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PERSPECTIVES

Drug Repurposing in Pancreatic Cancer: A Multi-Stakeholder Perspective to Improve Treatment Options for Pancreatic Cancer Patients

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Abstract: Pancreatic cancer (PC) remains one of the most challenging malignancies to treat. Current therapeutic options are unsatisfactory, and there is an urgent need for more effective and less toxic drugs to improve the dismal prognosis of PC. In recent years, drug repurposing (DR) has emerged as an attractive strategy to identify novel treatments for PC by leveraging existing drugs approved for other indications. Through the use of electronic medical records, Artificial Intelligence, study of metabolic pathways, signalling pathways, and many other approaches, it has become much easier in recent years to identify potential novel uses for old drugs. Although policy, funding and research attention in this area are steadily growing, major challenges to efficient and effective patient-centric DR in PC need to be addressed. These include but are not limited to regulatory, financial and funding barriers and the lack of coordination and collaboration among several sectors and stakeholders. To explore the opportunities and challenges associated with DR in PC, a one-day multi-stakeholder meeting was held on 14th of November 2023 in Brussels, Belgium as part of the REMEDi4ALL project. This meeting provided a platform for researchers, clinicians, industry representatives, funders, regulatory experts, and patient advocates to discuss and propose actions to optimize and accelerate DR in PC. Insights from this meeting support the potential of DR to enhance PC treatment options while highlighting the importance of systemic and supportive changes in the regulatory, policy and funding landscapes, interdisciplinary collaboration, data sharing, and patient involvement in driving therapeutic innovation. This summary highlights key outcomes and recommendations from the meeting in informing future efforts to advance DR initiatives in the context of PC.

Keywords: drug repurposing, pancreatic cancer, multi-stakeholder discussion, collaboration, patient centricity

Introduction

Pancreatic Cancer

Pancreatic cancer (PC) is one of the leading causes of cancer-related deaths worldwide.[1] The disease is increasing in incidence, with Western Europe having been identified as the region carrying the highest lifetime risk of developing PC.[2,3]

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PC's high mortality rate can be attributed to several factors; particularly its asymptomatic nature in early-stage disease, non-specific gastrointestinal presentations in later-stage disease and consequent delays in diagnosis and treatment initiation. Only one-fifth of patients are eligible for surgical intervention, currently the only curative option. Current treatment options for unresectable PC (a combination of chemotherapy, radiation therapy, and palliative care) are limited and unsatisfactory (eg, high rates of chemotherapeutic resistance and adverse effects).

While there have been significant improvements in 5-year overall survival (OS) rate for the 7 most common types of cancer (breast, skin, colon, prostate, blood, lung, and ovarian cancer) across Europe and the US, PC has been left behind. The 5-year OS rates for PC remain still very low, ranging from 3 to 12%.[4,5]

Here, we discuss why this is the case – a complex combination of a tricky disease and trickier landscape, and where drug repurposing (DR) may represent an alternative avenue in development of efficacious anti-neoplastic therapeutic regimens for PC.

Drug Repurposing

Drug repurposing (DR) is used routinely in oncology. Both oncology and non-oncology drugs are used as monotherapy or in combination therapy to enhance other therapeutic options across multiple cancer types.[6] DR lends itself to the personalised medicine approach commonly seen in oncology, where drugs are matched to the specific biology and genetics of individuals and their tumours.[7]

Except for liposomal irinotecan, all drugs used to treat PC have been repurposed from use in other tumour groups. Gemcitabine, a fundamental in PC standard of care, was repurposed due to its significant and organ agnostic cytotoxic effects on cancer cells. DR candidates in PC target multiple hallmarks of cancer, including key pathways implicated in tumour progression and survival. The KRAS signalling pathway, which is frequently mutated in PC, is a major focus, with repurposed drugs aiming to inhibit downstream effectors such as MAPK/ERK and PI3K/AKT.[8] Additionally, autophagy - a survival mechanism exploited by PC tumour cells – can be exploited through use of repurposed non-oncology drugs like chloroquine, a drug originally developed for use in malaria.[9] Other promising pathways include DNA damage repair mechanism, metabolic vulnerabilities such as glutamine dependency, and the tumour microenvironment.[9]

DR is often viewed as a route to medicines access that is "easier" than de novo drug development. This is not necessarily the case and often DR can give rise to challenges that may not exist in traditional drug development.[10] Many new and existing initiatives across the globe are coming together to make repurposing simpler for all stakeholders, including REMEDi4ALL (Repurposing Medicines for All, remedi4all.org/).

