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EuroGCT, D2-2: Research community hub, a report on dissemination and uptake of information produced in WP4 via the EuroGCT online research and regulatory community hub

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Deliverable Report

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Project acronym: EuroGCT

***Project title: European Consortium for Communicating
Gene and Cell Therapy Information***

Deliverable: D2.2 Research community hub

***Report on dissemination and uptake of information produced in
WP4 via the EuroGCT online research and regulatory community
hub***

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List of acronyms

ATMP: Advanced Therapy Medicinal Products

EuroGCT: The European Consortium for Communicating Gene and Cell Therapy Information

IMHT: The EuroGCT Information Management Hub Team, comprised of project staff employed directly by the project, based at the University of Edinburgh (UEDIN) and Aix-Marseille University (AMU)

WP: Work Package

D2.2 Report on dissemination and uptake of information produced in WP4 via the EuroGCT online research and regulatory community hub

EuroGCT WP4 develops an information hub for the research and regulatory communities that facilitates access of these communities to information on the practical steps needed for cell and gene-based therapy development and promotes information exchange within and between these communities. This tailored section of www.eurogct.org aims to create a 'one-stop shop' on where to seek further information and guidance relating to manufacturing guidelines, regulatory requirements, intellectual property rights, market acceptability and ethical matters related to advanced therapies development.

Report D2.2 summarises the activities performed regarding the dissemination and uptake of information produced in WP4 between month 12 (since the launch of the new website) and month 30.

1. Establishment and updating of the Research Pathways Hub, an interactive database

The EuroGCT online research and regulatory community hub, named 'Research Pathways', contains a set of information resources on the practical steps needed for cell and gene therapy development. This resource set can be viewed online at www.eurogct.org/research-pathways, and is outlined in Deliverable 4.2 - Resources on practical steps, and detailed in D4.1 - Landscape mapping.

The Research Pathways hub contains information on practical steps needed for cell and gene therapy development, and includes information resources developed by the EuroGCT consortium plus signposting to external information resources. The current database is built on the initial information published by this project (see deliverable D4.9), new content developed by EuroGCT during the current reporting period, and signposting to additional collated resources. Content within Research Pathways will be continuously updated throughout the project duration.

In the last reporting period, the EuroGCT IMHT carried out a review of user experience of the Research Pathways Hub. Based on the outcome of the review, in months 18-30 we have updated the section's design from a hierarchical structure to a database model, which gives improved searchability and usability. The improvement is further enhanced by carefully designed taxonomies used for tagging, new search and filter functions, which also link to grouped topical sections outlined as follows:

- **Key Research Pathways:** this section contains the collection of resources developed by EuroGCT WP4.
- **Key Pathway Resources:** this section contains collated key resources on ATMP development by medicines agencies, and existing complementary work produced by other organisations.
- **Case Studies:** this new section contains case studies on ATMP development, and provides storylines for readers to walk through the resources in the Research Pathways database.
- **Patient and Public Involvement:** this links to the ATMP Engage Patient and Public Involvement (PPI) Directory, a searchable and filterable directory with PPI resources for developers of cell and gene therapies.

- **Actors and Networks:** this section contains our initial mapping of stakeholders in ATMP development in Europe and beyond.

Users can freely interact with the database by choosing to narrow down their searches with keywords or filters. They can also utilise the Research Pathway as a gateway to the topic-based sections and to look for resources within. We anticipate the improved searchability and usability resulting from the above work will greatly enhance the user's experience in search and navigation within the section, and in turn will improve engagement.

2. Summary of Dissemination Activities

Besides establishing the EuroGCT website and the 'Research Pathways' section within it, the EuroGCT Consortium has actively disseminated outputs of the project via event attendance, presentations (online and in-person), posters, and networking activities.

Because the content in the Research Pathways section is tailored toward experts, we have not prioritised dissemination through social media channels in WP4. Instead, we have focused on reaching WP4 target audiences directly in meetings and networking events for dissemination and engagement activities. The activities performed between months 12 and 30 are summarised below:

2.1 Events

Table 1 lists all events EuroGCT has attended during this reporting period. Entries highlighted in blue are those at which we presented posters or gave an oral presentation. Entries highlighted in green are events hosted by EuroGCT/University of Edinburgh. Please see D2.2 Annex for the posters and abstracts submitted within this reporting period.

Date / Place	Host	Theme
28-29 July 2022, 2022 International Mammalian Synthetic Biology Workshop, Edinburgh, UK	American Institute of Chemical Engineers (AIChE)	Synthetic biology research, emphasizing both basic and applied science.
10 Oct 2022, Edinburgh, UK	University of Edinburgh	EuroGCT Sharing best practice workshop
11-14 October 2022, ESGCT 29 th Annual Congress, Edinburgh, UK	European Society of Gene and Cell Therapy in collaboration with British Society for Gene and Cell Therapy	Gene and Cell Therapy – oral presentation and poster presentations A EuroGCT kiosk: for in-person engagement with conference attendees, raising awareness about the project recruiting Network of Expertise members and translators.
31 October 2022, CGEM Away Day, Edinburgh, UK	Centre for Genomics and Experimental Medicine (CGEM), The University of Edinburgh	Recent advancements in gene therapy research
07-08 Nov 2022, London, UK	University College London	Regulatory Science for Advanced (Gene and Cell) Therapies short courses

9-12 November 2022, 15 th European Public Health Conference, Berlin, Germany	European Public Health Conference Foundation	Strengthening health systems: improving population health and being prepared for the unexpected
13 December 2022, Brussels, Belgium	European Commission	Biosimilar medicines: multistakeholder event
25 January 2023, online	EU Health Governance Research Network	Webinar EU Pharmaceutical Activity: Challenges arising from the Pharmaceutical Strategy and Beyond
07 Feb 2023, Edinburgh, UK	University of Edinburgh Centre for Regenerative Medicine (CRM)	CRM internal seminar
17-18 April 2023, Copenhagen, Denmark	University of Edinburgh, ReNEW and the University of Copenhagen	Generative AI and Gene and Cell Therapy Information Workshop
13 April 2023, Marseille, France	GT 3M (Maladies rares, Mutation, Méditerranée)	Séminaire interdisciplinaire essais cliniques
23-26 April 2023, Paris, France, 49 th Annual Meeting of the European Society for Blood and Marrow Transplantation	European Society for Blood and Marrow Transplantation	Key issues relating to HSCT and cellular therapy research
27-28 April 2023, Langen, Germany	DG-GT (Deutsche Gesellschaft für Gentherapie) / Paul-Ehrlich-Institut	The Next Frontiers in ATMP Development
11 May 2023, Online event	TESaCo (technologies émergentes et sagesse collective)	Biotechnologies : quelle sagesse collective ? CRISPR-Cas9 Genome Editing
22 May 2023, Online event	TESaCo (technologies émergentes et sagesse collective)	Biotechnologies: quelle sagesse collective? Novel forms of life: organoids
26 May 2023, online	T2Evolve	ATBX Spotlight Sessions
31 May-3 June 2023, Paris, France, Annual meeting of the International Society for Gene and Cell Therapy	International Society for Gene and Cell Therapy	Celebrating the progress of Advanced Therapies and building the Future through translations
7 June, 2023, Edinburgh, UK	Institute for Regeneration and Repair at University of Edinburgh	Catapult UK Edinburgh Launch
14 June 2023, Edinburgh, UK	University of Edinburgh	Science Communication workshop for graduate students
14 June 2023, Compiègne, France	ITEGOREC	Innovations technologiques et greffe d'organes : enjeux réglementaires, éthiques et culturels (organoïdes)
23 June 2023	Faculty of Law- Maynooth, Ireland	Meeting of the OUP Online Encyclopaedia of European Union Law: Evolving EU health law following the Covid-19 pandemic
27 July-31 July 2023, University of Tübingen, Germany	CIVIS Blended Intensive Programme	The science, ethics and governance of human genome editing
6-7 July 2023, Toulouse, France	École d'été 2023 de la Chaire UNESCO Éthique, Science et Société	Approches éthiques et juridiques de la vérité en science

Table 1. List of EuroGCT attended events. Entries highlighted in **blue** are those at which we presented posters or gave an oral presentation. Entries highlighted in **green** are events hosted by EuroGCT/University of Edinburgh.

