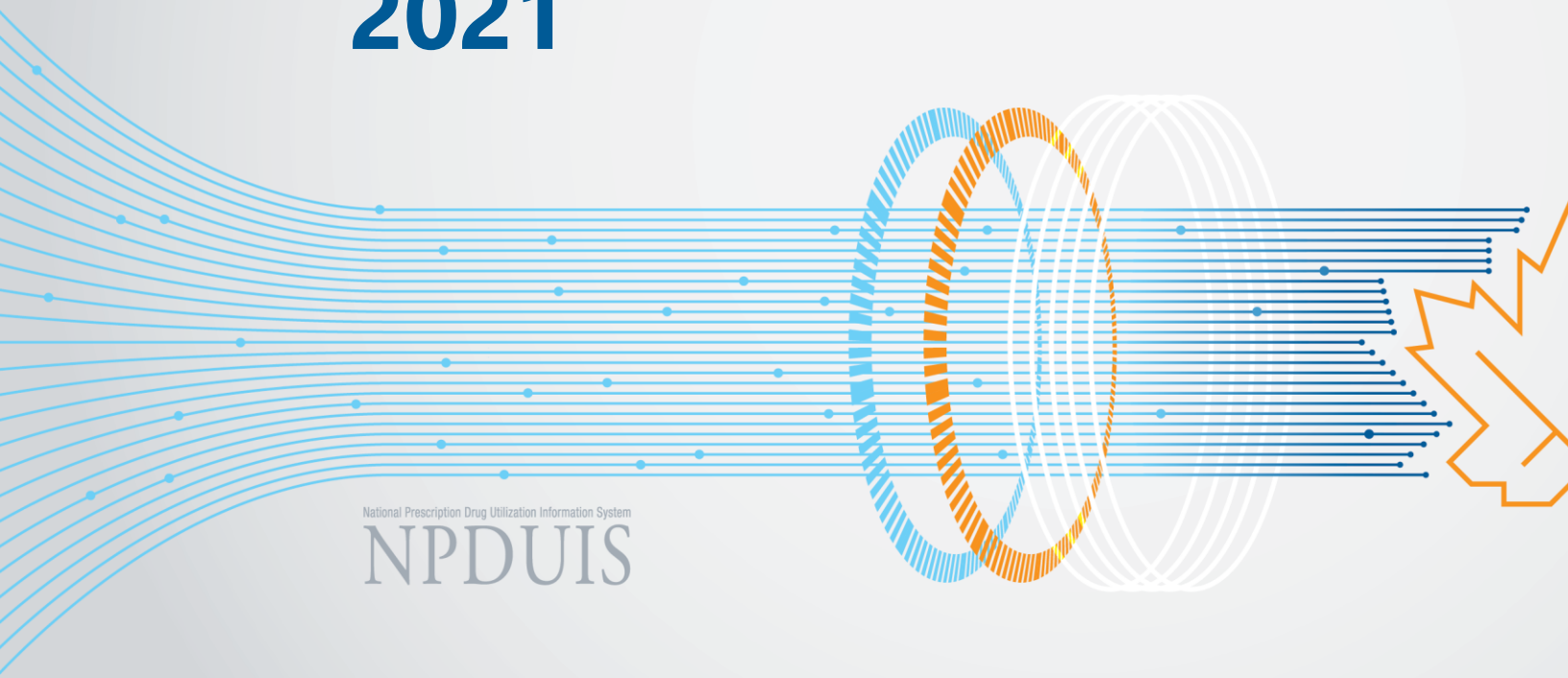
Patented Medicine Prices Review Board

Conseil d'examen du prix des médicaments brevetés

MEDS

PIPELINE MONITOR 2021



National Prescription Drug Utilization Information System

NPDUIS

Canada

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Patented Medicine Prices Review Board
Standard Life Centre
Box L40
333 Laurier Avenue West
Suite 1400
Ottawa, ON K1P 1C1

Tel.: 1-877-861-2350
TTY 613-288-9654

Email: PMPRB.Information-Renseignements.CEPMB@pmprb-cepmb.gc.ca
Web: www.canada.ca/en/patented-medicine-prices-review.html

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About the PMPRB

The Patented Medicine Prices Review Board (PMPRB) is an independent quasi-judicial body established by Parliament in 1987. The PMPRB has a dual regulatory and reporting mandate: to ensure that prices at which patentees sell their patented medicines in Canada are not excessive; and to report on pharmaceutical trends of all medicines and on research and development spending by patentees.

The NPDUIS Initiative

The National Prescription Drug Utilization Information System (NPDUIS) is a research initiative established by federal, provincial, and territorial Ministers of Health in September 2001. It is a partnership between the PMPRB and the Canadian Institute for Health Information (CIHI).

Pursuant to section 90 of the *Patent Act*, the PMPRB has the mandate to conduct analysis that provides decision makers with critical information and intelligence on price, utilization, and cost trends so that Canada's healthcare system has more comprehensive and accurate information on how medicines are being used and on sources of cost pressures.

The specific research priorities and methodologies for NPDUIS are established with the guidance of the NPDUIS Advisory Committee and reflect the priorities of the participating jurisdictions, as identified in the NPDUIS Research Agenda. The Advisory Committee is composed of representatives from public drug plans in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, Yukon, the Non-Insured Health Benefits Program (NIHB), and Health Canada. It also includes observers from CIHI, the Canadian Agency for Drugs and Technologies in Health (CADTH), the Ministère de la Santé et des Services sociaux du Québec (MSSS), and the pan-Canadian Pharmaceutical Alliance (pCPA) Office.

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Disclaimer

NPDUIS operates independently of the regulatory activities of the Board of the PMPRB. The research priorities, data, statements, and opinions expressed or reflected in NPDUIS reports do not represent the position of the PMPRB with respect to any regulatory matter. NPDUIS reports do not contain information that is confidential or privileged under sections 87 and 88 of the *Patent Act*, and the mention of a medicine in an NPDUIS report is not and should not be understood as an admission or denial that the medicine is subject to filings under sections 80, 81, or 82 of the *Patent Act* or that its price is or is not excessive under section 85 of the *Patent Act*.