REMEDi4ALL, an EU-funded initiative, focuses on optimizing and implementing the process of identifying new medical applications for drugs already recognized as safe and effective, making it more efficient, reliable, and patient-centric. REMEDiALL seeks to show that, in many cases, "repurposed" drugs can be taken all the way into clinic and to market more rapidly and at the fraction of the cost needed to develop a new drug from scratch.

Patient Centricity and Multi-Stakeholder Meetings

REMEDi4ALL is implementing multi-stakeholder meetings (MSM) to discuss disease and repurposing specific challenges, explore collaborative opportunities between stakeholders and thus facilitate accelerated, patient-centric drug repurposing efforts.

A multi-stakeholder approach has been seen in other EU-funded projects:

- ACCELERATE (accelerate-platform.org)
- Connect4children (conect4children.org)

Providing informal, collegial environments for knowledge sharing, dialogue, and engagement means these meetings can contribute to inclusive, effective and collaborative discussions, driving positive change in multiple contexts.[11,12] These fora are essential for patient centricity, providing patient communities with a unique platform to voice perspectives, concerns, and needs directly to relevant stakeholders.

Program outline

SESSION 1 SETTING THE SCENE

- General Introduction to Pancreatic Cancer
- Tackling Pancreatic Cancer: Tricks and (~~Tips~~) tricky
- Drug Repurposing in Oncology: Attractive but not simple
- REMEDi4ALL: vision, mission, European Context
- Patient Perspective on Drug Repurposing in Oncology and Pancreatic Cancer

SESSION 2 TREATMENT OPTIONS AND REPURPOSING OPPORTUNITIES IN PANCREATIC CANCER

- Orphan Medical Products for the Treatment of Pancreatic Cancer: Lessons Learned from Two Decades of Orphan Designation
- Preclinical and Clinical Updates on Drug Repurposing Opportunities in Pancreatic Cancer
- A Patient Story: Overcoming stage IV Pancreatic Cancer using a Vitamin D analog and an antimalarial drug in addition to traditional chemotherapy
- The VESPA Trial: Repurposing valproic acid combined with simvastatin to potentiate first line gemcitabine/nab-paclitaxel-chemotherapy regimen in metastatic Pancreatic Cancer patients

SESSION 3 THE PAST, PRESENT AND FUTURE OF PANCREATIC CANCER CLINICAL TRIALS

- Financial and Regulatory Barriers to Drug Repurposing in Pancreatic Cancer: REMEDi4ALL perspective, Industry perspective, Funders perspective
- Biomarkers in Pancreatic Cancer
- Patient Centricity in Pancreatic Cancer Clinical Trials

ROUNDTABLES

Lessons Learned from Failures in Drug Development/Repurposing in Pancreatic Cancer
Current Repurposing Landscape in Europe and major hurdles

Figure 1 Program outline of the first REMEDi4ALL Multistakeholder Meeting "Drug Repurposing, an Attractive Strategy in Pancreatic Cancer Treatment?" held on the 14th of November 2023 in Brussels.

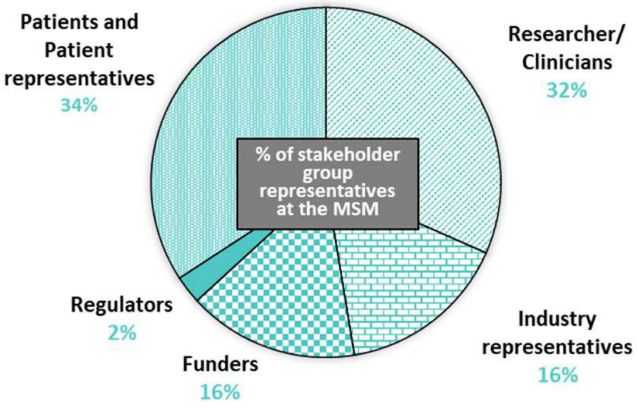

Figure 2 Representatives of all key stakeholder groups were involved in the workshop. Workshop participants included researchers/clinicians (31.6%), industry representatives (15.8%), funders (15.8%), regulators (2.6%) and those from the patient community (34.2%).

In line with REMEDi4ALL's patient-centric approach, the patient voice was the core narrative throughout the first REMEDi4ALL MSM "Drug Repurposing, an Attractive Strategy in Pancreatic Cancer Treatment?" (Figure 1).