2.2 List of oral communications and posters

Event	Oral communication / Poster
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2022 International Mammalian Synthetic Biology Workshop (mSBW), 28-29 July 2022, Edinburgh, UK	1 poster: C. Blackburn, J. Lorigan, A. Waite, A. Couturier, H.-Y. Kuo, Communicating reliable and accessible information about gene and cell therapy
2022 EuroGCT Sharing best practice workshop, 10 Oct 2022, Edinburgh, UK	2 Oral presentations: <ul style="list-style-type: none"> - A. Waite and F. Willingham, Partnering with patients—Case study on ATMP Engage PPIE Working Group - A. Waite and A. Couturier, Working together as the EuroGCT partnership
European Society for Gene & Cell Therapy Congress 2022, 11-14 October 2022, Edinburgh, UK	Oral presentation: Z. Ivics, Advances in Sleeping Beauty transposon-based therapeutic cell engineering Oral presentation: A. Waite, A. Couturier, Public engagement and communicating about gene and cell therapy Introductory session 1 poster: A. DELAGE, L.-S. GILBERT, H.-Y. KUO, J. LORIGAN, C. BLACKBURN, A. COUTURIER, A. WAITE, A. MAHALATCHIMY, Bringing gene and cell therapies from lab to patients: the EuroGCT research pathways
15th European Public Health Conference, 9-12 November 2022, Berlin, Germany	Oral communication: A. MAHALATCHIMY, The pandemic Treaty from an EU law perspective, roundtable on “Access, equity and the relevance of the Pandemic Treaty: lessons from the COVID-19 response” organized by Elena PETELOS
EU Health Governance Research Network seminar series, Panel discussion / webinar on “EU Pharmaceutical Activity: Challenges Arising From The Pharmaceutical Strategy And Beyond”, 25 January 2023, online	Oral communication: A. MAHALATCHIMY and E. GENNET, Towards an inclusive and equitable pharmaceutical strategy for the EU
University of Edinburgh Centre for Regenerative Medicine (CRM) internal seminar, 07 Feb 2023, Edinburgh, UK	Oral presentation: , J. Lorigan and H.-Y. Kuo, Get involved in communicating about gene and cell therapy
Generative AI and Gene and Cell Therapy Information Workshop, 17 April 2023, Copenhagen, Denmark	Oral communication: A. Couturier, Roundtable on “New developments in online marketing & information search: how should the stem cell community respond?”
GT 3M- Séminaire “Essais cliniques” 13 April 2023 Marseille, France	Oral communication: A. MAHALATCHIMY, Les spécificités réglementaires des essais cliniques pour les médicaments innovants
European Society for Blood and Marrow Transplant 49th annual meeting, 23-26 April 2023, Paris, France	1 poster: A. DELAGE, L.-S. GILBERT, H.-Y. KUO, J. LORIGAN, C. BLACKBURN, A. COUTURIER, A. WAITE, A. MAHALATCHIMY, Finding out the regulatory requirements for the development of Gene and Cell therapy products with the EuroGCT research pathways
German Society for Gene Therapy (DG-GT) and Paul-Ehrlich-Institut (PEI) Conference: "The next frontiers in ATMP development", 27-28 April 2023, Langen, Germany	Oral presentation: A. Couturier, The EuroGCT Consortium: Meeting the information needs of all stakeholders in cell and gene therapy
TESaCo Colloquium on “Biotechnologies: towards collective wisdom”, “New forms of life: how should organoids be regulated?”, 22nd May 2023, online	Oral communication: A. MAHALATCHIMY, Challenges for the implementation of the current EU legal frameworks to organoids
T2Evolve ATBX Spotlight Sessions 26 May 2023, online	Oral presentation: J. Lorigan, The EuroGCT Consortium: sharing reliable information about cell and gene therapy

<p>International Society for Cell & Gene Therapy, 2023 Paris Annual Meeting, 31 May - 3 June 2023, Paris, France</p>	<p>2 oral communications:</p> <ul style="list-style-type: none"> - A. MAHALATCHIMY, Roundtable on “Regulatory Revolution: Global Harmonization for Safe Personalized Medicines” - A. MAHALATCHIMY, Roundtable on “COVID-19 Hangover: How do we Regain the Trust in Research?” <p>2 posters:</p> <ul style="list-style-type: none"> - A. MAHALATCHIMY, L.-S. GILBERT, A. DELAGE, O. NEGRE, The Marketing Authorisation of Advanced Therapy Medicinal Products in the European Union - A. MAHALATCHIMY, V. BRUNEL, Which actors to influence the adoption of EU guidelines for Advanced Therapy Medicinal Products?
<p>Journée d'étude ITEGOREC- 14 June 2023 Compiègne, France</p>	<p>Oral communication: A. BOTTACCI et A. MAHALATCHIMY, Quel futur pour le cadre juridique des tissus et des organes destinés à la transplantation ? Le cas des organoïdes</p>
<p>University of Edinburgh Science Communication workshop for graduate students, 14 June 2023, Edinburgh, UK</p>	<p>Oral presentation: J. Lorigan EuroGCT: sharing reliable information about cell and gene therapy</p>
<p>EU Health Law Seminar “Evolving EU health law following the Covid-19 pandemic”, Faculty of Law, 23 June 2023, Maynooth, Ireland</p>	<p>A. MAHALATCHIMY, Update on contributions on EU law on medicines (including on ATMPs)</p>
<p>CIVIS Blended Intensive Programme: The science, ethics, and governance of human genome editing, 27-31 July 2023, University of Tübingen, Germany</p>	<p>3 lectures:</p> <ul style="list-style-type: none"> - A. MAHALATCHIMY, The fragmented regulatory landscape on human genome editing, Virtual Session 6, 5th July 2023 - A. MAHALATCHIMY, Human genome editing for research & EU Law, 29 July 2023 - A. MAHALATCHIMY, Human genome editing for therapy & EU Law, 29 July 2023

Table 2. List of EuroGCT oral presentations and posters.

2.3 Additional events

- Recurring online meetings:
 - International Society for Stem Cell Research (ISSCR) Education Committee (Dr. Anna Couturier, standing member)
 - EuroGCT Industry Working Group Meeting (Inaugural Meeting June 26, 2023)
 - ATMP Engage Working Group (co-led by NHS England and NHS Improvement and Genetic Alliance UK)
 - ATMP Engage Equity of Access working group meetings
 - Genetic Alliance UK ATMPs and Equity roundtable discussion
 - ESGCT-EuroGCT meetings for collaborating on EuroGCT programmes during 2023 ESGCT Congress
- EuroGCT partners meeting and Newsletter:
 - Online meetings held for Management group and General Committee according to grant agreement
 - Monthly newsletters for disseminating progresses made within the EuroGCT network

3. Uptake

The uptake of information produced in WP4 via the EuroGCT online research and regulatory community hub can be demonstrated by inquiries we received on collaborations, collaborations in discussion or formed, and website traffic stats.

3.1 Collaboration formed and/or currently in discussion:

- 1) **GetRadi** - The GetRadi collaboration is a Europe-wide project aimed at advancing gene therapy for rare diseases. With a focus on addressing technical challenges in the field, GetRadi trains 10 PhD students to become experts in gene therapy for rare diseases. EuroGCT, as a key partner in the collaboration, contributes by providing training in digital engagement to these students during the GetRadi Summer School. Additionally, EuroGCT serves as the platform for disseminating GetRadi digital engagement projects, fostering the development of impactful resources and also supporting young researchers.
- 2) **ATMP Engage** is a collaboration in which EuroGCT is a central partner. ATMP Engage brings together UK-based stakeholders with an interest in ATMPs to discuss and collaborate on Patient and Public Involvement (PPI) activity. The output of this collaboration is the “ATMP Engage PPI Directory” (www.eurogct.org/ppi-directory), a searchable and filterable directory with PPI resources for developers of cell and gene therapies, hosted on the EuroGCT website.
- 3) Established a collaboration with Canada and USA on legal aspects through the project “**Law, Public Policy and Social License for Next-Generation Regenerative Medicine**”, funded by the Canadian Stem Cell Network (2022-2025) led by Prof Amy Zarzeczny. A. Mahalatchimy is participating in this project as a EuroGCT partner and legal scholar.
- 4) Interest and inquiries received from Genetically Modified Organisms national authorities. Contacts with GMO national authorities were established, and this has resulted in a regulatory workshop '**GMO-based ATMPs**' planned for the 2023 ESGCT Congress.
- 5) **CARTALLEU project**: A team at the Hospital Clinic Barcelona running a CAR-T therapy clinical trial have expressly requested to collaborate with us on co-developing educational resources about CAR-T clinical trials. In addition, their CAR-T product has been selected as the first of the five EMA pilot programme participants. Through this collaboration, we aim to co-develop learning resources for the researcher and developer community to learn and leverage from the team's experience in navigating the regulatory approval process in EU, and how they interact with regulators in EMA's pilot programme.
- 6) **T2Evolve**: this project working on accelerating development and increasing awareness and access to cancer immunotherapy has reached out to us for collaborations.
- 7) Our relationship with The Committee for Advanced Therapies (CAT) at EMA has strengthened as a result of ESGCT 2022 and ISCT 2023 dissemination activities. EuroGCT is currently working on a proposal for a regulatory workshop at EMA in late 2024 with support from EMA/CAT.

- 8) Attracted one law assistant professor from the Netherlands to come for a 3-months research stay at AMU to learn about ATMP regulations and to provide support on the organisation of a EuroGCT workshop at EMA.
- 9) Contacts and proposals for collaborations with the Alliance for Regenerative Medicine (ARM) and the International Society for Cell & Gene Therapy (ISCT) established after poster presentations and roundtable discussions at ISCT 2023.
- 10) Established an online collaboration: A. Mahalatchimy is working on an ATMP regulation entry for an online Encyclopaedia about "European Union Law" edited by Oxford University Press.
- 11) Received request to co-develop resources—an ATMP development Case Study on Libmeldy. EuroGCT WP4 is currently working together with Orchard Therapeutics on co-developing a case study an EMA-approved Gene therapy medicinal product (GTMP), Libmeldy, for the researcher and developer community to learn about its development process.
- 12) **ISSCR Education Committee:** EuroGCT has a long standing position on the ISSCR's Education Committee. This includes providing editorial oversight of the ISSCR Patient Handbook (A. Couturier, C. Blackburn). In November 2023, EuroGCT will run a communications seminar for all ISSCR members. Additionally, EuroGCT is planned to be involved in the public engagement and regulatory outreach for the ISSCR Annual Conference to be held in Hamburg, 2024.
- 13) **ESGCT:** EuroGCT has built collaborations with ESGCT to expand its support of European Gene and Cell Therapy researchers. This includes leading public engagement and regulatory support for the ESGCT Annual Congress – 2023 (Brussels) and collaborating with ESGCT on a heatmap of gene and cell therapy centres.

3.2 Collaboration inquiries received:

- 1) COST Action HaploIPS (Generation of Human Induced Pluripotent Stem Cells From Haplo-selected Cord Blood Samples)
- 2) Collaboration with the Human Gene Therapy Journal on providing lay abstract of key papers published in this journal

3.3 Website traffic

Complementary to direct engagement, the establishment of the EuroGCT online research and regulatory community hub, Research Pathways, broadens our dissemination actions and makes these outputs accessible to everyone, independent of their geographical location.