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EXECUTIVE SUMMARY

Meds Pipeline Monitor (MPM) is a horizon scanning report that features a selection of new medicines in the late stages of clinical evaluation that may have a significant impact on future clinical practice and drug spending in Canada.

Medicines in Phase III clinical trials or pre-registration are considered as candidates if they have the potential to address an unmet therapeutic need, offer a novel mechanism of action or therapeutic benefit over existing therapies, or treat a serious condition. The final selection features medicines that treat a broad range of therapeutic areas. In addition to identifying new medicines for inclusion in the list, medicines featured in the previous edition of the MPM are also reviewed to report on changes to their status in the pipeline. A section focused on Canada highlights potentially significant medicines currently under review by Health Canada.

This edition of the report also includes a section on COVID-19, which provides an overview of medicines undergoing Phase I, II, and III clinical trials or in pre-registration for the treatment and prevention of the novel coronavirus disease.

The report collects data from two main sources: GlobalData's Healthcare database is used to identify medicines currently undergoing clinical evaluation, while Health Canada's Drug and Health Product Submissions Under Review list provides information on new medicines under review in Canada.

Together with its companion publication *Meds Entry Watch*, this report series monitors the continuum of new and emerging medicines in Canada and internationally, providing key information to decision makers, researchers, patients, and clinicians, among other stakeholders.

Highlights of the Meds Pipeline 2021

- In 2021, the pipeline contained nearly 8,500 new medicines in various stages of evaluation, compared to just under 7,000 the year before. The higher-than-average number of new medicines in the pipeline may be attributable to the ongoing COVID-19 pandemic, which has delayed clinical trials for other therapeutic areas.
- Consistent with previous years, the 1,145 new medicines undergoing Phase III clinical trials and pre-registration in 2021 represented a wide range of therapeutic areas and accounted for 13% of the total pipeline.
- Oncology continued to dominate the therapeutic mix in 2021, with cancer treatments representing one third (35%) of medicines in all phases of clinical trials. Treatments for infectious diseases held the second largest share of the pipeline, at 14%, due to the rapid response to the COVID-19 pandemic.
- One third (33%) of medicines in Phase III clinical trials or pre-registration had an early orphan designation approved through the US FDA or the EMA, which is consistent with the increasing trend in the prevalence of orphan-designated medicines entering the pharmaceutical market.
- Thirty-one late-stage new medicines were selected for addition to the 2021 MPM based on their potential impact on the Canadian healthcare system. Some of these medicines may offer breakthroughs in treating previously unmet needs or may have the potential to treat large patient populations.

- Five of the new medicines added to the MPM in 2021 have forecasted annual global revenues of over US $1 billion by 2027.
- Of the 27 new medicines featured in the 2020 edition of the MPM, nine received market authorization, 10 were retained on the list as they continued to satisfy the selection criteria, and eight were removed as their clinical trials were discontinued or they no longer meet the selection criteria.
- As of September 2021, 663 vaccines and therapies were undergoing clinical evaluation globally for the prevention and treatment of COVID-19.
- As of February 2022, Health Canada is reviewing the safety and efficacy of 18 new and supplemental drug submissions for the prevention and treatment of COVID-19.

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LIST OF TERMS

For the purpose of this report, the following terms and associated definitions apply.

CLINICAL EFFICACY: The maximum response achievable from a medicine in research settings and the capacity for sufficient therapeutic effect in clinical settings.[i]

GENE THERAPY: A technique for the treatment of genetic disease in which a gene that is absent or defective is replaced by a healthy gene, as defined by Health Canada.[ii]

MARKET AUTHORIZATION: The process of approval for a medicine to be marketed in a given country. In Canada, market approval is granted following a substantive scientific evaluation of a product's safety, efficacy, and quality, as required by the *Food and Drugs Act* and *Regulations.*[iii]

MEDICINAL INGREDIENT: A chemical or biological substance responsible for the claimed pharmacologic effect of a drug product. Sometimes referred to as a molecule, active substance, or active ingredient.[iv]

MEDICINE: A broad term encompassing both the final drug product and medicinal ingredient(s); this encompasses chemically manufactured active substances and biologics, including gene therapies. Medicines are reported at the medicinal ingredient level and can refer to a single ingredient or a unique combination of ingredients.

MEDICINE PIPELINE: A set of new medicine candidates under active research and development by biotechnology and pharmaceutical companies.

NEW MEDICINE: A medicinal ingredient that has not previously received market authorization by a regulator.[iv]

ORPHAN MEDICINE: A medicine used to treat a rare disease. For the purposes of this study, orphan medicines are defined as having an orphan designation granted by the US Food and Drug Administration (FDA) or the European Medicines Agency (EMA) for the relevant indication.

PHASES OF CLINICAL TRIALS

PHASE I: These trials test an experimental medicine on a small group of people for the first time. The purpose is to look at the medicine's safety, determine a safe dosage range, and monitor if there are any side effects.

PHASE II: In this phase, the medicine is given to a larger group of people (usually 100 or more) to gather data on how well the medicine works to treat a disease or condition, check its safety on a wider range of people, and determine the best dose.[v]

PHASE III: These controlled or uncontrolled trials are conducted after preliminary evidence suggesting efficacy of the medicine has been demonstrated. They are intended to gather additional and confirmatory information about the clinical efficacy and safety of the medicine under the proposed conditions of use.[ii] Phase III trials are usually randomized with double-blind testing in several hundred to several thousand patients.

PRE-REGISTRATION: A medicine is in the pre-registration phase once all the necessary clinical trials have been completed and it is waiting for registration or approval for use by a governing body.[vi]

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[i] Holford NHG, Sheiner LB. 1981. *Understanding the dose-effect relationship: Clinical application of pharmacokinetic-pharmacodynamic models.* Clin. Pharmacokinet. 6 (6): 429–453. doi: 10.2165/00003088-198106060-00002.