Prior to World Pancreatic Cancer Day 2023, a group spanning key stakeholders (Figure 2) met in Brussels on the 14th of November 2023 to discuss the potential of patient-centric DR in PC. This article summarizes key points discussed and recommendations/action items identified during the meeting.

Materials and Methods

Framework

Representatives of all key stakeholder groups were included in sessions and round tables (Figure 2). As highlighted in Figure 1 the first session explored the topic of DR in PC from all stakeholder perspectives. Session two summarised DR projects in PC (Table 1), while session three tackled current hurdles for efficient DR in oncology.

The meeting ended with two roundtable discussions, highlighting lessons learned from failures in past trials and current limitations of the repurposing ecosystem; culminating in recommendations/actions needed to advance the field to better meet patient needs.

All participants agreed that views expressed during the meeting could be used in this article summarizing the outcomes.

Results

Challenges and Hurdles

Although DR represents an attractive and valuable therapeutic opportunity for PC, with several studies investigating this potential[8,13] (Table 1), major challenges and hurdles (grouped into three main categories as below and in Figure 3) were highlighted during the meeting.

Table 1 Repurposing Trials Presented at the Workshop

Trial	Reference	Drug	Original Indications	Annotations
VESPA Trial	NCT05821556 Phase 2, open label	Valproic Acid (VPA) + Simvastatin (SIM)	VPA: seizures SIM: high cholesterol	Efficacy of VPA + SIM in combination with first-line gemcitabine and nab-paclitaxel-based regimens to extend progression free survival (PFS) as compared with chemotherapy alone.
ORIENTATE Trial	NCT05360264 Phase 2, open label	Decitabine	Myelodysplastic syndromes and acute myeloid leukaemia	Efficacy of decitabine repurposing against advanced, refractory, ductal adenocarcinoma (PDAC) with molecular transcriptional signatures indicating dependency on the KRAS oncogene.

