel, it presented a percentage of 25.9% of published articles related to the study of depression when compared to the total number of articles published in the study of behavioral changes (Figure 18).

**Figure 18**

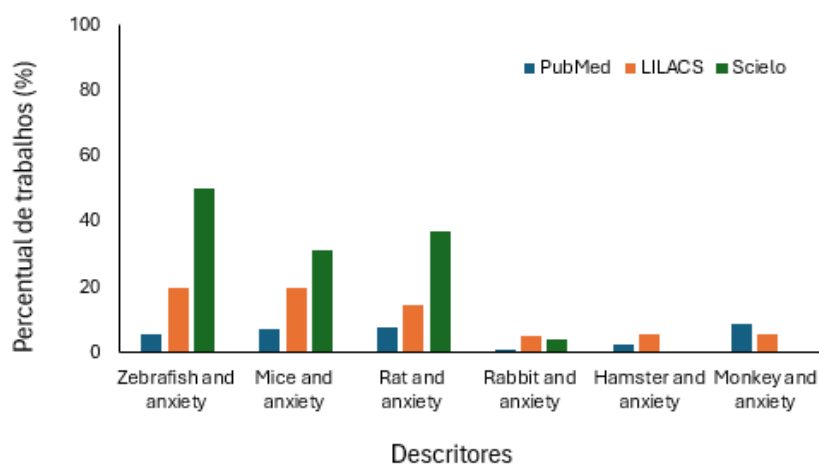
*Percentage of articles related to behavior with the descriptor for depression*



The percentage of published articles related to the study of anxiety, when compared to the total number of articles published related to behavioral changes, presented the highest percentage of articles published for each biomodel on the Scielo platform. For the zebrafish biomodel, the percentage of articles published in the anxiety study was 50%, for the rat biomodel it was 37% of articles published when compared to the total number of articles published using the descriptor for behavior. Followed by the mouse biomodel with 30% of published articles related to the study of anxiety when compared to the total number of articles published for the behavior descriptor. On the LILACS platform, the mouse biomodel presented 19.8% of published articles related to the anxiety study when compared to the total number of articles published for behavior changes, followed by the zebrafish biomodel with 19% of published articles related to the study of anxiety when compared to the total values of the simple behavior study (Figure 19).

**Figure 19**

*Percentage of articles related to behavior with the descriptor for anxiety*



**Table 14**

*Number of articles for each biomodel in relation to the types of infections*

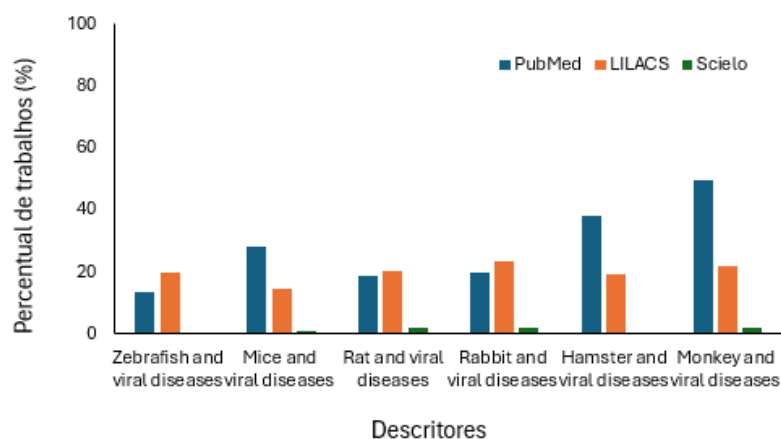
Descriptors	Highest number of Papers		
	PubMed	LILACS	Scielo
<i>Zebrafish and tumour</i>	X	-	-
<i>Mice and tumour</i>	X	-	-
<i>Rat and tumour</i>	X	-	-
<i>Rabbit and tumour</i>	X	-	-
<i>Hamster and tumour</i>	X	-	-
<i>Monkey and tumour</i>	X	-	-

When we typify infections for viral, bacterial or parasite-promoted origin, we again observed that the non-human primate biomodel has the largest number of articles published on the PubMed Medline platform, presenting 581,922 articles published related to viral infections, 278,982 articles published related to bacterial infections, and 81,943 articles published for infections promoted by parasites. The second biomodel with the highest number of articles published on the PubMed Medline platform was the mouse with 44,531 articles published for viral infections, 44,138 articles published related to the study of bacterial infections, and 17,029 when related to infections promoted by parasites. On the LILACS platform, the zebrafish biomodel presented a higher number of published articles related to viral infections, with 560 articles published. Therefore, the rat biomodel presented the largest number of articles published for the study of viral infections with about 10,639 articles published and the rabbit biomodel with 9,385 articles published for the study of viral infections on the LILACS platform. The Scielo platform presented a small number of articles published on the various types of infections.