[ii] https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/health-canada-clinical-trials-database/glossary.html

[iii] https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products.html

[iv] http://www.pmprb-cepmb.gc.ca/en/npduis/view.asp?ccid=1310&lang=en

[v] https://www.canada.ca/en/health-canada/services/clinical-trials.html

[vi] http://www.appliedclinicaltrialsonline.com/are-phase-labels-still-relevant

INTRODUCTION

This 11th edition of the *Meds Pipeline Monitor* (MPM) features a selection of medicines in Phase III clinical trials or pre-registration in 2021 that have the potential to significantly impact clinical practice and drug spending in Canada.

The methodology, which is detailed in the next section, uses a specific set of criteria to identify a list of pipeline candidates from the GlobalData Healthcare database, as well as a list of candidates currently under review in Canada from Health Canada's Drug and Health Product Submissions Under Review (SUR) lists. Medicines reported in the previous edition are also reviewed in this report, including those that continue to qualify for the list of candidates as well as those that have since received market authorization. Likewise, the new medicines featured in this report will be monitored in future editions of the MPM to identify candidates that successfully enter the market.

To provide context for the selection of medicines, the MPM includes a snapshot of the entire pipeline, with an emphasis on the therapeutic breakdown of each phase of clinical evaluation. This edition of the report also highlights select vaccines and other medicines undergoing evaluation for the treatment and prevention of COVID-19, in global markets as well as in Canada. The medicines assessed for this portion of the analysis include new therapies as well as previously marketed treatments that have been repurposed.

Meds Pipeline Monitor is a companion publication to *Meds Entry Watch*, which analyzes the market dynamics of newly approved medicines in Canada and internationally. Together, these two PMPRB reports monitor the market continuum of late-stage pipeline medicines and new approvals, providing decision makers, researchers, patients, clinicians, and other stakeholders with information on the emerging medicines and evolving cost pressures.

METHODOLOGY

Snapshot of the Pipeline

The snapshot of the pipeline captures the composition of medicines in various phases of clinical evaluation at a single point in time. For the purpose of this analysis, a full list of pipeline medicines was retrieved from GlobalData's Healthcare database in September 2021.

New medicinal ingredients are identified as those with no prior approvals through the US Food and Administration (FDA), the European Medicines Agency (EMA), or Health Canada. The distribution of new medicines by therapeutic area corresponds to the indication under evaluation, as reported by GlobalData. Note that a single new medicine may be undergoing multiple clinical studies for separate indications.

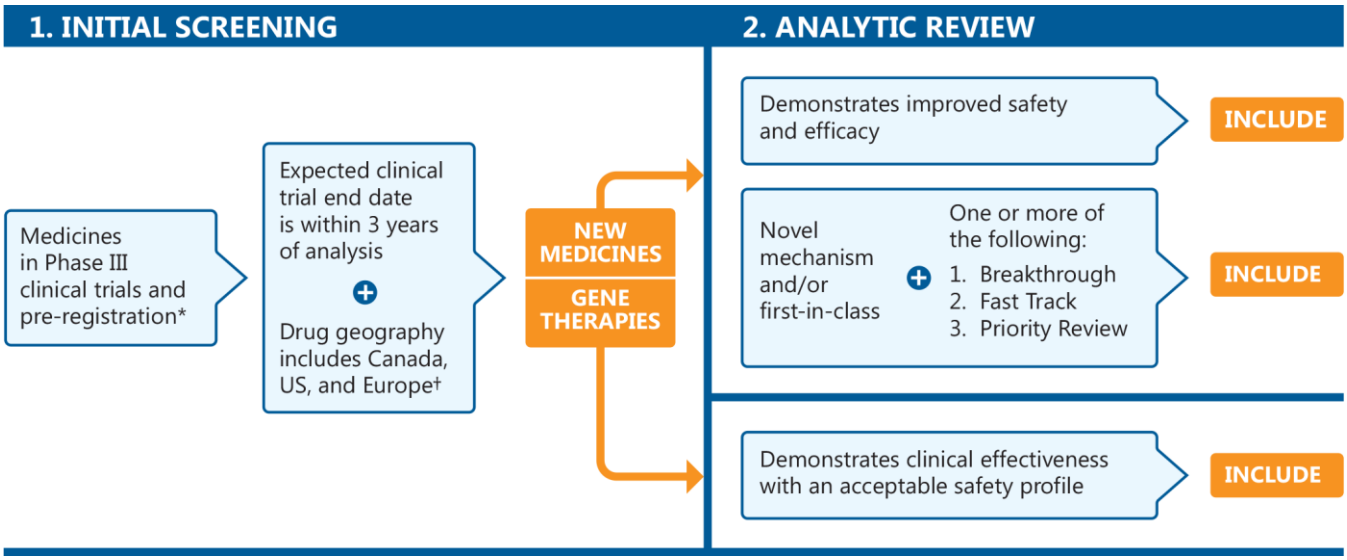
The list of medicines used for the analysis of orphan medicines in the pipeline was retrieved in September 2021. For the purposes of this analysis, orphan medicines were defined as new medicines that had been granted an orphan designation by the US FDA or the EMA.

Meds Pipeline Monitor

The MPM focuses on new medicines in Phase III clinical trials or pre-registration in Canada, the United States, and Europe. Pipeline medicines are selected for inclusion using a two-stage process (Figure 1). The initial screening stage selects medicines in the late phases of clinical evaluation, while the analytic review stage involves a more rigorous appraisal of each potential candidate to identify medicines that may have a significant clinical and budgetary impact. The second stage considers a specific set of criteria, in addition to the results of a thorough review of clinical evidence and scientific literature.

This methodology is reviewed annually and refined as required.

FIGURE 1. Selection process for medicines featured in the Meds Pipeline Monitor



* In pre-registration with the US Food and Drug Administration (FDA).
† Has Phase III clinical trials in Canada, the United States, or geographic Europe (excluding Russia and Turkey).

Stage 1. Initial screening

GlobalData's Healthcare database is used to identify a list of medicines undergoing Phase III clinical trials or in pre-registration. These medicines serve as the basis for the initial screening stage.