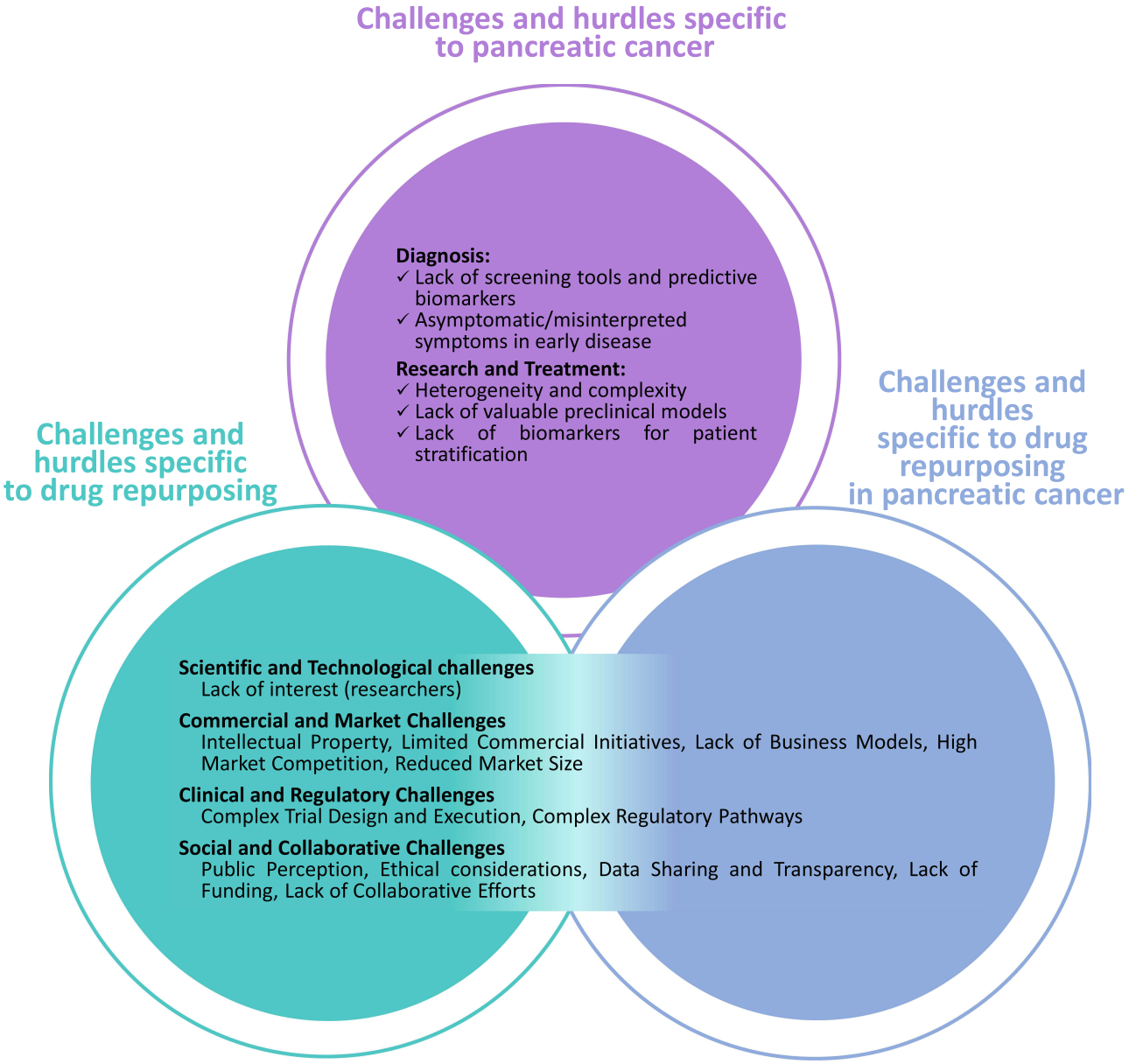

Figure 3 Challenges and hurdles identified during the workshop. Although drug repurposing (DR) represents a valuable and attractive strategy for the treatment of pancreatic cancer (PC), several limitations to advance the field were identified during the workshop. These challenges and hurdles can be classified in three main overlapping categories: 1)Challenges and hurdles specific to PC 2)Challenges and hurdles specific to DR 3)Challenges and hurdles specifically related to DR in PC.

Challenges and Hurdles Specific to PC

Diagnosis

Though not immediately relevant to the discussion of DR, it is important when approaching drug development to understand that PC is often diagnosed at an advanced stage; contributing to poor prognosis. Late diagnosis is associated with:

- Lack of screening regimens (as seen for breast and colorectal)
- Lack of predictive biomarkers
- Lack of symptom awareness.

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Research and Treatment

The intrinsic characteristics of the pancreas and PC are challenging; with significant heterogeneity, both between patients and within individual's tumours (high tumour cell plasticity and complex stroma.[14–18] This complex, dynamic disease state affects treatment response and complicates targeted therapy development. Lack of robust non-clinical models that recapitulate the complexity of PC biology limits accessible and effective research.[19]

Challenges and Hurdles Specific to DR

Although DR holds great promise for accelerating discovery, development and access to treatment, efficacious research must focus on improving patient outcomes, and not be naive in addressing challenges related to rarer cancer types alongside issues and hurdles specific to DR. DR across all diseases sees significant scientific, technological, commercial, clinical, regulatory, social and collaborative challenges. These challenges are exhaustively discussed in existing literature.[10,20] During the meeting, several barriers were emphasized, and we have grouped these into 4 major themes (Figure 4).

Scientific and Technological Challenges

In addition to challenges highlighted in Figure 4, perceived lack of interest in DR among researchers was highlighted.