Regarding the percentage of articles published related to the study of viral infections, the non-human primate biomodel presented 49.4% of articles published in relation to the total number of articles published with the descriptor infection. Followed by the hamster biomodel, which presented 38.2% of published articles related to the study of viral infections when compared to the total number of publications related to the study of infections. Finally, the mouse biomodel, which presented 27.9% of articles published for the study of viral infections, when compared to the total number of articles published related to the study of infections. On the LILACS platform, the rabbit biomodel was the one that presented the highest percentage of articles published for the study of viral infections, with 23.3% of the total articles published for the study of infections. Followed by the non-human primate biomodel, with 21.8% of published articles related to the study of viral infections, out of the total number of articles published for the study of infections. Finally, the rat biomodel, which presented about 20.1% of the percentage of articles published for the study of viral infections of the total number of articles published in the study of infections.

**Figure 20**

*Percentage of infection-related studies with the descriptor for viral infection*

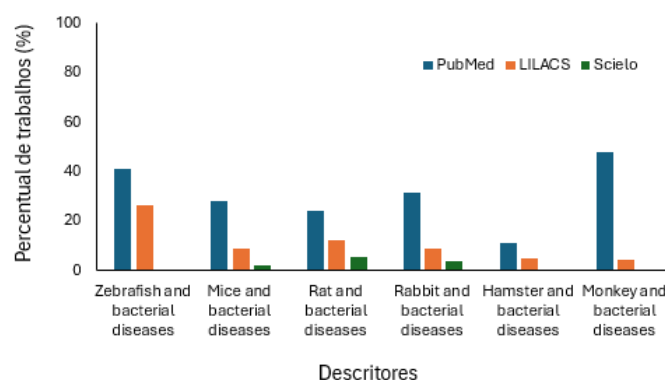


When we evaluate the percentage of published articles related to the study of bacterial infections, the non-human primate biomodel is the biomodel with the highest percentage of articles published, with about 47.9% of articles published in relation to the total number of articles published for the study of infections on the PubMed Medline platform. On this platform, the zebrafish biomodel had the second highest percentage of articles published with about 40.7% of articles published related to bacterial infections of the total number of articles published in the study of infections. Followed by the rabbit biomodel with 31.5% of

published articles related to the study of bacterial infections of the total number of articles published in the study of infections. On the LILACS platform, the zebrafish biomodel is the biomodel that presents the highest percentage of articles published in the study of bacterial diseases, with 26.1% of articles published related to bacterial infections of the total number of articles published in the study of infections by this biomodel. In second place in the percentage of published articles is the rat biomodel, with 11.9% of articles published in the study of bacterial infections when compared to the total number of articles published in the study of infections.

**Figure 21**

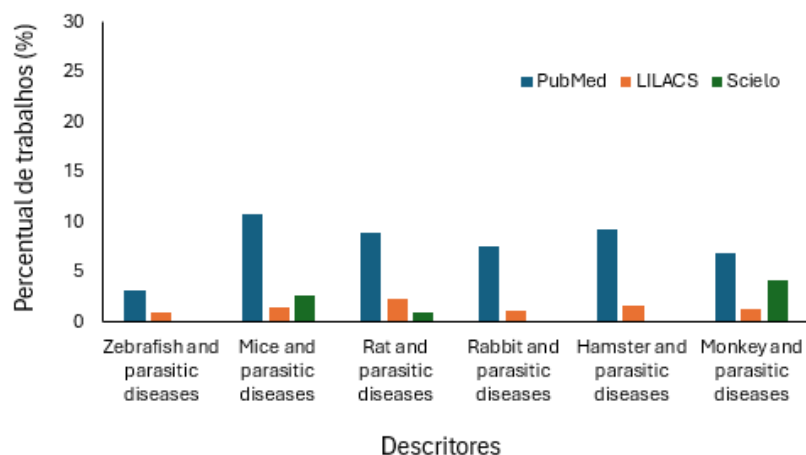
*Percentage of articles related to infections with the descriptor for bacterial infection*