The drug geography, defined as the geographical region or country in which the medicine is either marketed or in pipeline development, is restricted to Canada and other countries with similar regulatory and approval processes: the US and geographic Europe (excluding Russia and Turkey). Only new medicinal ingredients that have adequate data that supports increased efficacy and safety from clinical trials are considered as candidates for inclusion.

Medicines approved or sold in Canada, the US, or Europe for any other indication or in any other strength or formulation are excluded during the selection process, as are medicines whose clinical trials are inactive, suspended, withdrawn, or terminated.

The selection process groups pipeline candidates into two categories: (a) new medicines and (b) new gene therapies. As illustrated in Figure 1, the initial screening process for both groups is the same, but the analytic review stage is slightly different, as the available data for gene therapies is limited.

Stage 2: Analytic screening

Selection criteria

Following the initial screening, the second stage of the process considers a number of selection criteria to determine the final list of pipeline candidates. These criteria are detailed in Table 1.

Gene therapies are selected using a broader approach, as the clinical evidence available for this group is relatively limited. A gene therapy is retained on the list if the preliminary (or completed) results from Phase III trials suggest that there is evidence of clinical effectiveness with an acceptable safety profile.

TABLE 1. Selection criteria for the Meds Pipeline Monitor

SELECTION CRITERIA
Improved safety and efficacy shown in clinical trials: a medicine that demonstrates increased safety, new outcome measures, or increased life expectancy or quality of life
Novel mechanism / First-in-class: a medicine that uses a new mechanism of biochemical interaction to produce a medical effect, or a medicine that is the first in its therapeutic class In addition, **the medicine must fall into one or more of the three following FDA designations** for expedited development and review:
Breakthrough – medicines intended to treat a serious condition and for which preliminary clinical evidence indicates that they may demonstrate substantial improvement over available therapy on a clinically significant endpoint(s)
Fast Track – medicines used to treat serious conditions and fill an unmet medical need

SELECTION CRITERIA
Priority Review – medicines that would provide significant improvements in the safety or effectiveness of the treatment, diagnosis, or prevention of serious conditions when compared to standard applications
Gene therapy: a technique for the treatment of genetic disease in which a gene that is absent or defective is replaced by a healthy gene

Additional descriptive information

A profile of each successful pipeline candidate is provided, including a brief outline of the indication and mechanism of action, as well as a summary of the applicable published outcomes from clinical trials. Specific attributes that may influence the potential uptake or cost of each medicine are also identified. Table 2 provides a detailed description of these key attributes.

TABLE 2. Key attributes of new medicines selected for the Meds Pipeline Monitor

ATTRIBUTE	RELEVANCE	DATA SOURCES
Phase III clinical trials in Canada	Medicines tested in Canada are likely to be of interest to Canadians	GlobalData Healthcare; Health Canada Clinical Trials Database; Health Canada Drug and Health Product Submissions Under Review; National Institutes of Health (NIH) Clinical Trial Registry
Rare or orphan designation	Medicines used to treat rare diseases or conditions that generally have high treatment costs and may result in substantial spending	GlobalData Healthcare
Biologic medicine	These complex molecules produced by living organisms are expected to have high costs, resulting in substantial spending	
Add-on therapy	Medicines designed to be used in conjunction with existing medicines may increase the treatment cost and contribute to higher spending	

The profile also provides details of potential cost implications, if available, which includes the forecasted global revenues reported by GlobalData.

The indications and therapeutic areas of the featured medicines correspond to their Phase III clinical trial or pre-registration stage. A single clinical trial may assess multiple indications within the same therapeutic area. These medicines may also have additional indications at various phases of clinical evaluation that are not mentioned in this report. The scientific description and key attributes provided are focused on the specified indication(s) for the selected medicines.

Medicines reported for a given year are reassessed for each following edition of the MPM. They may be retained on the MPM list if they continue to meet the selection criteria, or they may be removed if they have been granted market authorization through the US FDA, the EMA, or Health Canada. Medicines for which clinical trials have been discontinued or for which the selection criteria is no longer met are not reported in subsequent editions.

Spotlight on Canada

Health Canada's Drug and Health Product Submissions Under Review (SUR) are assessed using a modified approach to the selection criteria to establish a list of medicines that may have the potential to significantly affect Canadian drug spending.

Medicines listed in the SUR include new drug submissions containing medicinal ingredients that have not been approved in Canada for any indication, in any strength or form. Unlike the selection of medicines identified in the pipeline lists, these medicines may have previously received market authorization through the US FDA or the EMA.

Selection Criteria

Following this initial screening, the medicine must demonstrate at least one of three selection criteria to qualify for inclusion in the report. These criteria are listed in Table 3.

TABLE 3. Selection criteria for the list of medicines currently under review by Health Canada

SELECTION CRITERIA	
	**Improved safety and efficacy shown in clinical trials:** a medicine that demonstrates increased safety, new outcome measures, or increased life expectancy or quality of life
	**Novel mechanism/First-in-class:** a medicine that uses a new mechanism of biochemical interaction to produce a medical effect, or a medicine that is the first in its therapeutic class
	**Gene therapy:** a technique for the treatment of genetic disease in which a gene that is absent or defective is replaced by a healthy gene

Additional descriptive information

The profile of each medicine under review includes the key attributes listed in Table 2, as well as a brief outline of the indication and mechanism of action, and a summary of the applicable published outcomes from clinical trials. Specific attributes that may influence the potential uptake or cost of each medicine are also identified, as well as potential cost implications, if available, which includes the forecasted global revenues reported by GlobalData.

Although FDA designations for expedited development or review are not a selection criteria for this list, relevant Breakthrough, Fast Track, and Priority Review designations are indicated where available. For a description of these designations, see Table 1.

Indications and therapeutic areas correspond to the information provided by GlobalData. The scientific description and key attributes provided are focused on the specified indication(s) for the selected medicine. For medicines under review for multiple indications, the primary indication is used.

Emerging COVID-19 Therapies

Vaccines and medicines under development worldwide with an indication for COVID-19 were extracted for this section of the report, based on a development stage of Phase I, II, and III clinical trials or pre-registration. All such medicines were assessed for this analysis, both new and existing. New medicines were identified as those that have not yet been marketed for any indication, while existing medicines include previously marketed therapies undergoing evaluation for new indications related to the treatment of COVID-19.