We note that the Research Pathways section produced by WP4 contains information that is mainly targeted toward experts and to a less extent, informed non-experts. The expert groups represent a small fraction of the total online population, and the likelihood of attracting online traffic that is at a comparable scale to our public-facing counterpart is low. Thus, reporting merely on the absolute visitor count is not suitable for evaluating the information uptake among these groups and the resulting impact. In this section, we

discuss and report the use of additional metrics to better assess our digital outreach, as well as information uptake by our target audience.

EuroGCT's effort on tracking webpage traffic is described in detail in D2.4. Briefly, we have made a conscious effort to focus on strict user privacy considerations, which results in challenges for reporting. For reporting uptake for WP4 content, we track passive user engagement using Fathom Analytics and Google Search Console. We will report webpage traffic using data drawn from Fathom Analytics; we will report on search rankings and top query terms using data drawn from Google Search Console. Based on Fathom Analytics, the top accessed WP4 pages and their unique visitor counts, and total views between website launch and 15 July 2023 are summarised in the Table 3 and ranked by total views:

Based on Fathom Analytics, the unique visitor counts and total views for the top accessed WP4 pages between website launch and 15 July 2023 are summarised in Table 3 and ranked by total views.

Webpage	Visitors	Total Views
eurogct.org/ (EuroGCT main landing page)	8.1k	11.5k
eurogct.org/research-pathways	1k	2.4k
eurogct.org/atmp-ppi-database	267	1.6k
eurogct.org/atmp-engage	666	1k
eurogct.org/ppi-directory	391	701
eurogct.org/key-pathway-resources	215	508
eurogct.org/research-pathways/research-and-innovation	261	439
eurogct.org/research-pathways/manufacturing/manufacturing-authorisation	316	401
eurogct.org/research-pathways/manufacturing/packaging-and-labelling	248	298

Table 3. Top accessed WP4 pages and their unique visitor counts, and total views between 1 Feb 2022 (website launch) and 15 July 2023

The entry highlighted in grey is the main EuroGCT landing page, included here for benchmarking purpose. The three entries highlighted in blue refer to the same suite of information, the ATMP Engage Public and Patient Involvement Directory. The two entries highlighted in green are EuroGCT original resource pages.

Below we report and discuss features and user characteristics captured for three major types of pages in the Research Pathways information hub: 1) directory search pages, 2) topical pages, and 3) individual resource page.

- 1) **Directory search pages**, including Research Pathways and ATMP Engage PPI Directory:

The pages containing directories received total views that are 2-6 times higher than their unique visitor number. This is distinct from the public-facing resource pages (WP3) where the views and unique visitor number are near 1:1 (see D2.4). This observation suggests that these directory pages have started to be used as a reference page for certain user groups as a standing resource for regular re-visit and to look up resources. This suggestion is further supported by Fathom Analytic's

referrer record for these WP4 pages being largely Direct/Unknown and not redirected from search engines (see Figure 1 and 2). A referrer is the site a visitor was previously on before they were redirected to our site. The EuroGCT site's average bounce rate, defined as the percentage of visitors who enter the site and then leave, is 74%. A significantly lower bounce rate (36% for 'Research Pathways' and 54% for 'ATMP Engage PPI Directory') is recorded for these directory search pages (see Figure 1 and 2). This translates to 64% and 46% of users respectively, who remain on our site and continue to browse content on our website after landing at this page.

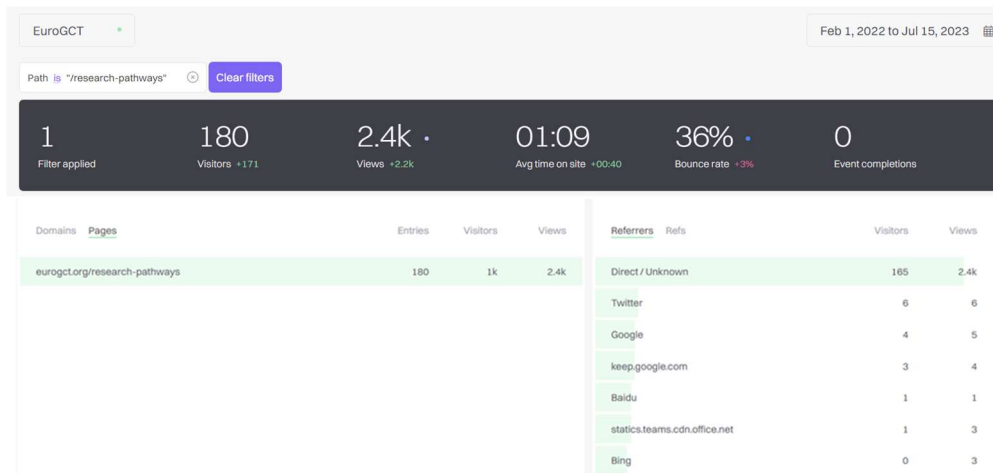


Figure 1. Webpage stats for the 'Research Pathways' directory search page. Main referrers are not search engines. A low bounce rate (36%) is recorded. Reported from Fathom Analytics between website launch and 15 July 2023.

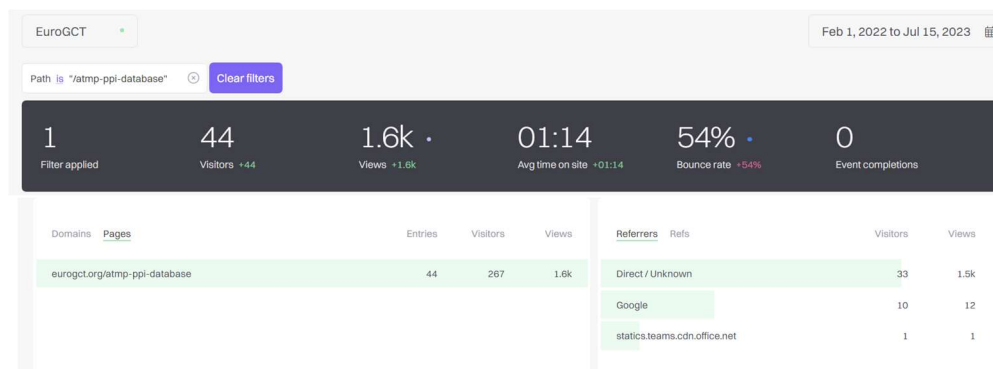


Figure 2. Webpage stats for the 'ATMP Engage PPI Directory' search page. Main referrers are not search engines. A low bounce rate (54%) is recorded. Reported from Fathom Analytics between website launch and 15 July 2023.

2) Topical pages:

Topical pages such as the 'Key Pathways Resources' page contain handpicked key resources on ATMP development and categorised by themes. For this type of page, the referrers are about 1:1 for search engines and Direct/unknown. A slightly lower bounce rate (62%) is recorded in Fathom Analytics (see Figure 3) indicating 38% of users remain on the site and continue to browse content.

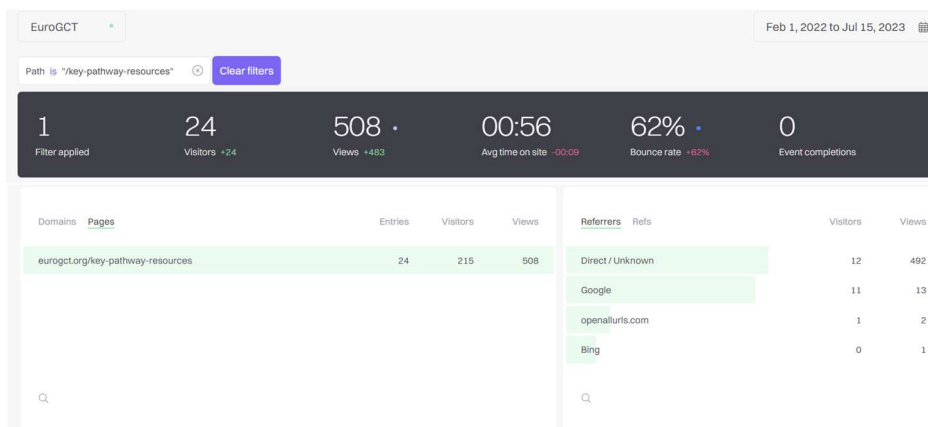


Figure 3. Webpage stats for the ‘Key Pathways Resources’ topical page containing handpicked key resources at ATMP development. Referrers are about 1:1 for search engines and Direct/unknown. A lower bounce rate (62%) is recorded. Record in Fathom Analytics between website launch and 15 July 2023.

3) Individual resources, including in-house resources and external resources:

Resources including ‘Packaging and labelling’ and ‘Manufacturing authorisation’ developed by the EuroGCT consortium are mostly accessed through organic searches as shown in Fathom Analytics (see Figure 4 for the stats of the ‘Manufacturing authorisation’ page as an example).

These pages appear in top 20 search results in Google using relevant query terms, and more often, are ranked within top 5 using exact search terms. (see Figure 5 for the stats of the ‘Manufacturing authorisation’ page as an example). The click-through rate (CTR) for these top-ranked search results are also significantly higher. For the case of ‘Manufacturing authorisation’ page, the CTR can often reach 10% when similar query terms are used in searches (see Figure 5). The CTR for this page averages 4.3%, significantly higher compared to the 1% for the entire EuroGCT site.

We have also recorded a significantly longer retention time for these EuroGCT original resource pages. For the ‘Packaging and Labelling’ and ‘Manufacturing authorisation’ and page, the average retention time is 4:10 and 4:13 minutes (see Figure 4), respectively. This is 2.5 times longer than the averaged 1:41 minutes for the entire site, indicating users are really reading and learning from these resources we created and published.