The percentage of articles published in relation to the study of parasitic infections showed that in the PubMed Medline platform, the mouse biomodel presented the highest percentage with about 10.7% of articles published related to the study of parasitic infections when compared to the total number of articles published in the study of infections. This biomodel was followed by the hamster biomodel with 9.3% of the articles published in the study of parasitic infections in relation to the total number of articles published for the study of infections. Finally, the rat biomodel presented a percentage of 8.9% of articles published related to the study of parasitic infection in relation to the total number of articles published for the study of infections. On the LILACS platform, the percentage of articles published in the study of parasitic infections was reduced by about 1 to 2% in all biomodels when compared to the total number of articles published in the study of infections.

**Figure 22**

*Percentage of studies related to infections with the descriptor for parasitic disease*



## 2 CONCLUSIONS

On the PubMed Medline platform, the biomodel with the highest number of articles published was the non-human primate biomodel, with 6. 485.11 articles published. The second biomodel with the highest number of published articles is the mouse, and the LILACS platform is where it has the largest number of published articles, with about 2,174,90 articles published. The same occurs for the other biomodels with 1,899,40 articles published for the rat biomodel, 407,129 for the rabbit biomodel and 139,885 articles published. The Scielo platform has a reduced number of published articles when compared to the other two platforms (Table 15).

**Table 15**

*Platform with the largest number of articles published for each biomodel*

Descriptors	Highest number of Papers		
	PubMed	LILACS	Scielo
<i>Zebrafish and tumour</i>	X	-	-
<i>Mice and tumour</i>	X	-	-
<i>Rat and tumour</i>	X	-	-
<i>Rabbit and tumour</i>	X	-	-
<i>Hamster and tumour</i>	X	-	-
<i>Monkey and tumour</i>	X	-	-

Regarding the study of cancer, the platform that presents the largest number of published articles is the PubMed Medline platform, with 1,349,87 articles published for the non-human primate biomodel, 268,652 published articles related to the study of cancer in

the mouse biomodel. Consequently, the mouse biomodel with 58,720 articles published in the cancer study on the PubMed Medline platform (Table 16).

**Table 16**

*Platform with the highest number of articles for each biomodel in the study of cancer*

Descriptors	Highest number of Papers		
	PubMed	LILACS	SciELO
<i>Zebrafish</i>	-	X	-
<i>Mice</i>	-	X	-
<i>Rat</i>	-	X	-
<i>Rabbit</i>	-	X	-
<i>Hamster</i>	-	X	-
<i>Monkey</i>	X	-	-

In the study of cardiovascular diseases, the PubMed Medline platform again presented the largest number of articles published with 535,650 articles published for the non-human primate biomodel, 81,864 articles published for the mouse biomodel, and 67,031 articles published in relation to the study of cardiovascular diseases (Table 17).

**Table 17**

*Platform with the highest number of articles for each biomodel in the study of cardiovascular diseases*

Descriptors	Highest number of Papers		
	PubMed	LILACS	SciELO
<i>Zebrafish and cardiovascular</i>	X	-	-
<i>Mice and cardiovascular</i>	X	-	-
<i>Rat and cardiovascular</i>	X	-	-
<i>Rabbit and cardiovascular</i>	X	-	-
<i>Hamster and cardiovascular</i>	X	-	-
<i>Monkey and cardiovascular</i>	X	-	-

Regarding the study of immune responses, the LILACS platform was the one that presented the largest number of articles published for the various biomodels, except for non-human primates. The study of immune responses presented 186,636 articles published in the mouse biomodel, 38,217 articles published in the rat biomodel, 14,186 articles published for the rabbit biomodel, 3,897 articles published for the hamster biomodel and 2,384 for the zebrafish biomodel. On the PubMed Medline platform, the non-human primate biomodel presented 264,030 articles published for the study of immune responses (Table 18).

**Table 18**

*Platform with the largest number of articles for each biomodel in the study of the immune response*

Descriptors	Highest number of Papers		
	PubMed	LILACS	SciELO
<i>Zebrafish and immune response</i>	-	X	-
<i>Mice and immune response</i>	-	X	-
<i>Rat and immune response</i>	-	X	-
<i>Rabbit and immune response</i>	-	X	-
<i>Hamster and immune response</i>	-	X	-
<i>Monkey and immune response</i>	X	-	-

The LILACS platform also presented the largest number of articles published for the study of neurodegenerative diseases in the various biomodels. The mouse biomodel was the one that presented the highest number of articles published with 30,136 articles published for the study of neurodegenerative diseases, 15,456 articles published for the rat biomodel and 1,026 articles published for the zebrafish biomodel. On the PubMed Medline platform, the non-human primate biomodel had the highest number of articles published for the study of neurodegenerative diseases, with 60,360 articles published (Table 19).