This section also highlights the COVID-19 medicines that have been approved in Canada as well as the medicines that are currently undergoing an expedited review process.

Data Sources

The GlobalData Healthcare database is the primary data source for the identification of pipeline medicines and their corresponding clinical information, including the clinical trial end date. GlobalData Healthcare tracks medicines from pre-clinical discovery, through clinical trials, to market launch and subsequent sales. The database is a comprehensive resource of medicines under various stages of clinical development. Search capabilities allow for controlled selection of specific attributes, including but not limited to the following: phase of clinical development, therapeutic area, molecule type, indication, drug geography, mechanism of action, and regulatory designations.

The Health Canada Drug and Health Product Submissions Under Review (SUR) lists are used to determine the featured selection of new medicines currently undergoing review by Health Canada. The SUR is a publicly available set of lists that identify pharmaceutical and biologic drug submissions containing new medicinal ingredients not previously approved in Canada that have been accepted for review. This applies to submissions accepted on or after April 1, 2015.

As this selection is restricted to new medicines, additional sources of information are cross-referenced to confirm that the candidates have not previously been approved or sold. These include recorded sales data from the IQVIA MIDAS® Database (all rights reserved); regulatory approval records from the National Institutes of Health (NIH), US FDA, the EMA, and Health Canada; and information in Health Canada's Clinical Trials database and ClinicalTrials.org.

LIMITATIONS

This analysis captures a snapshot of the pipeline over a specific time period. Although it is assumed to be representative of the composition of medicines over the entire year, the pipeline is fairly dynamic and the share of medicines in any particular therapeutic area will vary.

This assessment is restricted to medicines under development for market in Canada and other countries with similar regulatory and approval processes: the US and Europe (excluding Russia and Turkey). Medicines that have not yet received market authorization in these countries were considered as potential pipeline candidates, even if they have been approved elsewhere in the world.

Some of the selected medicines may be undergoing clinical trials for additional indications; this analysis only reports on indications in the late stages of development—that is, in Phase III clinical trials or pre-registration with the US FDA—that satisfy the selection criteria set out in the methodology.

For each selected pipeline medicine, the primary manufacturer(s) and trade name, if available, are given along with the indication. In some cases, additional manufacturers, including subsidiaries, may also be involved in the development of the medicine with the primary companies, or other manufacturers may be developing the same medicine for other indications.

Although this report attempts to identify the most important pipeline medicines, the selection is not exhaustive and some medicines that are not included in this selection may have a significant impact on future clinical practice and drug spending in Canada.

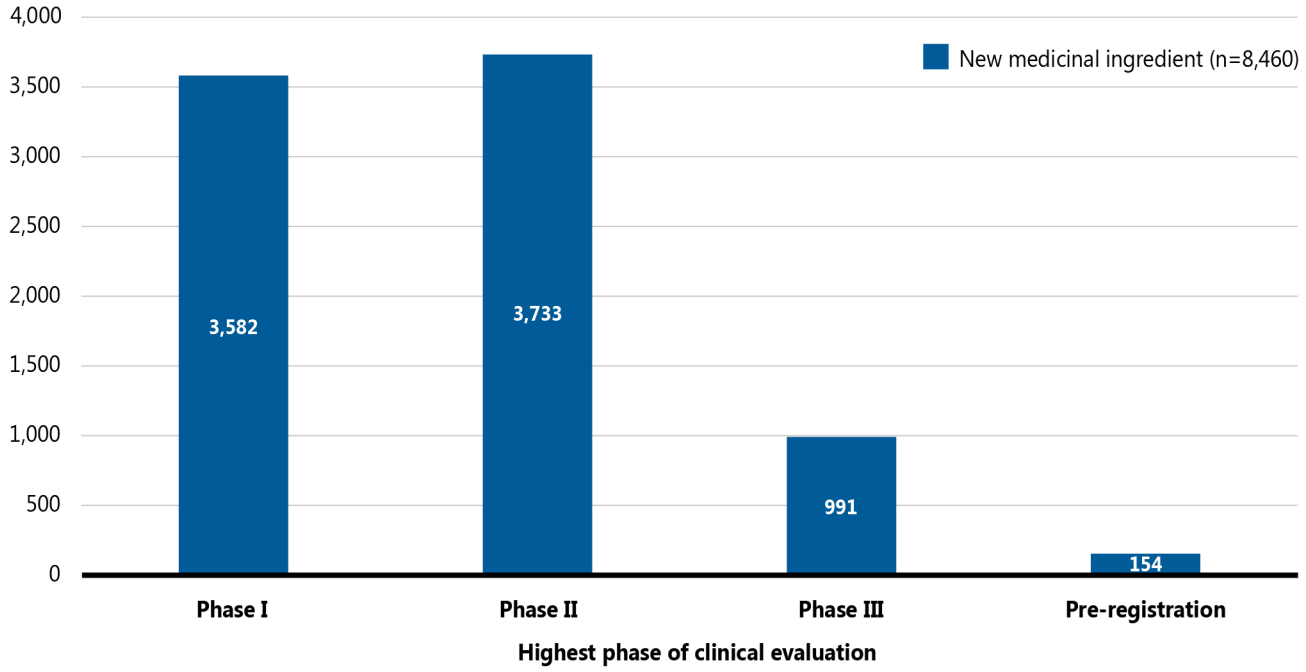
Unless otherwise specified, the featured lists capture the composition of the pipeline as of September 2021 and are validated as of the end of March 2022. Due to the unpredictability and fast-moving nature of pipeline medicines entering the market, some of the medicines listed in this edition may have been approved or marketed in Canada, the US, or Europe following this date. Pipeline medicines that have not been included in this report due to the timing of the selection may presently meet the selection criteria; these, along with the rest of the drug pipeline, will be considered for the next edition of the report.