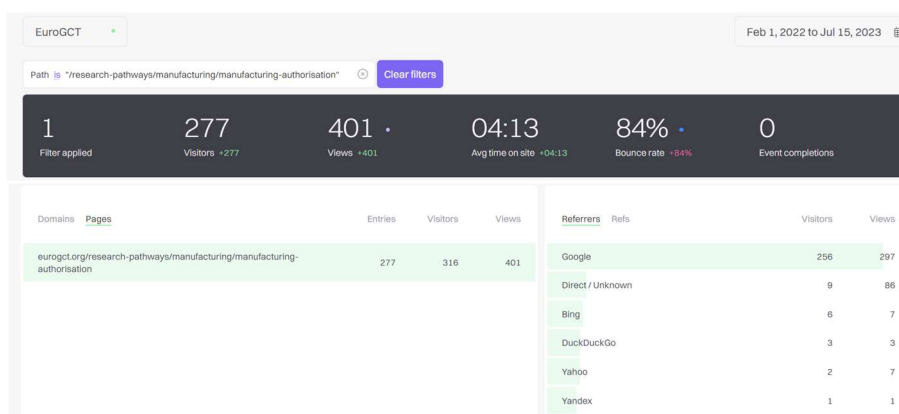


Figure 4. Webpage stats for the ‘Manufacturing Authorisation’ page. Main referrers is Google. Average time on site is 4:13 minutes. Record in Fathom Analytics between website launch and 15 July 2023.

QUERIES	PAGES	COUNTRIES	DEVICES	SEARCH APPEARANCE	DATES		
Top pages							
				↓ Clicks	Impressions	CTR	Position
https://www.eurogct.org/research-pathways/manufacturing/manufacturing-authorisation				286	6,640	4.3%	19.2

QUERIES	PAGES	COUNTRIES	DEVICES	SEARCH APPEARANCE	DATES		
Top queries							
				↓ Clicks	Impressions	CTR	Position
manufacturing authorization				25	243	10.3%	3.2
manufacturing authorisation				20	227	8.8%	3.8
manufacturing authorisation holder				6	84	7.1%	3.8
manufacturing authorization holder				4	128	3.1%	7.2
manufacturers authorisation				3	75	4%	2.4
manufacturing authority				1	88	1.1%	18.1
manufacturing authorization certificate				1	9	11.1%	7.8

Figure 5. Webpage stats (top) for ‘Manufacturing Authorisation’ page and the list of top query terms (bottom). Recorded by Google console between website launch and 15 July 2023.

In D2.4, we have reported our observation on a distinct user profile for WP3 and WP4 content. Here we report that the indicators that reflect information uptake vary depending on the nature of the webpage: for directory search pages, the total views to visitor ratio tends to be higher and bounce rate is significantly lower; for individual resource pages the ratio is closer to 1:1 with a bounce rate representative of the site’s bounce rate; topical pages sit in between the two types. We have also recorded the significantly longer user retention time for original resources produced by the EuroGCT consortium. We will continue to monitor website information uptake, and use these data to shape future reporting metrics and audience engagement strategies.

Research Pathways has a worldwide reach. Figure 6 shows that the Research Pathways pages have been accessed by users from countries beyond EU and UK. These countries include the US, Taiwan, India and China. This demonstrates that while the information regarding medicine legislation, regulation, and access is EU-specific, other Research Pathways resources have been utilised by communities outside of our target audience and can be useful irrespective of their geographical location.

Countries	Visitors
United Kingdom	74
France	39
United States of America	16
Taiwan, Republic of China	9
Luxembourg	7

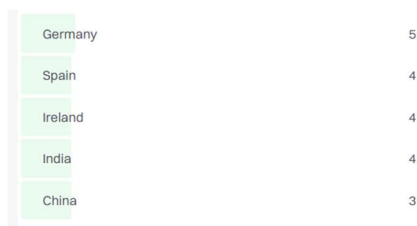


Figure 6. 'Research Pathways' page accesses listed by country recorded by Fathom analytics between website launch and 15 July

4. Conclusion and future work

Activities on disseminating WP4 outputs include establishing and updating the EuroGCT website, event attendance, presentations (both online and in-person), posters, and networking activities. The Research Pathways section, the output of WP4, contains information mainly targeted toward experts. We have mainly focussed on in-person and online events that allows direct interaction with these WP4 target audiences. Our direct engagement at meetings and networking events is effective and has resulted in a number of inquiries, collaborations in discussion and formed.

Complementary to direct engagement, the establishment of the EuroGCT online research and regulatory community hub, Research Pathways, has broadened our dissemination actions and made this work accessible to audience in the EU, UK, and worldwide. It also serves audiences beyond our targeted expert audience groups, giving an impact that will be beyond traditional academic publishing. We anticipate the improved search-ability and usability in the Research Pathways will greatly enhance user's experience and their learning when reading the resources within the section. The new content type 'Case Studies' could attract interest and opportunities for collaboration, from both inside and outside of the consortium.

As for website traffic, reporting merely on the absolute visitor count is not suitable for evaluating the information uptake among the expert groups we are targeting. We need additional means and metrics including but not limited to, the user retention time, bounce rate, and the views to visitor ratio to reflect the information uptake. We will continue to monitor and evaluate these metrics, then use this information to feed into future reporting as well as to shape our audience engagement strategies.

5. List of Annexes

Annex 1. Abstracts and posters list from February 2022 to July 2023

EuroGCT

Annex 1. to Deliverable D.2.2

Abstracts and posters list from February 2022 to July 2023

Abstracts for the European Society for Gene & Cell Therapy Congress 2022

11-14 October 2022, Edinburgh, the UK

<https://www.esgctcongress.com/>

Title: Bringing gene and cell therapies from lab to patients: the EuroGCT research pathways

Auxane Delage,¹ Luc-Sylvain Gilbert,² Hsin-Yu Kuo,³ Jennifer Lorigan,⁴ Clare Blackburn,⁵ Anna Couturier,⁶ Amanda Waite,⁷ Aurélie Mahalatchimy⁸

Bringing gene and cell therapies from lab to patients raises many challenges from the development of these therapies to patient access. Therapy development has to comply with many regulatory requirements, some being binding, other being guidance only, in order to primarily ensure patients' safety. These requirements have been established throughout the life cycle of these therapies from fundamental research to post-administration vigilance, through manufacturing, clinical trials, marketing authorisation, patentability, or pricing & reimbursement. While the majority are governed by European Union law, several aspects remain regulated at national levels. The legal classification of these therapies also leads to different regulatory pathways. Therefore, their development is not only complex scientifically, it is also complex regarding their regulatory landscape, which is made up of a combination of general and specific rules and guidance depending on competent institutions (e.g. EU and Member States regulatory agencies or health technology assessment bodies), types of products, and steps of their developments. To address this complexity, the European Consortium for Communicating Gene and Cell Therapy Information (EuroGCT), is building an online tool to provide research pathways' information, that will be presented in this poster, to facilitate better decision-making at key points in development of new therapies and thus

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Abstract published in *Human Gene Therapy*, Volume: 33, Issue 23-24: December 14, 2022, A1-A212. <http://doi.org/10.1089/hum.2022.29225.abstracts>

**Poster submitted to the European Society for Gene & Cell Therapy
Congress 2022
11-14 October 2022, Edinburgh, UK**

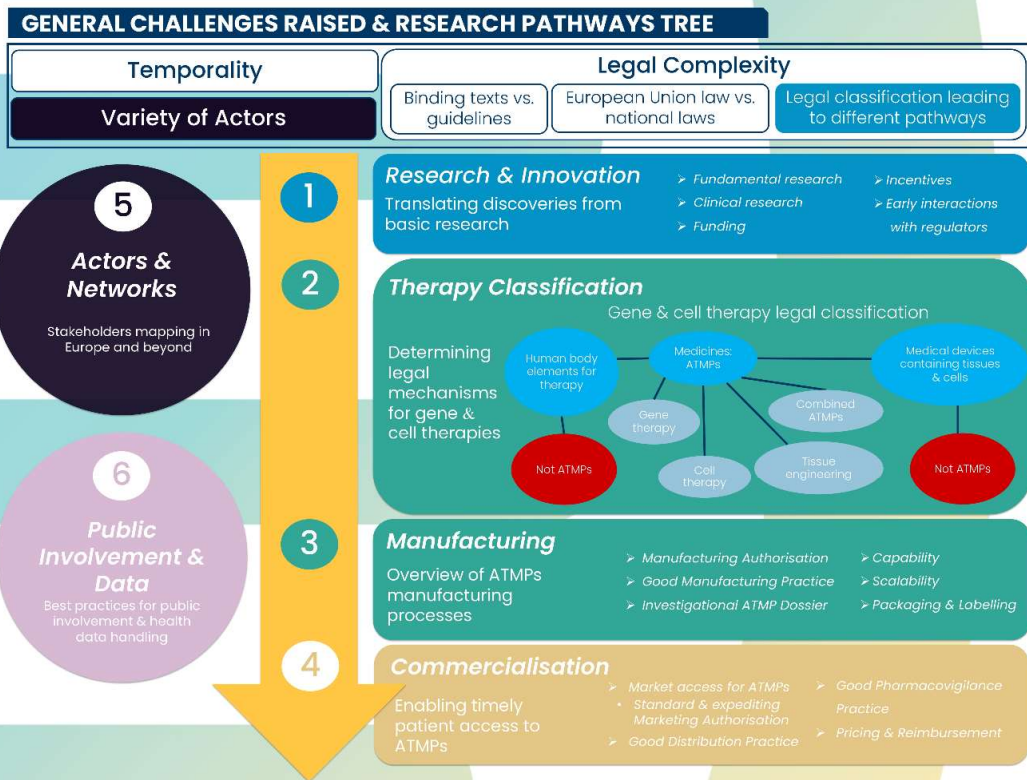


**Bringing gene and cell therapies from lab to patients:
the EuroGCT research pathways**

Auxane Delage¹, Luc-Sylvain Gilbert², Hsin-Yu Kuo³, Jennifer Lorigan⁴, Clare Blackburn⁵, Anna Couturier⁶, Amanda Waite⁷, Aurélie Mahalatchimy⁸

