

Gregory MS

Annual Review of 2022



<https://gregory-ms.com/>

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1. Foreword

by Bruno Amaral

"I am and always will be the optimist, the hoper of far-flung hopes, and the dreamer of improbable dreams."

— The Doctor, from "The Almost People"

My intention was to have this report published in February, to keep the pace that began in 2021. March comes around, and I am finally sitting down to write the foreword.

The reason for the delay is nothing practical or glamorous, it was due to personal reasons, overwork and over commitment. Follow me for a little bit, please.

In September, I came to the conclusion that my current job was not serving me, or showing me a path to a better career. This, and the worsening of MS symptoms, was enough to make me resign to avoid burnout.

Gregory became my full time job for a little while, after which I decided to establish my own company, with nothing else than a first client who believed in me.

The Lisbon Collective was formed, and Gregory is now the company's single open source project. And because Gregory can tackle any field of research, we now call it Gregory AI.

The current implementation for Multiple Sclerosis is then kept separate on Gregory-MS, and the Lisbon Collective will ensure that it keeps running.

From this, comes a need to show exactly how much comes from donations to the MS project and how much comes from the company. With that in mind, I am looking into setting up a non profit organisation here in Portugal.

And in regards to Gregory AI, it will stay as an Open Source project. I am keeping the code under my GitHub account because making the software free and available to everyone is my own personal commitment. Right now it uses a CC0 1.0 Universal license and I don't see any reason why that should ever change.

Ideally, I even hope more companies will join in to make it grow. That growth of the project will have to be steered by me and António Lopes to ensure we don't lose focus or end up with a software too focused on a particular disease or area of research.

António stays in the background, but each of his contributions has a roaring impact. He helped with the initial Machine Learning algorithm and recently with the ability to extract key takeaways from the abstracts.

More details on this will follow.

I'm happy with all that we accomplished so far, and my gratitude to those who helped us get here could fill oceans.

I have a few ideas on how this project can break more communication barriers and help researchers. Consider this an invitation to keep following what's going on and to reach out if you would like to have a chat.

— Bruno

2. About this report

This document is published by the team that manages <https://gregory-ms.com/> and whose mission is to help map out Multiple Sclerosis (MS) research and help the medical community identify new treatments faster.

The team publishes this report with the goal to be more transparent about what is done over the year, and how the whole project is managed.

With that transparency in mind, this year we have added a few supporting documents and files that can be found in the Annual Reports section of the <https://gregory-ms.com/> website.

The MS project is not to be confused with the software that can be found at <https://gregory-ai.com/>

3. About GregoryAI

2022 was the year that Gregory broke away from the focus in Multiple Sclerosis. We started using the name GregoryAI to describe it as a generic software to help all sorts of research.

We now refer to GregoryAI as a research assistant that scouts trustworthy sources in any field, indexing and filtering the results into a searchable database. Currently, Gregory is meant to be used for scientific research, empowering doctors and patients to discover new cutting-edge therapies and medications. But this is just the first of Gregory's many potential applications — from news feeds to industry research, Gregory is fully customisable to your interests and needs.

Not only does Gregory remove duplicates and standardise titles and abstracts, the information it collects can be further broken down according to any keywords. Then, RSS, API, and email integrations allows for teams to get updates based on levels of interest or preferred categories. Gregory also connects seamlessly to Metabase, allowing users to create data visualization dashboards, or plug Gregory's results into their existing websites or mobile apps.

Gregory is open-source and will always be free to use.

The current implementation is focused on Multiple Sclerosis research and depends on donations to stay up and running at <https://gregory-ms.com/>

GregoryAI is developed by the Lisbon Collective, a company set up by Bruno Amaral for his consultancy. The company is also the main sponsor, making sure that donations cover the server costs, and putting some of it's resources into publicising the initiative.

With that in mind, the Lisbon Collective created <https://gregory-ai.com/> a website with all the Open Source documentation needed for others to download and install GregoryAI on their own server and for their own purpose.