SNAPSHOT OF THE 2021 PIPELINE

Pharmaceutical innovation is transforming the development and application of medical treatments worldwide. Nearly 8,500 new medicines were in clinical evaluation or pre-registration in 2021.

Figure 2 provides a snapshot of the pipeline in 2021, including the number of new medicinal ingredients in each phase of clinical evaluation. Of the 8,460 new medicines, 1,145 (13%) were in Phase III clinical trials or pre-registration.

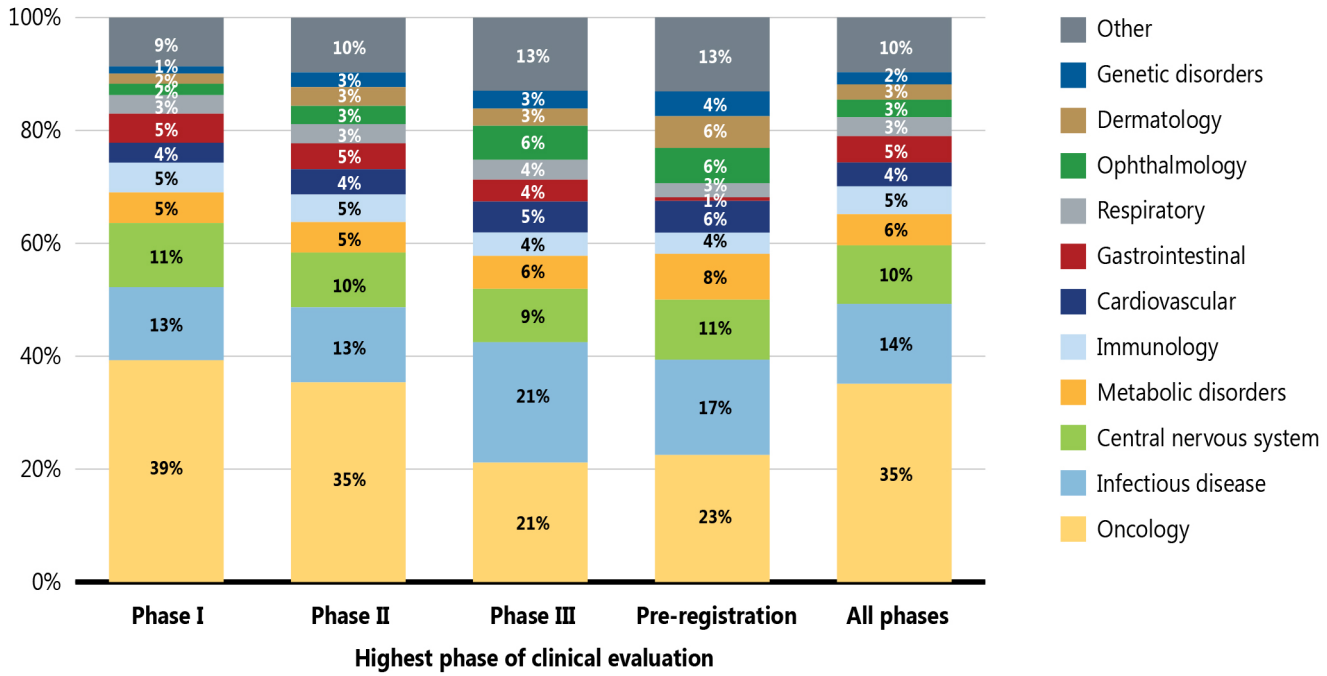
FIGURE 2. Number of new medicines in each phase of clinical evaluation, 2021



Data source: GlobalData Healthcare database (accessed September 2021); IQVIA MIDAS® Database.

Figure 3 illustrates the distribution of new medicines by therapeutic area from Phase I through pre-registration. Although the findings show that pipeline medicines represented a wide range of therapeutic areas in 2021, cancer treatments dominated the therapeutic mix across the pipeline, accounting for over one third (35%) of medicines in all phases of clinical evaluation. Other important pipeline therapies include those for infectious diseases (such as COVID-19) and central nervous system therapies.

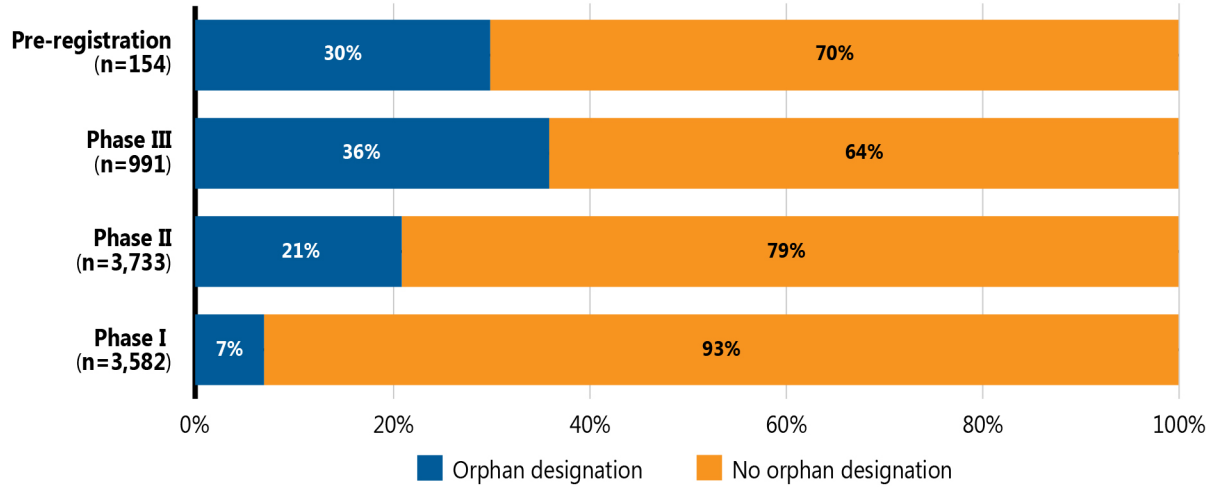
FIGURE 3. Therapeutic class distribution of pipeline medicines by phase of clinical evaluation, 2021



Data source: GlobalData Healthcare database (accessed September 2021).