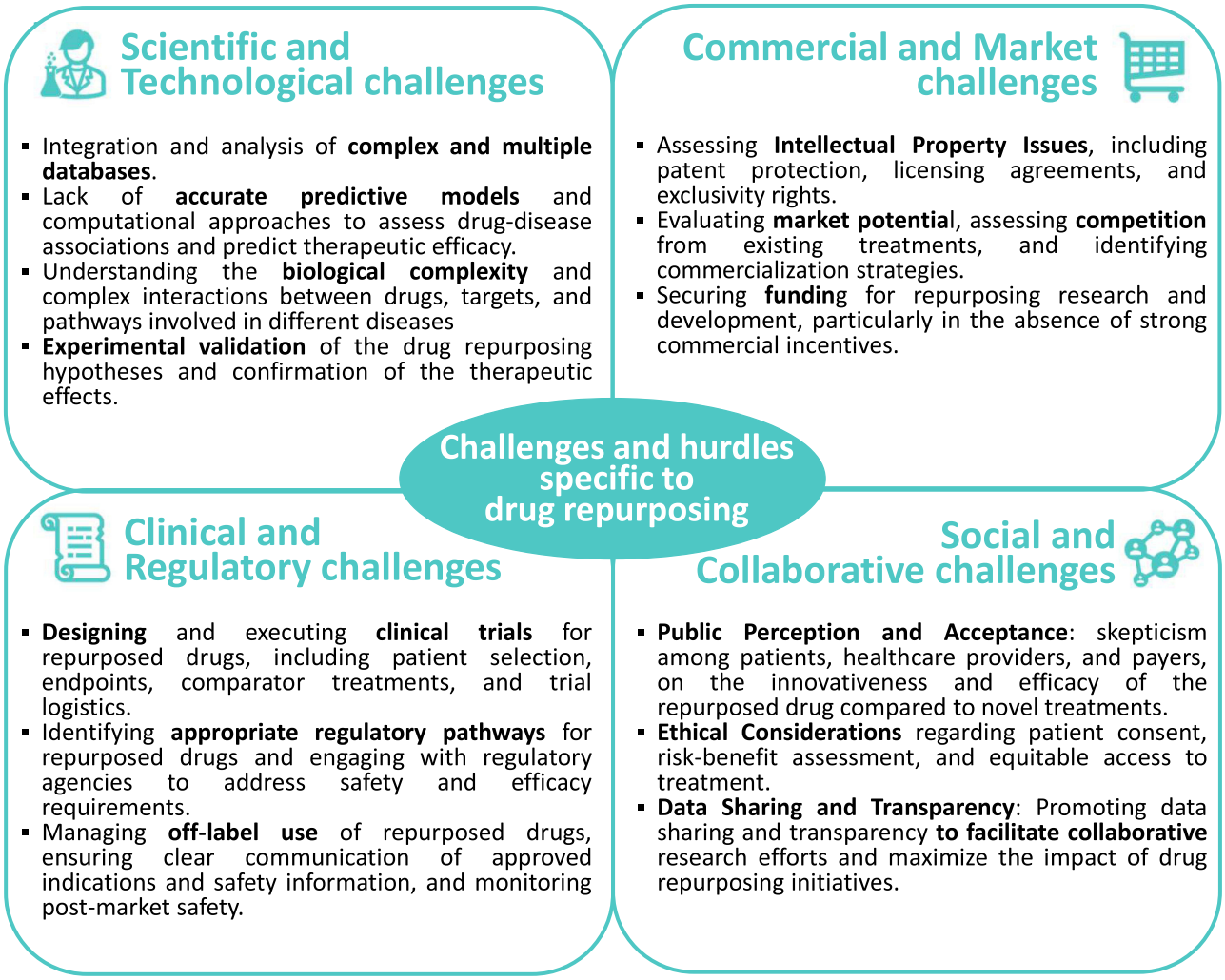

Figure 4 Challenges and hurdles specific to drug repurposing (DR). DR across different diseases, from oncology to rare diseases, presents significant challenges across multiple domains, that can be grouped in four main categories: 1) Scientific and Technological challenges 2) Commercial and Market challenges 3) Clinical and Regulatory challenges 4) Social and Collaborative challenges.

The perception that DR is not innovative enough relates to several interconnected factors across the four categories, particularly scientific and technical complexity, commercial considerations, regulatory challenges, limited funding sources and publication bias.

Commercial and Market Challenges

Issues within this category related to lack of funding and additional commercial challenges were raised by all stakeholders (Figure 4). Pharmaceutical companies often prioritize novel drug development over DR due to a more favourable business model and potential for profit. DR raises the unique challenge of posing a high initial investment risk and in the case of on-patent drugs, intellectual properties (IP) queries.[10,20]

The market for repurposed drugs may be highly competitive, with multiple companies vying for market share with similar products. This can lead to pricing pressures and reduced profitability, particularly if there are already established treatments available for the repurposed indication. The market for repurposed drugs is also often limited to niche indications or subgroups of patients, again resulting in smaller revenue potential for pharmaceutical companies.

Clinical and Regulatory Challenges

Designing and executing clinical trials for repurposed drugs involves unique considerations in selecting appropriate treatment regimens, patient populations, stratification, and recruitment.

Patients may be hesitant to enrol in trials for drugs already approved for other indications, and recruitment faces competition from trials testing novel drugs or regimens.

DR for new indications requires navigating complex regulatory pathways, including obtaining approval for new clinical trials which may have novel designs implemented to appropriately address the need of the population. Regulatory requirements for repurposed drugs are not well known or understood, leading to uncertainty and delays in the approval process.

Social and Collaborative Challenges

DR faces scepticism from different stakeholder groups, including patients who may perceive it as less innovative or effective compared to novel treatments. Overcoming negative perceptions and building confidence in safety and efficacy of DR is essential.