4. Software maturity

Being an Open Source project, all of the development can be seen on GitHub: <https://github.com/brunoamaral/gregory>

On the previous Annual Review we had put forward 4 items for the roadmap.

1. Inform of related clinical trials
2. Allow everyone to browse and analyse the database
3. Track acceptance of new therapies and drugs
4. Help researchers optimize their efforts

These items are still open because we found a number of other opportunities to make Gregory easier to install, configure, and use.

There were 14 new releases in 2022 that translated into a whole redesign of the code. Let's highlight a few and their importance for Multiple Sclerosis and other research areas.

Gregory is more flexible

We broke Gregory into separate parts and moved the [Gregory-MS.com](https://gregory-ms.com) website to it's own software. This allows us to install a plain version of GregoryAI and configure it to a specific field research. We're no longer limited to MS research.

Our other efforts focused on the amount of information the software can hold, and in making sure that the data follows a pipeline to ensure quality. There are now two different ways to add journal articles to the database, via the RSS Reader configuration and through an Application Protocol Interface (API).

This API allows developers to extend the sources of information. It also allows displaying the information in any number of ways, whether in mobile apps or websites, and of course via Email.

Current list of features

- Machine Learning prediction of relevant content
- Key takeaways extracted using Artificial Intelligence
- Configure RSS feeds to gather search results for any keyword
- Configure searches on any public website, not just medical publications
- Set up automatic email notifications
- Manage and segment subscribers
- Public API to fetch the articles and clinical trials. This allows an integration with mobile apps, websites, and other kinds of software
- Private API to allow internal and external stakeholders to add content to the database. This allows integrating any other source of information.
- Automatic identification of articles under open access using unpaywall.org
- Fills in any missing information from science papers using crossref.org
- Customise your own categories to get personalised search results
- Breakdown broader subjects into different segments

5. What we have learned in 2022

We are still hoping to see the medical community step forward to be more involved with GregoryMS. It would be helpful to have help validating that the Machine Learning algorithm is accurate and the key takeaways extracted using AI are precise.

Either way, some things are clear. Promoting myelin production, halting the disease, and regenerating the nervous system are paramount goals. Looking back, we were able to manually identify 81 papers.

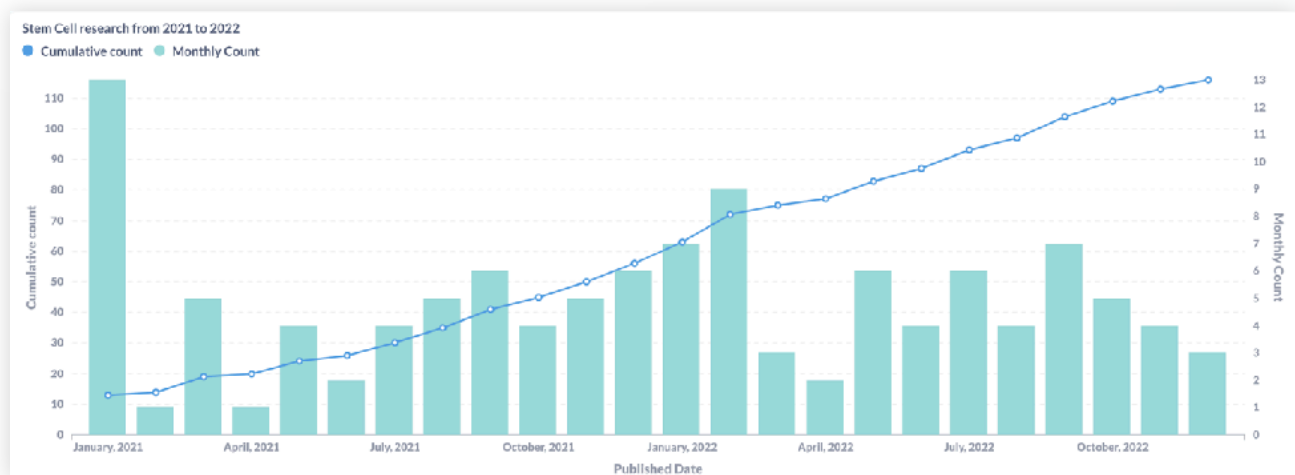
The list below is a manual collection and does not reflect any kind of suggestion for treatment. It was not selected by a person with medical training of any kind.