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INTRODUCTION & AIM	METHODOLOGY
<p>Bringing gene and cell therapies from lab to patients raises challenges from the development of these therapies to patient access. Therapy development must comply with many regulatory requirements in order to ensure patient safety. These requirements have been established throughout the life cycle of these therapies from fundamental research to post-administration vigilance, through manufacturing, clinical trials, marketing authorisation, patentability, or pricing & reimbursement.</p> <p>The EuroGCT website aims to provide accessible and reliable information on therapy development and regulatory pathways.</p>	<ul style="list-style-type: none"> Legal and scientific watch Collection and organisation of ATMPs legal acts and guidance Dissemination of information to EuroGCT partners Review of research pathways main entries drafts by partners & external collaborators



CONCLUSION	CONTRIBUTE
<p>Research Pathways content should be written in lay language and regularly updated to provide reliable and accessible information. Key content will be translated and available in seven European languages: English, French, German, Italian, Polish, Spanish, and Portuguese.</p>	<p>Contribution and participation is warmly welcome!</p> <p>Join the EuroGCT ELSI Network of Expertise:</p> <ul style="list-style-type: none"> To provide drafts content of entries To provide lay summaries of your research papers To translate existing entries To review draft entries To provide useful updated resources <p>All contributions will be credited on the EuroGCT website: www.eurogct.org To get involved in this collaborative work, please contact the EuroGCT information officers on ELSI: Auxane Delage: auxane.delage@univ-amu.fr Luc-Sylvain Gilbert: luc.gilbert@univ-amu.fr</p>

**Abstract submitted to the 49th Annual Meeting of the EBMT, 23-26 April
2023, Paris, France**

**FINDING OUT THE REGULATORY REQUIREMENTS FOR THE DEVELOPMENT OF GENE
AND CELL THERAPY PRODUCTS WITH THE EUROGCT RESEARCH PATHWAYS**

A. Delage¹, L.-S. Gilbert¹, H.-Y. Kuo², J. Lorigan², C. Blackburn², A. Couturier², A. Waite², A. Mahalatchimy^{1,3}

¹Aix-Marseille University, Aix-en-Provence, France, ²The University of Edinburgh, Edinburgh, United Kingdom, ³CNRS, Aix-en-Provence, France

Preferred Presentation Type: Poster

Topic: 31: Data Management

**Title: FINDING OUT THE REGULATORY REQUIREMENTS FOR THE DEVELOPMENT OF GENE AND CELL THERAPY PRODUCTS WITH THE
EUROGCT RESEARCH PATHWAYS**

Background: Communicating information on the regulatory framework applicable to gene and cell therapies, at every stage of development and towards every actor involved, is a challenge. Therapy development needs to comply with several regulatory requirements mostly to ensure products' and patients' safety, the complexity comes from the diversity of the regulatory frameworks. Some requirements are binding, others are guidance only. Most aspects are governed by European Union law, but some remain regulated on a national scale. The regulatory landscape is a combination of general and specific rules and guidances depending on competent institutions (e.g. EU and Member States regulatory agencies or health technology assessment bodies), types of products, and steps of their developments.

Methods: The European Consortium for Communicating Gene and Cell Therapy Information (EuroGCT) is building an online tool to provide research pathways' information. Therefore, communicating clear, precise, and accurate information in the form of a database. It will allow professionals of the field as well as patients to be informed on all regulatory aspects of the development of a Gene and Cell therapy product.

Results: Depending on the legal classification of these therapies different regulatory pathways appear, which are shown on the EuroGCT website. Becoming a "one-stop shop" for accurate legal information on the legal classification of Gene and Cell therapies from lab to patient.

Conclusions: The tool will facilitate better decision-making at key points in development of new therapies and thus enable improved product development, by providing the research community and regulatory and healthcare authorities with an information source on the practical steps needed for cell and gene therapy development.

Disclosure: Nothing to declare.

1. I confirm that the abstract and that all information is correct: Yes

2. I confirm that submission of the abstract constitutes consent to publication: Yes

3. I confirm that I submit this abstract on behalf of all authors.: Yes

4. I confirm that all contributors have provided original material: Yes

5. I understand that the Annual Meeting and the publisher reserve the right to decline publication for any reason: Yes

6. Has this abstract been previously published online or in other media (journals, other meetings)?: No

Poster submitted to the 49th Annual Meeting of the EBMT, 23-26 April 2023, Paris, France



Illustrating regulatory requirements for the development of Gene and Cell therapy products with the EuroGCT Research Pathways

Auxane Delage¹, Luc-Sylvain Gilbert², Dr. Hsin-Yu Kuo³, Jennifer Lorigan⁴, Dr. Clare Blackburn⁵, Dr. Anna Couturier⁶, Aurélie Mahalatchimy⁸

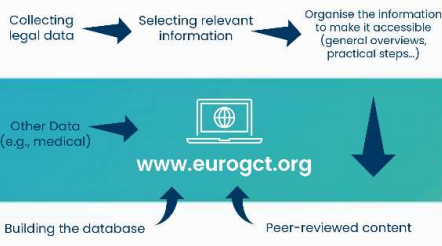
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BACKGROUND

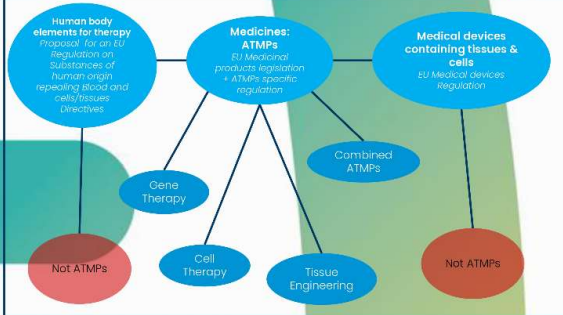
Communicating information on the regulatory framework applicable to gene and cell therapies, at every stage of development and towards every actor involved, is a challenge. Therapy development needs to comply with several regulatory requirements mostly to ensure patients' safety. The complexity comes from the diversity of the regulatory landscape. Some requirements are binding, others are guidance only. Most aspects are governed by European Union law, but some remain regulated on a national scale. The regulatory landscape is a combination of general and specific rules and guidance depending on competent institutions, legal classifications of the products, and steps of their developments.

Methodology

Communicating information on GCT with an online tool



Legal Classification of Gene & Cell Therapy



CHALLENGES

TEMPORALITY
 > Changes in regulation or legislation
 > Scientific discoveries

DIVERSITY OF ACTORS
 > European Medicines Agency
 > National Medicines Agencies
 > HTA Bodies
 > Ethics committees
 > GMO authorities

LEGAL COMPLEXITY
 > European Union law vs. national laws
 > Binding texts vs. guidance
 > Legal classification leading to different pathways

Addressing the challenges in finding information with EuroGCT Research Pathways

Research & Innovation | Therapy Classification | Manufacturing | Commercialisation | Public Involvement & Data

> Fundamental Research
 > Clinical Research
 > Translational Science
 > Incentives
 > Early interactions with Regulators

> See figure above

> Manufacturing Authorisation
 > Good Manufacturing Practice
 > Investigation Medicinal Product Dossier
 > Capability
 > Scalability
 > Packaging and Labelling

> Market Access for ATMPs
 > Distribution
 > Advertising
 > Pharmacovigilance
 > Pricing and Reimbursement

> Data Protection
 > Data storage
 > Data collection, processing, controlling
 > Data sharing and Open Data
 > Mission creep and Data Misuse

CONCLUSION

The EuroGCT Research Pathway resources facilitates better decision-making at key points in development of new therapies and thus enable improved product development, by providing the research community, regulatory and healthcare authorities with an information source on the practical steps needed for cell and gene therapy development.

Creating and documenting this process adds value to the community as a whole as we navigate bringing novel treatments responsibly from the lab to the clinic.

CONTRIBUTE

Interested in contributing your insight? We welcome involvement in the further development of the EuroGCT Research Pathways Resource.

- Join the EuroGCT ELSI Network of Expertise:
 - ✓ To provide drafts content of entries
 - ✓ To provide lay summaries of your research papers
 - ✓ To translate existing entries
 - ✓ To review draft entries
 - ✓ To provide useful updated resources

All contributions will be credited on the EuroGCT website: www.eurogct.org
To get involved in this collaborative work, please contact the EuroGCT information officers on ELSI:
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**Abstract submitted to the International Society for Cell & Gene Therapy
2023
Annual meeting, May 31-June 3, Paris, France**

CONTROL ID: 3893338

TITLE: The Marketing Authorisation Of Advanced Therapy Medicinal Products Under The Regulation Of The European Union

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ABSTRACT BODY:

Background & Aim: Advanced Therapy Medicinal Products (ATMPs) is a European classification of medicinal products based on genes, cells and tissues specifically regulated in the European Union (EU) from the entry into force of Regulation (EC) No 1394/2007 of the European Parliament and of the Council of 13 November 2007 on ATMPs.

Any company wishing to market ATMPs within the EU must hold a Marketing Authorisation (MA) issued by the European Commission under the "centralised procedure", after a single application to the European Medicines Agency (EMA) and its scientific assessment by the Committee for Advanced Therapies. The purpose of the MA is to ensure high quality, safety and efficacy for ATMPs, with a positive risk-benefit balance, to be commercialised. The MA is valid in the EU Member States, Iceland, Norway and Liechtenstein for a five-years period.