**Table 19**

*Platform with the highest number of articles published for each biomodel in the study of neurodegenerative diseases*

Descriptors	Highest number of Papers		
	PubMed	LILACS	SciELO
<i>Zebrafish and neurodegenerative</i>	-	X	-
<i>Mice and neurodegenerative</i>	-	X	-
<i>Rat and neurodegenerative</i>	-	X	-
<i>Rabbit and neurodegenerative</i>	-	X	-
<i>Hamster and neurodegenerative</i>	-	X	-
<i>Monkey and neurodegenerative</i>	X	-	-

Regarding the study of behavioral alterations, PubMed Medline presented a higher number of articles published for the various biomodels, such as the non-human primate with 1,199,02 published articles, followed by the mouse model with 138,094 published articles and 10,602 articles published for the zebrafish biomodel. However, the LILACS platform in the study of behavioral changes presented 128,369 published articles related to the rat biomodel in the study of behavioral changes, 8,123 for the rabbit biomodel and 4,255 for the hamster biomodel of articles published for the study of behavioral changes (Table 20).

**Table 20**

*Platform with the highest number of articles published for each biomodel in the study of behavior changes*

Descriptors	Highest number of Papers		
	PubMed	LILACS	SciELO
<i>Zebrafish and behavior</i>	X	-	-
<i>Mice and behavior</i>	X	-	-
<i>Rat and behavior</i>	-	X	-
<i>Rabbit and behavior</i>	-	X	-
<i>Hamster and behavior</i>	-	X	-
<i>Monkey and behavior</i>	X	-	-

In the study of infections, the LILACS platform is the platform that presents the largest number of published articles, except for non-human primates. It presented 223,275 articles published for the mouse biomodel, 52,729 articles published for the rat biomodel, 40,221 articles published for the rabbit biomodel, 15,940 articles published for the hamster biomodel, and 2,841 articles published for the zebrafish biomodel related to the study of infections (Table 21).

**Table 21**

*Platform with the highest number of articles published for each biomodel in the infection study*

Descriptors	Highest number of Papers		
	PubMed	LILACS	SciELO
<i>Zebrafish and infection</i>	-	X	-
<i>Mice and infection</i>	-	X	-
<i>Rat and infection</i>	-	X	-
<i>Rabbit and infection</i>	-	X	-
<i>Hamster and infection</i>	-	X	-
<i>Monkey and infection</i>	X	-	-

Refining the search for the various studies in the area of cancer, the PubMed Medline platform presented a greater number of published studies in all the biomodels studied. In the area of cardiovascular diseases, through the survey of published articles related to myocardial infarction, there was a greater number of articles published on the LILACS platform. However, for arterial hypertension, the PubMed Medline platform presented 11,973 articles published for the mouse biomodel in the respective type of study. In the study of the immune response divided by the topics of autoimmunity, inflammation and allergy, there was a variation between the two platforms: PubMed, Medline and LILACS. For the study of autoimmunity, the PubMed Medline platform produced the largest number of articles published for the zebrafish, mouse, rat, rabbit, hamster and non-human primate biomodels. For inflammation, the LILACS platform presented the largest number of articles published

for the various zebrafish, mouse, rat, rabbit and hamster biomodels. Regarding neurodegenerative diseases, the study of Alzheimer's disease and Parkinson's disease, the LILACS platform presented the largest number of articles published in the various biomodels studied. The same profile was detected for the study of behavioral changes such as stress, depression and anxiety with a greater number of articles published on the LILACS platform for the various biomodels studied. Except for non-human primates, which had a higher number of articles published on the PubMed Medline platform for all behavioral changes studied. In the study of the types of infection, we subdivide them into viral, bacterial and parasitic infections. In general, the PubMed Medline platform presented the highest number of articles published for all biomodels except viral diseases in the rat biomodel, zebrafish biomodel and rabbit biomodel, which presented the highest number of articles published in the LILACS platform.

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