Challenges and Hurdles Specifically Related to DR in PC

During the meeting, it was agreed that DR represents an attractive option for PC and a number of preclinical and clinical studies in the area have been conducted in the past and are currently ongoing (Table 1).[8,13] Despite the increasing interest among drug developers for DR in oncology and PC, the number of repurposed medicines reaching market is low.[20]

While DR in PC might offer several advantages, including reduced costs and faster timelines compared to developing new drugs, there are significant challenges that limit its success as summarised above. One of the primary obstacles is the generally weak potency of repurposed drugs against the highly aggressive and therapy-resistant biology of PC. Repurposed drugs, originally designed for non-cancer indications, often lack the specificity and strength needed to overcome key oncogenic drivers in PC, such as KRAS mutations, enhanced DNA damage repair mechanisms, and metabolic reprogramming. Achieving therapeutic efficacy frequently requires higher doses, which can lead to unacceptable toxicity and poor patient tolerance. For instance, drug regimens exceeding 1–2 grams several times daily may not only be challenging for patients to adhere to but can also amplify systemic side effects, reducing the overall therapeutic benefit.

Moreover, the unique challenges of PC further complicate the application of DR. PC is characterized by its dense stromal microenvironment, which serves as a physical and biochemical barrier, impeding drug delivery and reducing the effectiveness of systemic therapies. This, combined with the tumour's intrinsic resistance to cell death and its propensity for early metastasis, often diminishes the efficacy of repurposed drugs unless used as part of a well-optimized therapeutic strategy.

Despite these hurdles, DR remains an appealing approach for PC, particularly given the disease's poor prognosis, limited treatment options, and urgent need for more accessible therapies. Unlike the protracted and costly development of new cancer drugs, DR leverages the established safety and pharmacokinetic profiles of existing medicines, which allows for faster progression to clinical trials and reduced development costs. However, the efficacy of these agents in PC is

often limited by their original pharmacological design, as many were not developed with the specific requirements of targeting aggressive cancers in mind. To enhance the success of DR in PC, several strategies must be prioritized. Combination therapies represent a promising avenue, where repurposed drugs are used alongside chemotherapies (eg, FOLFIRINOX or gemcitabine), targeted therapies, or emerging modalities such as immunotherapy.[21] For example, repurposed drugs that disrupt metabolic vulnerabilities in PC, such as glutamine dependency, could complement standard treatments to enhance tumour control. Similarly, drugs targeting the tumour microenvironment—such as those that modulate stromal interactions or improve immune recognition—could help overcome key barriers to treatment efficacy.

Beyond scientific innovation, addressing the structural and regulatory challenges, as further discussed below is essential.[22] Regulatory pathways for investigator-initiated trials should be streamlined to facilitate faster testing of repurposed drugs in this hard-to-treat cancer. Additionally, policies that encourage off-label use and provide funding for independent clinical trials can help drive DR efforts forward. Given the limited financial incentives for pharmaceutical companies to invest in DR for PC, strong government involvement and public-private partnerships will be vital. Governments could also enact legislation that supports easier access to repurposed drugs and simplifies regulatory approvals for these agents in oncology.

Recommendations and Actions Needed

Improving success in DR for PC requires a multifaceted, collaborative approach that addresses the numerous challenges across the research and development pipeline. Different recommendations were made during the meeting and all participants agreed on three essential, major recommendations. Specific recommendations are summarized in Table 2.

Need for Economic Investment/Funding

All meeting participants agreed on need for investment/funding from preclinical research through to biomarker discovery, clinical development and implementation into practice. Increased investment is needed for research into diagnosis, prevention and treatment, but also into supporting and encouraging collaborations across the PC community. Aligned with current thinking,[23,24] it was agreed that, while cancer mortality in many tumour groups will fall over coming years, PC mortality is likely to remain unchanged, with a grim prognosis in that by 2030, PC will be the second leading cause of cancer-related deaths in Europe and the US. Such a high disease burden to healthcare systems, society and the individual should warrant major focus of public and private investments/funding.

Need for Education and Awareness

The need for education and awareness was highlighted. Enhanced education about the signs and symptoms of PC will increase the number of patients pursuing help and clinicians recognising the disease, improving early diagnosis rate and treatment outcomes. Campaigns initiated by PC organisations (eg, Campaign launched by Pancreatic Cancer UK (pancreaticcancer.org.uk/what-we-do/we-campaign-for-change/earlier-diagnosis/), Campaign launched by the Italian Foundation Nadia Valsecchi (fondazionevalsecchi.org/quanto-pesano-80-grammicampagna-di-sensibilizzazione-sul-tumore-al-pancreas/)) often aim to increase global awareness of PC with the hope of advocating for more research funding, seeking policy changes and importantly, highlighting key disease characteristics.