TABLE 1

	article_id	Title	DOI
1	935312	Melatonin ameliorates disease severity in a mouse model of multiple sclerosis by modulating the kyn	10.1038/s41598-022-20164-0
2	930748	Stemazole Promotes Oligodendrocyte Precursor Cell Survival In Vitro and Remyelination In Vivo	10.3390/ijms231810756
3	925708	Pregabalin mitigates microglial activation and neuronal injury by inhibiting HMGB1 signaling pathw	10.1186/s12974-022-02596-7
4	902425	Bu Shen Yi Sui Capsule Promotes Myelin Repair by Modulating the Transformation of A1/A2 Reactive	10.1155/2022/3800004
5	895430	Pseudocorine chloride ameliorates Th17 cell-mediated central nervous system autoimmunity by re	10.1080/13880209.2022.2063344
6	869114	High-efficiency brain-targeted intranasal delivery of BDNF mediated by engineered exosomes to pro	10.1039/d2bm00518b
7	869056	Promoting remyelination: A case study in regenerative medicine	10.1016/j.cbpa.2022.102201
8	862076	The effect of Zingiber Officinale Extract on Preventing Demyelination of Corpus Callosum in a Rat M	10.52547/ibj.2979
9	856335	Suppressive Effect of Fruiting Bodies of Medicinal Mushrooms on Demyelination and Motor Dysfunc	10.1615/IntJMedMushrooms.2022044840
10	850968	Ginsenoside Rg1 promotes remyelination and functional recovery in demyelinating disease by enhar	10.1016/j.phymed.2022.154309
11	850965	The landscape of targets and lead molecules for remyelination	10.1038/s41589-022-01115-2
12	846157	Anemoside B4 ameliorates experimental autoimmune encephalomyelitis in mice by modulating inf	10.1016/j.ejphar.2022.175185
13	840196	GABAB receptor agonist baclofen promotes central nervous system remyelination	10.1002/glia.24262
14	837749	Ursolic Acid Enhances Myelin Repair in Adult Mice Brains and Stimulates Exhausted Oligodendrocyt	10.1007/s12031-022-02059-x
15	831890	Total astragalosides promote oligodendrocyte precursor cell differentiation and enhance remyelinat	10.1016/j.jep.2022.115622
16	824741	Myelin repair is fostered by the corticosteroid medrysone specifically acting on astroglial subpopulat	10.1016/j.jbiom.2022.104204
17	823476	Non-invasive brain stimulation in rehabilitation	10.5606/tftrd.2022.10608
18	822313	Nebivolol elicits a neuroprotective effect in the cuprizone model of multiple sclerosis in mice: emph	10.1007/s10787-022-01045-4
19	769418	Inhibition of astrocytic DRD2 suppresses CNS inflammation in an animal model of multiple sclerosis	10.1084/jem.20210998
20	751509	CCR1 antagonist J-113863 corrects the imbalance of pro- and anti-inflammatory cytokines in a SJL/J r	10.1016/j.jmbio.2022.152245