Methods, Results & Conclusion: From the adoption of the EU regulation, 24 ATMPs have been granted a marketing authorisation in the EU and the European Commission decision is pending for another one. There has been a clear increase in approvals from 2018, and most approved ATMPs are gene therapy medicinal products. Almost half of them benefited from expediting pathways or regulatory support schemes for

(innovative) medicines to be commercialised in the EU. Nevertheless, MA has been withdrawn or not renewed for 7 of them.

This poster will present the European regulatory requirements and pathways for ATMPs to obtain marketing authorisation, and discuss the challenges of their commercialisation.

This work has been supported by the European Union's Horizon 2020 research and innovation programme under grant agreement No 965241 and by ANR-funded I-BioLex project (ANR-20-CE26-0007-01).

**Abstract published in Cytotherapy, Vol. 25, Issue 6, Supplement, S160-S161,
Published in issue: May, 2023**

**Poster submitted to the International Society for Cell & Gene Therapy 2023,
Annual meeting May 31-June 3, Paris, France**



The marketing authorisation of Advanced Therapy Medicinal Products under the regulation of the European Union

Aurélien Mahalatchimy¹, Luc-Sylvain Gilbert², Auxane Delage³, Olivier Nègre⁴

EUROGCT Deputy coordinator and WP4 leader, Permanent Researcher in law at the French National Centre for Scientific Research (CNRS, CR), Law Faculty, UMR 7318 International, Comparative and European laws, UMR 7318 DICE CERIC, CNRS, Aix-Marseille Univ., Toulon Univ., Aix-en-Provence, France; ²EUROGCT Information Officer on Ethical, Legal & Societal Issues (ELSI), Research Engineer and PhD student in law, Law Faculty, UMR 7318 International, Comparative and European laws, UMR 7318 DICE CERIC, CNRS, Aix-Marseille Univ., Toulon Univ., Aix-en-Provence, France; ³Biotherapy Partners, Paris, France, EuroGCT Member of The General Committee, Management Group Deputy Coordinator, WP4 Co-Leader, Board Member of the French Society of Cell and Gene Therapy (SFTCG), Chief Scientific Officer at Smart Immune, Co-President Gene and Cell Therapy Institute (G&CTI), Acknowledgments: This work has been supported by the European Union's Horizon 2020 research and innovation programme under grant agreement No 868241 and by ANR-funded I-Biolex project (ANR-20-CDE5-0007-01).

BACKGROUND & AIM

Advanced Therapy Medicinal Products (ATMPs) is a European classification of medicinal products based on genes, cells and tissues specifically regulated in the European Union (EU) from the entry into force of Regulation (EC) No 1394/2007 of the European Parliament and of the Council of 13 November 2007 on ATMPs. Any company wishing to market ATMPs within the EU must hold a Marketing Authorisation (MA) issued by the European Commission under the "centralised procedure" (CP), after a single application to the European Medicines Agency (EMA) and its scientific assessment involving notably the Committee for Advanced Therapies (CAT). The purpose of the MA is to ensure high quality, safety and efficacy for ATMPs, with a positive risk-benefit balance, to be commercialised. The CP is the standard procedure to allow MA holders to market ATMP throughout the EU. The MA shall be refused, suspended or withdrawn if the quality and the safety of the ATMP is insufficient and if the risk-benefit balance is not favourable. Moreover, expediting MA pathways and regulatory tools have been developed to provide more flexibility and accelerate ATMPs access to the market while other pathways exist for patients to access ATMPs without MA. The latter are alternative to standard CP and possible under strict conditions only. This poster will present the European regulatory requirements and pathways for patients to access ATMPs, and discuss the challenges of ATMPs' commercialisation.



PROCEDURES AND PROGRAMMES FOR EARLIER ACCESS

EXPEDITING MARKETING AUTHORISATION PATHWAYS				REGULATORY SUPPORT SCHEME TO ALLOW AN EARLIER ACCESS TO ATMPs		
	Accelerated Assessment	Conditional MA	MA under Exceptional Circumstances	What	Priority Medicines (PRIME)	ATMP PILOT for academia and non-profit organisations
Legal basis	Article 14(9) Reg 726/2004	Article 14a Reg 726/2004	Article 14(b) Reg 726/2004		An enhanced interaction & early dialogue to optimise development plans & speed-up evaluation of promising medicines	Enhanced regulatory support for up to five selected ATMPs to optimise their development.
What	Assessment time for MA ≤ 150 days	Less complete data for earlier authorisation	Inability to provide comprehensive safety & efficacy data for objective & verifiable reasons		To support medicine development	To support translation of basic research into medicine
Why		Early access			Unmet/high medical need	
How	Major interest for public health (unmet medical need) Standard MA criteria	Seriously debilitating or life-threatening diseases, emergency situations, orphan drugs, unmet medical needs Standard MA Criteria	Rare condition or collection of full information or data is not possible in the state of scientific knowledge or unethical		Fostering early dialogue to improve clinical designs	Guiding through the regulatory process starting
Who		MA Applicant to European Medicines Agency			Potential candidate for AA to dedicated person at EMA	Academic/Non-profit ATMP developers to national competent authority or EMA
When	Before submission of MA BUT should be discussed earlier via PRIME	Before submission of MA BUT should be discussed earlier via scientific advice / protocol assistance			Use of existing routes of approval, especially AA Clinical stages of development (or earlier for academics and SMEs)	Possible to use existing support scheme (e.g. PRIME) Early stages of development (from best practice principles for manufacturing to planning clinical developments)

Acronyms: Marketing Authorisation (MA), Accelerated Assessment (AA), Advanced Therapy Medicinal Product (ATMP), Small and Medium Enterprises (SME), Priority Medicines (PRIME)

OTHER PATHWAYS FOR PATIENTS' ACCESS TO ATMPs

	Compassionate use: groups of patients	Compassionate use: Named patient basis	ATMP Hospital Exemption
Legal basis	Article B3 Regulation 726/2004	Article B1 Directive 2001/83/EC	Article 2B2 Regulation 1394/2007
What	Under strict condition for seriously ill groups of patients (life-threatening, long-lasting or seriously debilitating illnesses) undergoing clinical trials or MAA process	For a bona fide unsolicited order, with specifications of an authorised health-care professional, & for use by an individual patient	ATMP prepared on a non-routine basis, specific quality standards, & used within the same Member State in a hospital under the exclusive professional responsibility of a medical practitioner, to comply with an individual medical prescription
Why	To facilitate & improve access to compassionate use programmes	To fulfil special needs of patients, including without ongoing clinical trials	To enable patients to receive ATMPs under controlled conditions
How	EMA/CHMP recommendations & national rules	National rules	National rules but traceability & pharmacovigilance requirements and quality standards equivalent to ATMPs going through the MA pathway
Who	National competent authority to EMA & Applicant to National competent authority	Applicant to National competent authority	Applicant to National competent authority

Name	Type	Disease	MA Year	MA Type	Current status
ChondroCeres	TEP	Orthopaedic	2009	Standard	Withdrawn, 29-07-2016
Glybero	GTMP	Gastrology	2012	Exceptional	Withdrawn, 28-10-2017
MACI	Comb. TEP	Orthopaedic	2013	Standard	Withdrawn, 1-7-2018
Provenge	CTMP	Oncology	2013	Standard	Withdrawn, 6-5-2015
Hokloclor	TEP	Ophthalmology	2015	Conditional	Positive
Imlygic	GTMP	Oncology	2015	Standard	Positive
Stemveel	GTMP	Immunology	2016	Standard	Positive
Zimosis	CTMP	Graft vs. host	2016	Conditional	Withdrawn, 9-10-2019
Spherex	TEP	Orthopaedic	2017	Standard	Positive
Allofeel	TEP	Gastrology	2018	Standard	Positive
Yescarta	GTMP	Immunocellular cancer	2018	Standard (PRIME)	Positive
Kymriah	GTMP	Immunocellular cancer	2018	Standard (PRIME)	Positive
Luxturna	GTMP	Ophthalmology	2018	Standard	Positive
Zynreigo	GTMP	Bleed-thrombocytopenia	2018	Conditional/Accelerated (PRIME)	Withdrawn, 24-3-2022
Zolgensma	GTMP	Muscular Atrophy	2020	Conditional/Accelerated (PRIME)	Positive
Libmeldy	GTMP	Leukodystrophy, Metachromatic	2020	Accelerated	Positive
Tecartus	GTMP	Lymphoma, Mantle-Cell	2020	Conditional/Accelerated (PRIME)	Positive
Skysona	GTMP	Cerebral adrenoleuko-dystrophy	2021	Accelerated (PRIME) reverted to Standard	Withdrawn, 18-11-2021
Albeo	GTMP	Cancer of plasma cells	2021	Conditional/Accelerated (PRIME)	Positive
Breyanzi	GTMP	Blood cancer	2022	Accelerated (PRIME)	Positive
Upadaciz	GTMP	Amino Acid Metabolism, Inborn Errors	2022	Exceptional	Positive
Carvykti	GTMP	Multiple Myeloma cancer of the bone marrow	2022	Conditional (PRIME)	Positive
Rocavian	GTMP	Haemophilia A	2022	Conditional	Positive
Ebavlio	CTMP	Lymphoproliferative Disorders	2022	Exceptional (PRIME)	Positive
Hemigraft	GTMP	Haemophilia B	2023	Conditional (PRIME)	Positive

The 25 authorised ATMPs in the European Union (latest update March 2023)
TEP: Tissue Engineered Product, GTMP: Gene Therapy Medicinal Product, CTMP: Cell Therapy Medicinal Product, MA: Marketing Authorisation

CONCLUSION

Even if the EU supports and fosters ATMPs' research, development, and access to market with regulatory tools, patients access to effective and affordable ATMP is limited by the high average cost per patient, the withdrawal of authorised ATMPs from MA holder mostly for commercial reasons, and the differences between healthcare systems and reimbursement strategies of the different Member States. Although the standard procedure and the expediting MA pathways provide the widest commercialisation of ATMPs in Europe, patients' access to ATMPs is dependent on MA granting and on the MA holder strategy to make the product available in Europe. The latter is linked to the agreement(s) on pricing and reimbursement to provide affordable ATMPs as well as an acceptable financial benefit, including return on investment, for the MA holder. Patients can also access ATMPs, thanks to other pathways, alternative to MA and possible under strict conditions only. However, depending on how these other pathways can be used according to the applicable national heterogeneous rules (e.g., hospital exemption), they could also lead to unfair competition regarding the high requirements for MA granting.