Orphan medicines, as designated by the US Food and Drug Administration (FDA) or the European Medicines Agency (EMA), accounted for a notable proportion of the total medicine pipeline in 2021. Figure 4 provides the shares of orphan and other medicines in the pipeline from Phase I to pre-registration. Orphan medicines made up a greater share of medicines in the later stages of clinical evaluation, accounting for 8% of pipeline medicines in Phase I clinical trials and 30% of those in pre-registration.

FIGURE 4. Share of orphan medicines in the pipeline by highest phase of clinical evaluation, 2021



Note: Includes all pipeline medicines with a highest development stage of Phase I to pre-registration that are being developed for market in Canada, the United States, or geographic Europe (excluding Russia and Turkey). Orphan medicines were defined as pipeline medicines that have been granted an orphan designation by the US Food and Drug Administration (FDA) or the European Medicines Agency (EMA).
Data source: GlobalData Healthcare database (accessed September 2021).

MEDS PIPELINE MONITOR 2021

The following tables list the selection of new pipeline medicines in 2021, those retained from earlier editions of the *Meds Pipeline Monitor*, as well as medicines featured in previous editions that have since gained market authorization. These pipeline medicines will continue to be monitored in future editions of this report.

Applying the screening criteria described in the Methodology section, 31 of the 1,145 pipeline medicines in late stages of clinical evaluation were selected for inclusion in the 2021 new medicines list (Table 4).

Of the new medicines featured in the 2020 report, 10 were retained as recent evidence continues to support promising clinical benefit that satisfies the selection criteria (Table 5). Nine of the 2020 pipeline medicines had received market authorization in the US, Europe, or Canada as of December 2021 (Table 6), while eight were removed from the list as their clinical trials were discontinued or they no longer fulfill the selection criteria.

TABLE 4. Selected new medicines for 2021

SELECTION CRITERIA						KEY ATTRIBUTES			
Increased safety and efficacy	Novel mechanism	Gene therapy	Breakthrough	Fast Track	Priority Review	Clinical trials in Canada	Rare or orphan designation	Biologic medicine	Add-on therapy

MEDICINE (TRADE NAME) COMPANY	INDICATION(S)	DESCRIPTION AND KEY ATTRIBUTES
CARDIOVASCULAR		
Apabetalone Resverlogix Corp.	Coronary artery disease (CAD) (ischemic heart disease); Prevention of major adverse cardiac events	• The first selective bromodomain and extraterminal (BET) protein inhibitor targeting bromodomain 2 (BD2), hypothesized to have potentially favourable effects on pathways related to atherothrombosis.[1] • When it binds to the BD2 domain, it triggers a cascade of events leading to increased apolipoprotein A-I (ApoA-I) gene transcription and eventually production of the protein. This increased ApoA-I proteins removes the cholesterol from plaques through reverse cholesterol transport pathway and treats the condition. • Administered orally. • The first cardiovascular outcomes trial[2] failed to detect the assumed 30% reduction of major adverse cardiovascular events in patients with type 2 diabetes (T2D) after an acute coronary syndrome (ACS).[3] However, treatment was associated with fewer

		hospitalizations for heart failure in the subgroup of patients with T2D and recent ACS.[4] • Also in a Phase III trial for the treatment of COVID-19.[5]
CSL-112 CSL Ltd	Acute coronary syndrome (ACS)	• A reconstituted high-density lipoprotein (HDL) made from ApoA1 lipoprotein isolated from human plasma then reconstituted with lipid. Exhibits cardioprotective effects by enhancing cholesterol efflux capacity that mimics the action of HDL. • Administered as an intravenous infusion. • May represent a novel therapy to reduce the risk of early recurrent cardiovascular events following acute myocardial infarction in patients with or without moderate renal impairment.[6] • Has been described as a potential game-changer for heart attack patients, about 10% of whom have a second cardiovascular event within 90 days of their first attack, many of which are fatal.[7] • Could potentially reduce the burden of heart disease for both patients and the health system.[8] • A Phase III trial is ongoing.[9]
CENTRAL NERVOUS SYSTEM		
AL-001 Alector Inc.	Dementia	• A first-in-class monoclonal antibody designed to elevate progranulin, a key regulator of immune activity in the brain. Decreased progranulin levels due to genetic mutations are a known cause of frontotemporal dementia (FTD), a rare, rapidly progressing neurodegenerative disease that is the most common form of dementia for people under the age of 60.[10] • Administered intravenously. • Phase II results showed "an encouraging picture of AL001's potential to slow disease progression in patients with FTD, a devastating disease for which there are currently no approved treatment options."[11] • A Phase III trial is ongoing.[12] Patients are randomized to receive AL001 or placebo intravenously every four weeks for the duration of the 96-week study and will be given the option to continue receiving treatment in an optional open-label extension study after the treatment period.[13] • Total global revenue forecasted to be $264 million by 2027.*
Valiltramiprosate Alzheon Inc.	Alzheimer's disease (AD)	• A beta-amyloid protein 42 inhibitor that prevents formation of neurotoxic soluble amyloid oligomers that drive onset and progression of Alzheimer's disease (AD).[14] It works at the beginning of the oligomer formation process, preventing the protein misfolding at the initiation stage. It also inhibits the growth of existing oligomers, thereby stopping the progression