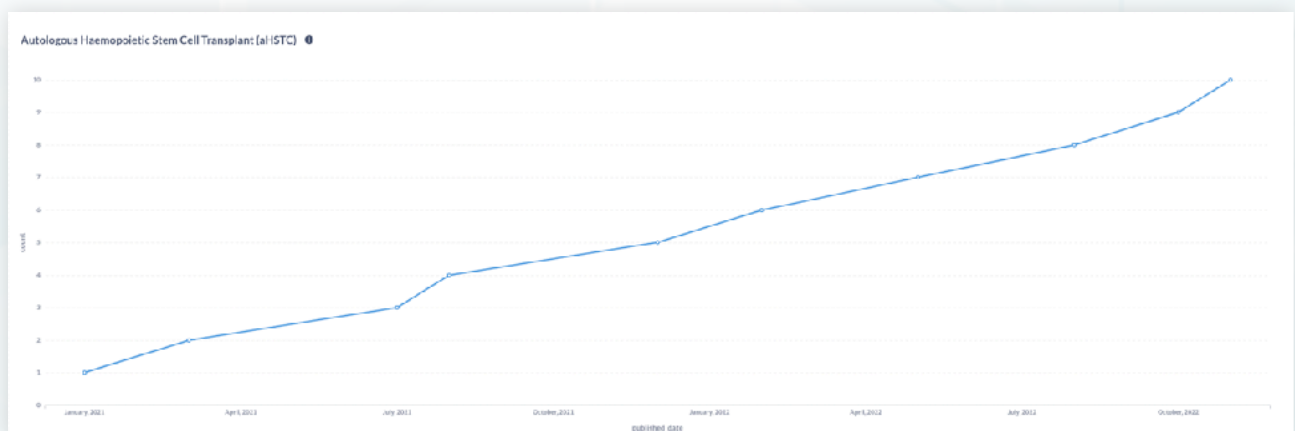
Table 1. Possible promoters of myelin. **Source:** Possible promoters of Myelin production.xlsx

Stem cells are one of the areas being explored for new treatments. With 116 articles published between 2021 and 2022



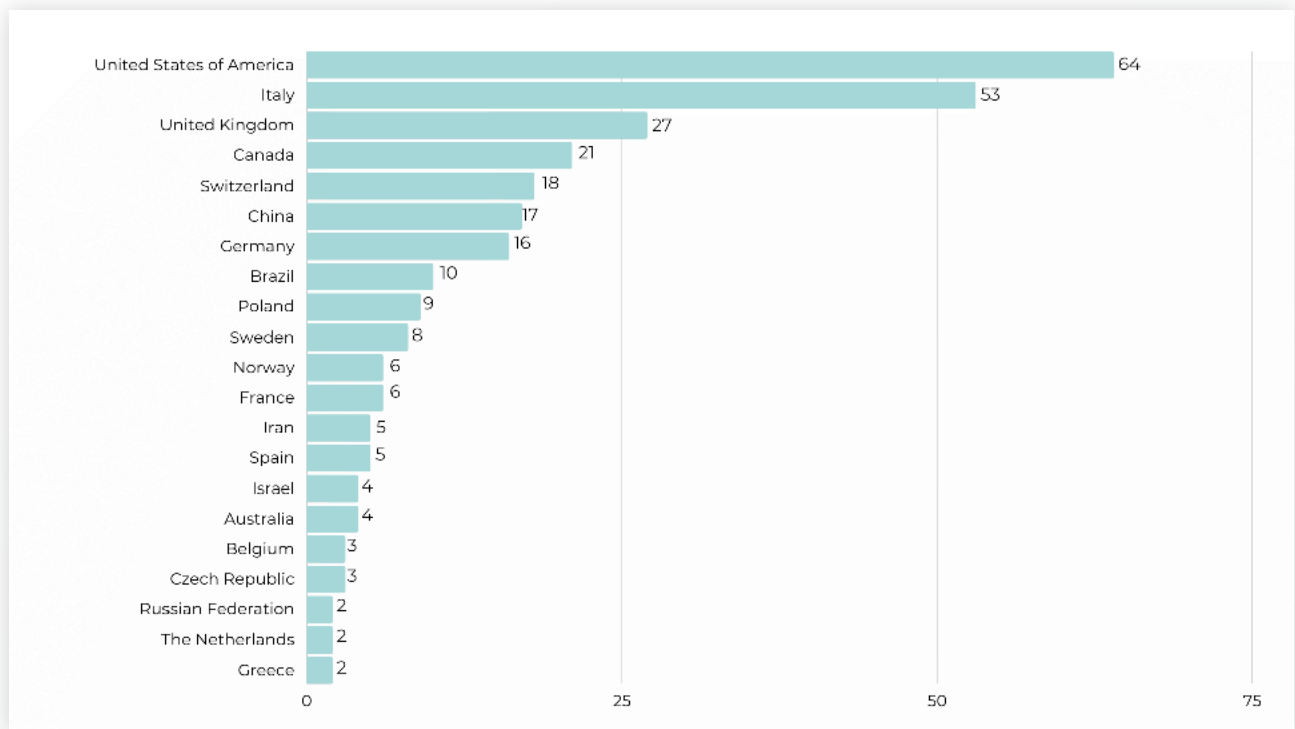
Source for the chart: <https://metabase.gregory-ms.com/public/dashboard/0156d01e-c7f5-498f-90a4-e771a2d62493>