There is a significant level of scepticism regarding DR in the patient community which may stem from public perceptions of repurposed drugs as "second-best" treatments compared to novel therapies.[25] This can impact the patient's decision on treatment. It is essential for clinical staff to inform and empower patients on all available treatment options, including DR, to ensure they can make informed decisions about their care.

To fully explore the benefits of DR and encourage investment and collaborative efforts, educational tools and training campaigns targeting all stakeholders can be crucial.

While highlighting the value and potential benefits, it is equally important to explain that DR is complex and requires careful consideration of scientific, clinical, regulatory, and commercial factors.

Need of Collaborative Efforts

Collaborative, multidisciplinary efforts are critical in addressing the challenges associated with PC. Bringing together experts across multiple sectors, ie, diagnosis, research, therapeutic approaches, as has been the case in this MSM, helps

Table 2 Actions Needed to Accelerate and Improve Drug Repurposing (DR) in Pancreatic Cancer (PC) Highlighted by Different Stakeholders

Patients/Patient Representatives	Researchers/Clinicians	Industry	Funders	Regulators
• Need to **increase awareness and education among patients** (and healthcare providers) on the pancreas itself, PC and related symptoms ≫ improve early diagnosis and intervention. • Need to **increase awareness among all stakeholders** ≫ improve interest, investments, global awareness. • Need to increase awareness among the general public to reduce stigmatization associated with PC. • Need to increase awareness and education among patients on the added value and possibilities of DR approaches. • Need of **collaborative efforts across multiple sectors**, ie, diagnosis, research, therapeutic development, and patient empowerment/advocacy.	• Need of **investment in predictive biomarker/screening tools development** ≫ improve early diagnosis and intervention. • Need of **investment in preclinical research** to better understand the complexity and heterogeneity of the disease. • Need of **innovative trial designs** (patient stratification, multiple arms in the same trial etc.) (*[1]) • Need to **increase awareness and education among healthcare providers** on PC and related symptoms ≫ improve early diagnosis. • Educational needs on the whole DR pipeline ≫ training on different topics. • Need of **collaborative efforts** (data and infrastructure sharing, etc.).	• Need for more predictability for repurposing projects in terms of needed resources (financial, technological, human) and turn of investment. • Need of **collaborative efforts** and early interaction/dialogue with all stakeholders. • Need of **transparent and adaptable regulatory pathways**.	• Funding (both public and private) of DR research is limited and the funding landscape is quite fragmented ≫ **need of collaborative efforts among funders to synergize, exchange best practices, reduce fragmentation** by aligning research agenda, identifying opportunities for co-funding (including joint calls), creation of innovative funding streams, and viable business models. • Need of a marketplace to connect interesting repurposing projects and funders.	Regulatory agencies play a crucial role in facilitating DR efforts by providing guidance, oversight, and support throughout the development and approval process. Here some recommendations to potentially increase the success rate of DR projects: • **Encourage early engagement and dialogue with regulators** to discuss repurposing strategies, study designs, and regulatory requirements. (Scientific Advice and Protocol assistance (ema.europa.eu/en/human-regulatory-overview/research-and-development/scientific-advice-and-protocol-assistance) • **Use tailored regulatory pathways** (eg, Orphan Drug Designation, PRIME scheme etc.)

Notes: (*1) Currently two initiatives to improve innovative trial design in PC are running: 1) Precision Promise (PrP) is a multi-center, seamless Phase 2/3 platform trial (clinicaltrials.gov/study/NCT04229004) designed to evaluate multiple regimens in metastatic PC sponsored by the Pancreatic Cancer Action Network (PanCAN, pancan.org/); 2) Precision Panc (precisionpanc.org/) is a pan-UK multi-center, Next Generation Therapeutic Development Platform that aims to rapidly translate preclinical molecular advances into clinical practice sponsored by Cancer Research UK (cancerresearchuk.org/).

generate insights on how best to develop therapies and improve patient outcomes. During the meeting the need for resource and data sharing (eg, sharing of patient samples, clinical data, biomaterials, research infrastructures) was emphasized.