RESULTS

- Clear increase in approvals from 2018
- Most approved ATMPs are gene therapy medicinal products.
- Half of authorised ATMPs benefited from expediting pathways or regulatory support schemes for (innovative) medicines
- BUT MA withdrawn or not renewed for 7 ATMPs.

**Abstract submitted to the International Society for Cell & Gene Therapy
2023
Annual meeting, May 31-June 3, Paris, France**

Title: Which actors to influence the adoption of EU guidelines for Advanced Therapy Medicinal Products?

Aurélie Mahalatchimy,¹ Valentin Brunel² - Abstract published in *Cytotherapy* Volume 25, Issue 6, Supplement, May 2023, Page S161

Genes, cells, and tissues based medicinal products are specifically regulated as Advanced Therapy Medicinal Products (ATMPs) within the European Union (EU) from the adoption of Regulation (EC) n°1394/2007 on ATMPs. Beyond legislative requirements, the complexity and scientific technicity of these medicines, as well as the necessary flexibility to take into account the evolutions and the scientific and regulatory experience gained has led to the development of an important amount of guidelines in the field.

These guidelines have mainly been adopted by the European Medicines Agency (EMA), the European regulatory agency especially in charge of the scientific assessment of medicines to be commercialized in the EU. Some of them have also been adopted by the European Commission which grants the final marketing authorization for medicines to enter the EU market.

The adoption of EU guidelines involves a public consultation procedure to gather comments from stakeholders and interested parties.

Our poster aims at mapping these different actors, and their potential changes over time, to allow for a realistic and concrete portrait of all stakeholders and interested parties involved in the field of ATMPs regarding their European regulation through guidelines.

The identification of EU scientific guidelines applicable to ATMPs, and of the actors involved in the consultation process has led to the establishment of a database with over 200 organizations corresponding to fourteen guidelines for which dates of production range from 2008 to 2022. The organizations have been classified by type (Business, Academia, National bodies, etc.), country, and theme of the drafts of guidelines they commented on.

This poster especially highlights and discusses which organizations have influenced the adoption of EU scientific guidelines on ATMPs; some of them commenting almost all guidelines in the field while others considered only certain guidelines.

Findings concern both the number and quality of stakeholders with the aim to understand over time, what types of organizations from which country have been the most active in answering to guidelines' consultations, who were the major or more prolific respondents, and what themes were more often commented.

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WHICH ACTORS TO INFLUENCE THE ADOPTION OF EU GUIDELINES FOR ADVANCED THERAPY MEDICINAL PRODUCTS?

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Background and Methodology

Genes, cells, and tissues based medicinal products are specifically regulated as Advanced Therapy Medicinal Products (ATMPs) within the European Union (EU) from the adoption of Regulation (EC) n°1394/2007 on ATMPs. Beyond legislative requirements, the complexity and scientific flexibility of these medicines, as well as the necessary flexibility to take into account the evolution and the scientific and regulatory experience gained has led to the development of an important amount of guidelines in the field. These guidelines have mainly been adopted by the European Medicines Agency (EMA), the European regulatory agency especially in charge of the scientific assessment of medicines to be commercialised in the EU. Some of them have also been adopted by the European Commission (EC) which notably grants the final marketing authorization for ATMPs on the basis of EMA's assessment to enter the EU market. The adoption of EU guidelines involves a public consultation procedure to gather comments from stakeholders and interested parties. These comments are then considered to establish the final version of the guidelines to be adopted to be used as reference documents in the field.

Who are these actors influencing the adoption of EU guidelines for Advanced Therapy Medicinal Products?

Our research team searched both the EMA and EC websites in order to identify all guidance documents specific to ATMPs. This led to the establishment of a list of 27 documents, among which 27 guidelines. This poster is dedicated to guidelines only.

Out of all 27 applicable guidelines identified, we considered only those for which a consultation process report was available. For older guidelines, sometimes no consultation was organized, and sometimes the subsequent report was not available on the EMA website.

Once all guidelines and associated reports on public consultation were collected, we identified all the actors involved in the consultation process: this led to the establishment of a database with 195 contributions from 147 organisations corresponding to thirteen guidelines for which dates of production range from 2006 to 2022.

For every guideline, we collected its title, date of publication, as well as the type of therapy to which it referred (either Advanced Therapy Medicinal Products (ATMPs) generally, Medicinal products based on Genetically Modified Organisms (GMO MP), Cell Therapy and Tissue Engineering Products (CT and TEP), or Gene Therapy Medicinal Products (GTMP)).

For each guideline, all organisations participating in the public consultation process were indexed and sorted in a table. Additional information was collected on the organisations' websites, regarding their typology, country of registration and specific activity.

The typology of organisations was constructed using all information available to sort out organisations to clearly identify the main polarizations between them.

Main figures

Table 1: Number of organisations involved in different types of guidelines

Guideline	Author	Theme	Date	Number of orgs
Non-clinical testing for inactivated germline transmission of gene transfer vectors	EMA	GTMP	16/11/2006	4
Environmental risk assessments for medicinal products containing, or consisting of, genetically modified organisms (GMOs) human cell-based medicinal products	EMA	GMO MP	17/12/2006	4
Non-clinical studies required before first clinical use of gene therapy medicinal products	EMA	GTMP	30/05/2008	4
Scientific requirements for the environmental risk assessment of gene-therapy medicinal products	EMA	GTMP	30/05/2008	7
Follow-up of patients administered with gene therapy medicinal products	EMA	GTMP	22/10/2009	1
Guidelines on the minimum quality and non-clinical data for certification of advanced therapy medicinal products	EMA	ATMPs	15/10/2010	6
Patent testing of cell-based immunotherapy medicinal products for the treatment of cancer	EMA	GTMP	21/01/2016	4
Quality or Good Manufacturing Practice specific to Advanced Therapy Medicinal Products	EC	ATMPs	22/11/2017	55
Quality, pre-clinical and clinical aspects of gene therapy medicinal products	EMA	GTMP	22/05/2018	29
Guidelines on Good Clinical Practice specific to Advanced Therapy Medicinal Products	EC	ATMPs	10/10/2019	34
Quality, non-clinical and clinical aspects of medicinal products containing genetically modified cells	EMA	GMO MP	12/11/2020	20
Guidelines on some SmpC, labelling and Package Leaflet for advanced therapy medicinal products (ATMPs) containing genetically modified cells	EMA	ATMPs	10/05/2022	9

Results

- 11/13 guidelines have been adopted from 2008.
- 11/13 guidelines have been established by EMA while 2/13 guidelines have been established by EC.
- 4/13 guidelines relate to ATMPs in general.
- 6/13 guidelines relate to GTMP.
- 2/13 guidelines relate to GMO MP.
- 1/13 guideline relate to CT & TEP.

Discussion

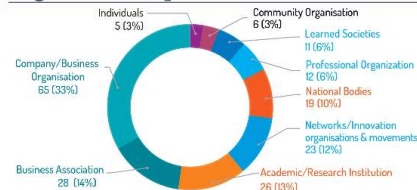
- There is a wide scale of involvement in public consultation processes, ranging from only 1 to 55 organisations having been involved. The number of organisations involved in public consultations processes is linked to the guidelines' topics and not to a potential increase due to better awareness of the process with time.
- Almost half of the guidelines for which a report on public consultation is available, have been adopted in the field of GTMP which highlights the rise of this type of ATMPs as well as the particular need for regulatory guidance for their development and commercialisation in the EU. On the opposite, only one guideline covers CT & TEP together.
- The guidelines which involved the highest number of organisations during the public consultation processes are the ones adopted by the EC. This can be explained

by both their highest legal value and the wider scope of their topic on particularly challenging aspects of ATMPs development: Good Manufacturing Practice and Good Clinical Practice specific to ATMPs.

The other guidelines involving a high number of organisations during the public consultation processes relates to wide scientific aspects of the main types of ATMPs: Quality, pre-clinical and clinical aspects of gene therapy medicinal products for GTMP (29), Human cell-based medicinal products for CT & TEP (20), and Quality, non-clinical and clinical aspects of medicinal products containing genetically modified cells for GMO MP (20). Here also, the guideline on GTMP has involved more participation than for other types of products. Guidelines on CT & TEP and on GMO MP have involved the same number of organisations, even though only the first one covers two sub-categories of ATMPs explicitly defined at the legislative level (Regulation (EC) n°1394/2007 and Directive 2009/120/EC).

The other guidelines involving less organisations (9 maximum) relate to various types of ATMPs, or ATMPs generally and they cover very particular scientific (e.g., potency testing) or regulatory (e.g., packaging & labelling) aspects of their development, or specific procedure (e.g., certification).

Organisations' profile

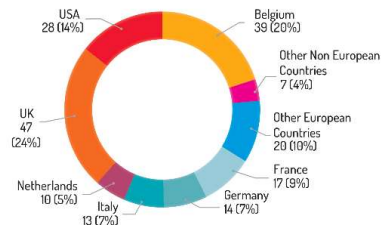


Graph 1: Typology of organisations involved in the consultation processes of ATMPs guidelines.