Within the area of stem cells, there is also a growing interest around the Autologous Haemopoietic Stem Cell Transplant (aHSTC).



Source data for the chart: <https://metabase.gregory-ms.com/public/question/6979938f-85d1-4161-9c07-34403823fb4e>

But which countries are exploring this treatment? We investigated where the 285 different authors were based and came up with this list of countries and the number of authors there.



Source file: 01. Authors with published research on aHSCT.xlsx

6. Conferences and Academic Research

This project relies on academic and clinical research, and is fact a tool to assist it.

In 2022, António Lopes and me wrote an article titled “[A machine learning approach for mapping and accelerating multiple sclerosis research](#)” where we explain the inner workings of Gregory’s Machine Learning.

Information on this paper is also available at [ISCTE’s website](#).

Costs for participation in the conference, where the paper was presented, were incurred by the Lisbon Collective and are not listed in the accounts for the MS project.

Fórum Saúde XXI

After an invitation by the organising team, Bruno participated in the Fórum Saúde XXI that took place April 30th, in Aveiro.

Information on the event can be found at [Fórum Saúde XXI website](#).

All costs were supported by the Lisbon Collective.

Participating in the event was only possible thanks to the help of Artur Ventura, Luís Amaral, and Pedro Pinheiro who helped overcome unexpected obstacles.

And a special thank you goes to Andrea Lima, from the organising team, for believing in us.

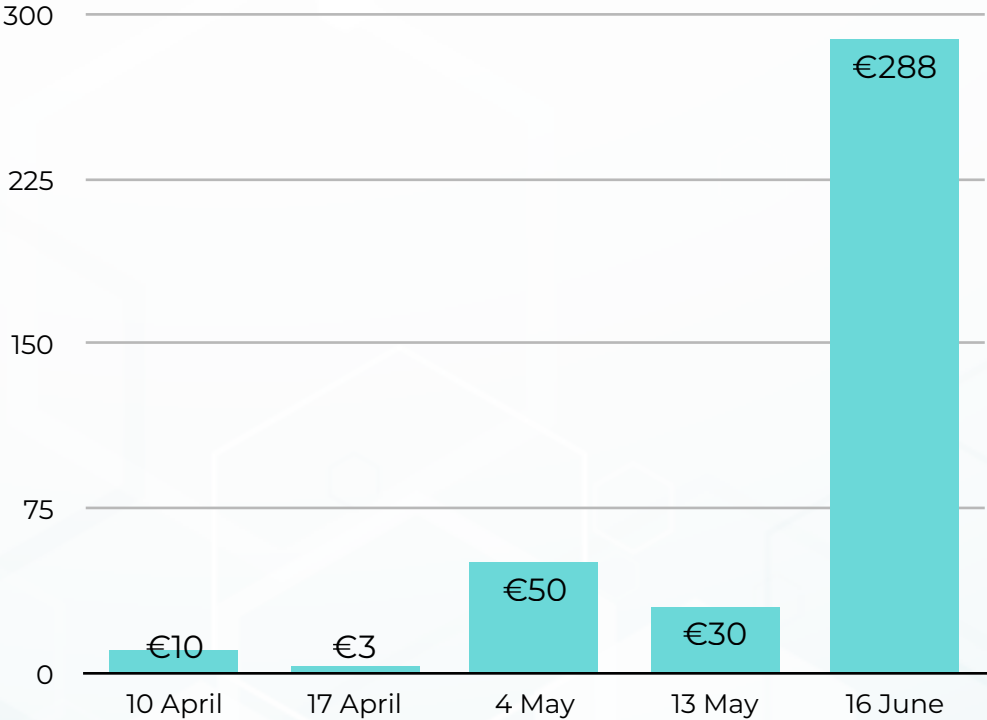


[Presentation slides](#)

7. Accounts

Donations

In April we opened the options to send donations from the website, using the Ko-Fi service. As a result, the project gained 381€ in donations.



