

Ivana Kildsgaard¹, Juliana Martínez-Atienza², Claus Cursiefen³, Neil Lagali⁴

1. Aniridia Sweden, 2. Public Foundation Progress and Health, Andalusia, Spain 3. University of Cologne, Germany 4. Linköping University, Sweden

Aniridia is a rare congenital eye disease, affecting about one in 80.000 people, and requiring intensive eye care, social and community support from birth and throughout an individual's lifetime. A congenital genetic mutation causes an underdeveloped iris, retina, cataract, glaucoma, and a progressive ocular surface disease with very few effective treatments available (Figure 1). This stems from a lack of adequate-sized patient populations to conduct coordinated clinical and research activities, and a lack of information exchange in assessing and treating aniridia, with expertise typically limited to geographically-dispersed centers.



Figure 1. Aniridia occurs while the eye is developing during the 12th to 14th week of pregnancy. It is due to a mutation in the short arm of chromosome 11, affecting the PAX6 gene.

ANIRIDIA-NET is a pan-European bottom-up network of researchers, ophthalmologists, trainees, aniridia patient organizations, industry and special interest groups funded by the European Union's Cooperation in Science and Technology (COST) program (www.cost.eu). This network currently consists of 28 European member countries, and 2 near neighbor countries (Figure 2) with the overall goal of improving clinical management of aniridia and promoting innovative research and development of new alternatives for its diagnosis and treatment. This network constitutes an innovative approach for research and clinical management that encourages communication among healthcare professionals and researchers with patient organizations to share and foster new ideas and collaboration to improve aniridia management through evidence-based research, harmonized clinical protocols, pooling/sharing of samples, experiences and models and consensus activities.

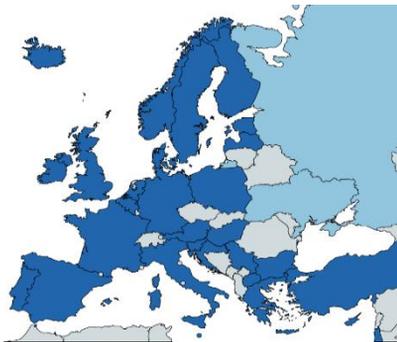


Figure 2. Geographical distribution of ANIRIDIA-NET members, including 30 participating countries, 28 COST full or cooperating members (darker blue) and 2 near neighbour countries (lighter blue). Date updated: 14/04/2020. Created with mapchart.net.



Figure 5. Keynote lecture given by Neil Lagali in June 2019 at the 1st Nordic Aniridia Conference, an event organized by Aniridia Norway, Aniridia Denmark, Aniridia Sweden and Linköping University. Funded by the COST program through ANIRIDIA-NET action, the main goal of this conference is to strengthen cooperation among clinicians, researchers and patient's representatives.



Figure 3. ANIRIDIA-NET members at the Action's kick-off meeting held in Brussels on April 2019. Networking meetings serve as essential support for collaboration, knowledge sharing and research promotion.

ANIRIDIA-NET primary goal has been structured into the following working groups:

- (1) **Clinical guidelines.** Harmonization/consensus on clinical examinations, treatment guidelines, patient information and clinical endpoints.
- (2) **Clinical and cohort studies.** Development of clinical and cohort multicenter studies with patient data, and/or biological samples for biomarker, genetic and high-throughput molecular analysis.
- (3) **Stem cells and regenerative medicine.** Approaches of stem cell research, tissue engineering, genetic techniques for developing translational regenerative therapeutic strategies.
- (4) **Transplantation, inflammation and immunity.** Evaluation of emerging surgical techniques for aniridia associated pathologies.
- (5) **Aniridia models for collaborative research.** Development of aniridia animal models and novel research techniques for the identification of new therapeutic strategies.
- (6) **Patient-driven research.** Support of patient participation in aniridia-focused research to raise awareness toward unmet patient needs and challenges.

Working groups consist of an inclusive team of stakeholders directed by a leader that works in the identification of key needs, research objectives, as well as opportunities for collaboration and exchange.



Figure 4. Key session on aniridia-associated keratopathy pathophysiology given by Neil Lagali, ANIRIDIA-NET action chair and Professor at Linköping University, at the World Congress of Paediatric Ophthalmology and Strabismus celebrated last September 2019 in Paris.

Action's **networking tools** include regular management and scientific meetings to support collaboration, training schools to share knowledge, scientific missions to foster research exchanges, funding for young researchers to attend international science and technology conferences as well as publications and other diffusion and dissemination activities.



Figure 5. Elena Danielle, a MSc postgraduate at the Veneto Eye Bank Foundation (Italy), at a Short Term Scientific Mission (STSM) with the Skottman group at Tampere University (Finland) to share knowledge on primary limbal stem cell (LSC) culture and characterization techniques. STSM offer researchers the opportunity to foster linkages and build capacity in aniridia-focused research.

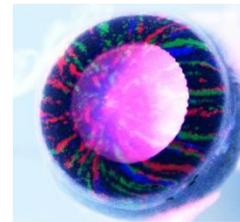


Figure 6. Limbal stem cells (LSC) are believed to be affected in Aniridia. Shalom-Feuerstein's lab (Israel) has developed genetic mouse models that allow the exploration of the origin and fate of LSCs using several types of cell labelling systems. The image represents LSC labelled with "confetti" fluorescent reporter genes.



Figure 7. ANIRIDIA-NET members at the 3rd scientific meeting held in Lisbon in February 2019, coinciding with Rare Disease Day. Culture and assessment of LSC, clinical multicentre studies, harmonized clinical protocols, aniridia pathophysiology, post-transplant immunosuppression and MSCs for eye diseases were some of the topics covered during this networking event.

Rare diseases affect over 350 million people worldwide and frequently go undiagnosed for years, suffering from sparse and dispersed medical knowledge and a lack of effective therapeutic options. In this scenario, collaborative strategies that pool resources and knowledge are vital, including transnational team science networks that involve patients as research partners. ANIRIDIA-NET is a strategic pan-European collaborative action developing sustainable networking activities to foster cooperation and innovative research to seek and drive solutions for aniridia patients. In ANIRIDIA-NET, patient advocacy groups are involved as key stakeholders to raise awareness towards unmet patient needs and research challenges to accelerate diagnosis and therapeutic development for aniridia worldwide.

More information at:

<https://aniridia-net.eu>
www.cost.eu/actions/CA18116/



@aniridianet



Aniridianetcost-ca18116