Discussion: The countries most represented are the most active in the development of ATMPs: UK, Belgium, USA, France, Germany, Italy and the Netherlands. Nevertheless, the important involvement of Belgium (20%) should be put in perspective with the European institutions being mainly established in Brussels, which leads to an important amount of organisations having their headquarters there.

The important involvement of the UK (24%) can be explained by the UK being one of the leading countries in the field, although almost all public consultations processes considered (12/13) occurred before Brexit. Thus, such main position of the UK may change in the future. The important involvement of the USA (14%) can be astonishing given that the public consultations relate to European regulation. However, it reveals how much the field is international and how much the European Market is targeted by external countries, especially the USA.

Discussion: Companies and business associations account for almost half of all contributions (47%). Community organisations (3%) and individuals (2%), on the contrary, seldom contribute. As for public sector organisations, such as national bodies and academic institutions, they hold the middle ground (24%). These results can be explained by the availability of means (human and financial ones in particular regarding necessary time and knowledge) to contribute to the process of public consultation.



Graph 2: Organisations involved in the consultation processes of ATMPs guidelines by country.

Most contributing organisations

Table 2a: Organisations by number of contributions

Number of contributions	Organisations
Three or more	9
Two	25
One	185

Out of the 9 organisations which have contributed to 3 or more guidelines:

- 4/9 are located in Belgium.
- 4/9 are Business Associations.
- 5/9 are from the private sector (Company or Business Association).
- 2/9 are Networks/Innovation Organisations.

Table 2b: Name, type and country of organisations answering to 3 or more guidelines

Organisation	Type	Country	Number of contributions
European Federation of Pharmaceutical Industries and Associations (EFPIA)	Business Association	Belgium	6
European Association for Biotechnologies (Europabio)	Business Association	Belgium	5
Alliance for Regenerative Medicine (ARM)	Networks/Innovation Organization	USA	4
Cell and Gene Therapy Catalysts	Networks/Innovation Organization	UK	4
European Association of Hospital Pharmacists (EAHP)	Professional Organization	Belgium	4
European Biopharmaceutical Enterprises (EBE)	Business Association	Belgium	4
International Society for Cell & Gene Therapy (ISCT)	Learned Society	Canada	4
German Pharmaceutical Industry Association (BfArM)	Business Association	Germany	3
Wolun Consulting Life Sciences (VCLIS)	Company/Business Organization	France	3

General conclusion

- Most guidelines have been adopted after the adoption of Regulation (EC) n°1394/2007 on 13 November 2007 and have contributed to its practical implementation.
- Most guidelines applicable to ATMPs have been established by the EMA. It highlights both the main role of the agency in this field and the technical specificity of ATMPs. Guidelines on Good Manufacturing Practice and on Good Clinical Practice specific to ATMPs have been adopted by the EC in accordance with the provisions of Regulation (EC) n°1394/2007.
- More EMA guidelines but more contributions on EC guidelines due to highest legal value and wider scope of their topic on particularly challenging aspects of ATMPs development.
- A wide scale of involvement in the public consultation processes: from 1 to 55 organisations.
- The more general a guideline is, the more contributions it obtains.
- Involvement in the public consultations processes is linked to the guidelines' topics, and neither to a potential increase due to better awareness of the process on time nor to an habit to contribute even for national regulators.

Discussion

- As long as only few organisations have contributed to 2 and to 3 or more consultations, and 78,2% of organisations contribute only once to a consultation process on ATMPs guidelines, it appears the contribution are based on the topics of the guidelines rather than on an habit to be involved in this process.
- Among organisations contributing most often, the private sector is leader given the means it can dedicate to this activity, and Belgium is the most represented country given the strategic position of being in Brussels to know and influence EU policy and regulation. Surprisingly, the public sector, mainly represented by National bodies and academic/ research institution, does not appear among the organisations contributing the most often to public consultation regarding ATMPs guidelines. It implies a participation based on the topics of the guidelines rather than on an habit. Although this can be understood for academic/ research institution which generally focus on specific area of research even in the delimited field of ATMP, it is more questionable for national bodies, and especially national authorities, such as national medicines agencies, which could have been considered as the main contact point for ATMP developers, despite main EMA competence, given national languages and their potential interface's role between the EMA and ATMPs developers located in National EU Member States.



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Title : The challenges of Advanced Therapy Medicinal Products manufacturing in the European Union: Strengths and limits of current regulatory tools

Luc-Sylvain Gilbert,³ Auxane Delage,⁴ Aurélie Mahalatchimy,⁵

Advanced Therapy Medicinal Products (ATMPs) is a European classification of medicinal products based on genes, cells and tissues specifically regulated in the European Union (EU) from 2007.

Any company wishing to manufacture ATMPs in the EU must hold a manufacturing authorisation issued by the national competent authority of the Member State where they carry out these activities.

Ensuring the quality of medicines is a criterion to obtain ATMPs' marketing authorisation issued by the European Commission under the "centralised procedure" after a single application to the European Medicines Agency. All ATMPs marketed in the EU must be produced in accordance with EU quality standards to ensure the quality, safety and efficacy of medicines for the patients: Good Manufacturing Practice (GMP) principles and guidelines dedicated to ATMPs enforceable since 2017, and relevant parts of the European Pharmacopeia provide the main regulatory standards to comply with.

The manufacture, meeting the GMP requirements from the raw materials to the final product, is particularly challenging for ATMPs regarding their level of complexity and their specific characteristics, especially the use of substances of human origin as starting materials, and the reproducibility when using live biological samples. The ATMPs' manufacturer has to maintain costly technical specifications capable of guaranteeing the reproducibility of the medicine's composition in accordance with GMP guidelines and the specific requirements of the ATMP marketing authorisation.

Regulatory requirements are often seen as obstacles to the development of ATMPs. Nevertheless, they mainly provide a set of solutions to overpass the technical obstacles of ATMPs' manufacturing in order to ensure their quality for the safety of patients. It appears clearly within the various supporting regulatory tools currently available at the European level, which include both guidance documents and procedures for interactions with regulators.

This poster will provide an overview of the challenges of ATMPs' manufacturing and link them to the relevant supporting regulatory tools highlighting both their strengths and their limits in the context of ATMPs development for patients.

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Title: Mapping regulators' early interactions procedures to support innovation

Auxane Delage⁶, Luc-Sylvain Gilbert,⁷ Aurélie Mahalatchimy⁸

In an effort to help stakeholders to overcome the legal and scientific challenges raised during the development of a medicinal product, procedures, such as scientific advice, have been established in the European Union to enable early contact with regulators, especially in the field of gene and cell therapy. These procedures help to support innovation. They are various: some are available for all medicines and others target innovative medicines or Advanced Therapy Medicinal Products (ATMPs); some are legislative or regulatory schemes, others put into place services; some benefit to all types of medicines' developer, others target a specific type of developer. These procedures for early interactions between stakeholders and regulators are available to facilitate communication between institutions and medicine developers all along the medicine's lifecycle, but the main focus is on the pre-marketing authorisation phase. The exchanges occurring between regulators and the seeker of interaction can impact the chances an ATMP has to enter on the market. Thus, the aim is to foster their development by helping developers to navigate the regulatory pathways adequately for ATMPs to meet quality, safety, and efficacy requirements according to robust evidence to obtain marketing authorisation and access to patients. Knowing all the procedures, who can ask for them, which procedure to use, and with which regulator can be a challenge. Moreover, the extent of the possible support is often overlooked.

This poster describes and discusses the multiple existing options available to ATMPs' developers to overcome challenges during the pre-marketing authorisation phase through early interactions with regulators, here focusing on the European Medicines Agency and National agencies. Communicating on the early procedures available at national and European levels will help to identify potential gaps and raise developers' awareness of the different procedures available to support the marketing authorisation of ATMPs.

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Communicating reliable and accessible information about gene and cell therapy



THE UNIVERSITY of EDINBURGH
Institute for Regeneration and Repair
Centre for Regenerative Medicine

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About the Project

The *European Consortium for Communicating Gene and Cell Therapy Information (EuroGCT)* is a European Union funded project led by the University of Edinburgh. The consortium unites 47 partner organisations and institutions across Europe, including the major European advanced therapies learned societies, with the common goal of providing reliable and accessible information related to cell and gene therapy development to European stakeholders.

EuroGCT brings together wide-ranging expertise, including **basic and clinical research; ATMP development; ethical, legal and societal impacts; and public engagement.**

We link with target audience representatives. These include *people affected by conditions, educators, healthcare professionals, regulators, policymakers, and the media.*

EuroGCT has established infrastructure for:

- *Coordinated approach to communication*
- *Collaborative resource development*
- *Increased reach and impact*
- *Building capacity in the scientific community*
- *Evaluation and sharing of best practice*

Objectives

Our aim is to support better informed decision-making related to cell- and gene-based therapies for researchers and the public.

- We provide **patients, people affected by conditions, healthcare professionals and citizens** with accurate scientific, legal, ethical and societal information and engagement opportunities.
- We provide the **research community, regulatory and healthcare authorities** with an information source on the practical steps needed for cell and gene therapy development for the purpose of facilitating better decision-making at key points in development of new therapies and, thus, enable improved product development.

Get Involved

We need...

- **Your expertise.** Communicate your research to a wide audience and help ensure the accuracy of our content by participating in our Network of Expertise.
- **Your skills.** Contribute to the accessibility of our information by writing, reviewing or translating content.
- **Your content.** Share your public- or patient-facing resources or your research news.
- **Your network.** Tell other researchers and target audience members about the website and the project.

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