Expenses

Our initial estimate for expenses in 2022 was 262.90€ but our final sum was 312.57€, putting us 49.67€ over budget. Our current balance is 68.43€ and it will be used to pay for server costs and domain only.

We had unexpected server costs due to the need to store backups and even full snapshots of the server from July to December. We eventually removed the snapshots in order to bring the costs down.

Invoices for expenses				
Name	Category	#	Cost in USD	Cost in euro
Digital Ocean - Jan22	server		\$24.00	€22.56
Digital Ocean - Feb22	server		\$24.00	€22.56
Digital Ocean - Mar22	server		\$24.00	€22.56
Digital Ocean - Apr22	server		\$24.00	€22.56
Digital Ocean - May22	server		\$24.00	€22.56
Digital Ocean - June22	server		\$24.43	€22.96
Digital Ocean - July22	server		\$26.33	€24.75
Digital Ocean - August22	server		\$31.59	€29.69
Digital Ocean - September22	server		\$31.59	€29.69
Digital Ocean - October22	server		\$31.59	€29.69
Digital Ocean - November22	server		\$29.62	€27.84
Digital Ocean - December22	server		\$28.80	€27.07
Cloudflare - January22	domain		\$8.57	€8.06
			SUM \$332.52	SUM €312.57

Table 2. Expenses

8. The Team

The team began with Bruno and António. Soon after, Margarida joined and raised the bar for what we communicate. In the beginning of 2023, Inês Carvalho found us and volunteered to help the project grow.

António Lopes

António is a programmer who has dedicated most of his professional life to researching, designing and developing systems in all kinds of environments, from desktop and mobile, to physical computing. He's been involved in researching and working with Artificial Intelligence since the year 2000, and in the past couple of years has focused his attention on AI usage and development. After knowing Bruno for over a decade, they started working together on a way to automate Gregory and turn it into a tool anyone could use.



Find out more of what António has been working on at antoniolopes.info and on LinkedIn <https://www.linkedin.com/in/alopes/>

Margarida Gomes

Margarida is a designer and the newest member of the Gregory team. She studied Industrial Design at IADE — Creative University, but nowadays she applies those same design principles to different areas of the discipline, including graphic design for social media.

Margarida is passionate about arts and crafts, and also travel, as she's been a solo traveler since 2014.

Check out more of Margarida's work on her LinkedIn profile <https://www.linkedin.com/in/margaridagomesfreelancer/>



Inês Carvalho

Inês is a recent addition to the Public Relations (PR) field of communication. She graduated in PR and Business Communication and as already created an online store for indoor plants and worked in marketing for one of Portugal's largest supplement brands. In her free time, Inês is learning German and learning nutrition. She recently joined Lares Online as a Strategic Content Manager. She joined the team after meeting Bruno in the School of Communication and Media Studies. With a keen interest in Artificial Intelligence and a desire to create positive change, Inês eagerly contributes her unique blend of skills, creativity, and passion to make a lasting impact on the projects she undertakes.

Check out what Inês is doing on her LinkedIn profile <https://www.linkedin.com/in/ipcarvalho/>



Bruno Amaral


Bruno is a Digital Strategist who works bridging the gap between tech and communication. He founded and works at the Lisbon Collective, and is a teacher, both in Lisbon University's Masters Course of Communication and Digital Strategy, and Public Relations at the School of Communication and Media Studies, also in Lisbon.

Bruno was diagnosed with Multiple Sclerosis in 2019 and is using tech to help improve quality of life for himself and others suffering with MS.

You can see what Bruno has been working on at brunoamaral.eu and on LinkedIn <https://www.linkedin.com/in/brunoamaral/>





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