Discussion

PC remains a global health challenge with one of the lowest survival rates among all major cancers, underscoring the urgent need for innovative therapeutic strategies. Despite advances in oncology, the development of effective treatments for PC continues to face significant scientific, clinical, and regulatory hurdles. DR represents a promising strategy in this landscape, offering potential advantages such as reduced costs and faster timelines. However, as highlighted in this report, DR's application in PC is fraught with challenges that require coordinated efforts and unified collaboration.

PC's unique biology poses significant obstacles to the success of repurposed drugs. Its dense stromal microenvironment and intrinsic therapy resistance reduce the effectiveness of systemic therapies, necessitating the exploration of combination regimens and advanced drug delivery methods. Moreover, the weak potency of repurposed drugs against key oncogenic drivers often necessitates high doses that are difficult to administer and poorly tolerated by patients. Overcoming these hurdles requires scientific innovation, strategic policymaking, and effective collaboration across sectors.

The REMEDi4ALL MSM underscored the importance of coordinated efforts to address these challenges and served as a starting point for driving collaboration and catalysing collective actions in tackling the intricate challenges associated with DR in PC.

Anecdotally, the meeting demonstrated significant value for participants, who identified the need for follow-up meetings with focused agendas addressing specific aspects of the dynamic PC and DR landscapes. These proposed actions, outlined in Table 3, highlight the critical need for ongoing collaboration. The REMEDi4ALL initiative is uniquely positioned to lead this effort, with its outreach and mandate enabling the organization of impactful discussions like the MSM. Moreover, this framework can be expanded to facilitate collaborations across industry and academia, with the ultimate goal of streamlining patient access to effective therapies.

Table 3 Concrete Actions Implemented/Planned Within REMEDi4ALL to Accelerate and Improve Drug Repurposing (DR) in Pancreatic Cancer (PC)

Identified Needs to Improve DR in PC	Concrete Actions Implemented/Planned Within REMEDi4ALL
Need for economic investment/funding • Need of collaborative efforts among funders to synergize, exchange best practices, and reduce fragmentation in funding initiatives.	- REMEDi4ALL has currently established a funders network bringing together diverse funding entities - both public and private- from across the globe dedicated to advance DR initiatives (remedi4all.org/funders-network/). The overall aims are: • to **promote and facilitate collaboration** among all type of funding entities and with all other relevant stakeholders. • to **synergize funding activities and align research agendas** - reduce fragmentation of the DR funding landscape, support alignment of research agenda's, facilitate coordination of funding activities, and support joint calls. • to innovate funding and business models - through public private collaborations. • to share best practices and learnings. • to provide a **marketplace for funding opportunities** and connect funders with investigators and projects. • to find solutions for funding barriers and advocate for policy changes.
Need for education and awareness • Need to increase education among all stakeholders on the whole DR pipeline. • Need to increase awareness among patients on the added value and possibility of DR approaches.	- REMEDi4ALL is currently building **a high-quality content training and educational portfolio** and developing a comprehensive curriculum for all stakeholders. These include virtual courses, annual academy, mentoring programs for researcher/clinicians and patients, hackathons for early career researchers, etc. The online training will be launched in autumn 2024. - REMEDi4ALL collaborates with different PC patient organizations to co-develop, launch and promote **targeted educational campaigns on DR in PC**, especially sharing real-life testimonials and case studies of patients who have benefited from repurposed drugs or participated in DR clinical trials.
Need of collaborative efforts.	- Build on the momentum and collaborative spirit generated during the 1st MSM **organizing yearly update meetings** to sustain engagement and progress (next meeting planned for autumn 2024).

Beyond its immediate outcomes, the MSM serves as a model for how multi-stakeholder collaboration can catalyse progress in patient-centric drug development. Governments, academic institutions, and industry players should draw inspiration from this approach, fostering partnerships that align research and development efforts with patient needs. Importantly, policies must evolve to simplify regulatory pathways for investigator-initiated trials, support off-label use, and incentivize public-private partnerships in DR.

In conclusion, while DR offers immense potential in PC, its success will depend on overcoming biological, logistical, and systemic barriers. Multi-stakeholder collaboration, such as that exemplified by the REMEDi4ALL MSM, represents a critical first step toward addressing these challenges and advancing innovative solutions. We hope that the momentum generated by this meeting will serve as a catalyst for continued efforts, fostering a unified approach to tackling the intricate challenges associated with DR in PC and ultimately improving outcomes for patients worldwide.

Data Sharing Statement

No new data were generated or analysed in support of this article. All data are derived from sources in the public domain.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The views expressed in the article reflect the views of the authors and are not intended to convey the views of their employers or affiliations. The authors declare that they have no competing interest in this work.

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