		into insoluble amyloid protofibrils and fibrils that form plaques in brains of AD patients. • Administered orally. • Has shown "significant clinical effects in the high-risk population of patients homozygous for the ε4 allele of apolipoprotein E gene (APOE4) and a dose-dependent preservation of hippocampal volume."[15] Around 15% of patients with early AD are APOE4/4 homozygous.[16] • ALZ-801 has "a favorable safety profile and high brain penetration that can robustly inhibit Aβ oligomer formation at the clinical dose."[17,18] • A Phase III trial is ongoing.[19] It is focusing on early AD patients with the APOE4/4 genotype, with future expansion to investigate it for prevention of Alzheimer's onset and in patients carrying only one copy of the APOE4 gene.[20] • If approved, it could be the first disease-modifying treatment for AD.[21]
Ampion (Ampion) Ampio Pharmaceuticals Inc.	Pain; Osteoarthritis	• Acts as an aryl hydrocarbon receptor (AhR) agonist. The activation of the AhR suppresses inflammation by limiting the secretion of pro-inflammatory cytokines and promoting the overexpression of immuno-modulatory mediators. It also decreases levels of interleukin (IL) IL-23 and IL-17. • Has been shown to uniquely reduce inflammation along multiple pathways, unlike other anti-inflammatory therapies that target only one mechanism.[22] • Administered orally and as an intra-articular injection. • Results from completed Phase III trials[23,24,25] reflected a clinically and statistically significant reduction in pain at weeks 10 and 12 following a single injection, compared to saline, using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale.[26] • One Phase III trial was terminated[27] and another is ongoing.[28]
Lecanemab Eisai Co. Ltd	Alzheimer's disease (AD)	• An amyloid beta peptide inhibitor that acts by selectively binding, neutralizing, and eliminating soluble protofibrils, the toxic amyloid-beta aggregates that cause Alzheimer's disease (AD). • Administered as an intravenous infusion solution. • In Phase II studies, it did not meet the 12-month primary endpoint. However, prespecified 18-month Bayesian and frequentist analyses demonstrated reduction in brain amyloid accompanied by a consistent reduction of clinical decline across several clinical and biomarker endpoints.[29]

		• Compared to aducanumab, another antibody used in AD, lecanemab trial data thus far suggest it causes less amyloid-related imaging abnormality (ARIA), with an incidence of about 10% vs. 35% with aducanumab. This suggests a more favourable risk-benefit analysis for treatment with lecanemab.[30] • Phase III trials are ongoing.[31,32] • Total global revenue forecasted to be $1.3 billion by 2027.*
ND-0612 Mitsubishi Tanabe Pharma Corp.	Parkinson's disease (PD)	• A fixed dose combination of levodopa and carbidopa for use as an adjunct to oral levodopa for the treatment of moderate to severe Parkinson's disease (PD). • Administered through a patch-pump or belt pump to deliver a controlled dose continuously as a subcutaneous infusion. It is formulated as both high-dose and low-dose formulations. • Results from the open-label, nonrandomized, Phase IIb BeyonND study demonstrated that treatment with ND0612 subcutaneous levodopa/carbidopa delivery system increased good "ON" time while reducing "OFF" time and motor disability in patients with PD and motor fluctuations.[33] • It is anticipated that continuous administration of subcutaneous levodopa and carbidopa (ND-0612) will provide a highly effective, practical new therapy for the treatment of advanced PD and potentially for slowing disease progression in early-stage PD patients.[34] • A Phase III trial is ongoing.[35]
Midomafetamine [MDMA] Multidisciplinary Association for Psychedelic Studies	Post-traumatic stress disorder (PTSD)	• A first-in-class dopaminergic and adrenergic reuptake inhibitor, and psychedelic agent, that results in upregulation of anti-inflammatory cytokines and promotes neuroregeneration. It is used as an adjunct to psychotherapy. • Administered orally. • Phase II trial data showed that midoafetamine resulted in a significant reduction in post-traumatic stress disorder (PTSD) symptoms.[36] PTSD symptoms were reduced 1 to 2 months after MDMA-assisted psychotherapy, and symptom improvement continued at least 12 months post-treatment.[37] The long-term study also showed that there was a reduction in suicidal thoughts in patients with midomafetamine treatment.[38] • MDMA-assisted psychotherapy (MAP) provided to patients with severe or extreme chronic PTSD appears to be cost-saving while delivering substantial clinical benefit.[39] • A Phase III trial has been completed[40] and several are ongoing.[41,42]

GASTROINTESTINAL DISORDERS		
Brazikumab AstraZeneca PLC	Crohn's disease (regional enteritis)	• An immunoglobulin G2 human monoclonal antibody that neutralizes interleukin IL-23 interaction with its receptor while sparing IL-12. IL-23 antagonism is a promising therapeutic approach in the treatment of inflammatory bowel disease.[43] • Administered by subcutaneous or intravenous injection. • IL23p19 antagonists have been shown in head-to-head trials for immune-mediated conditions such as psoriasis to have superior efficacy to ustekinumab, a top-selling medicine in this class.[44] • Has the potential to provide safety benefits over ustekinumab.[45] • Phase III trials are ongoing.[46,47] • Total global revenue forecasted to be $363 million by 2027.*
Lirentelimab Allakos Inc.	Eosinophilic esophagitis (EoE); Gastritis; Gastroenteritis	• A humanized non-fucosylated anti-Siglec-8 monoclonal antibody (IgG1) that acts by producing a cytotoxic response against mast cells expressing Siglec-8. It reduces the overexpressed mast cells and thereby regulates the allergic reaction. • Administered as an intravenous and subcutaneous injection. • In a Phase II study, statistically significant differences in patient symptoms between the active and placebo groups occurred one day following administration of lirentelimab. In addition, patients with comorbid eosinophilic esophagitis treated with lirentelimab experienced statistically significant decreases in esophageal eosinophil counts and substantial reductions in patient reported dysphagia symptoms.[48] • Long-term treatment with lirentelimab has resulted in sustained histologic and symptomatic improvements in patients with eosinophilic gastritis and duodenitis through week 94. There was also a sustained response of blood and tissue eosinophil depletion and symptomatic responses improved with increased duration of treatment.[49] • Existing treatment options for eosinophilic gastritis and eosinophilic duodenitis are often ineffective.[50] • Phase III trials are ongoing.[51,52,53,54] • Total global revenue forecasted to be $872 million by 2027.*
RBX-2660 Rebiotix Inc.	Clostridioides difficile infections (C. difficile associated disease)	• A non-antibiotic therapy that restores the composition and function of the intestinal microbiota in diseased patients. • Administered rectally as an enema. • In a Phase III trial,[55] it showed an efficacy of 70.4% at 8 weeks post-treatment, compared to a 58.1% efficacy for the placebo.[56]

		• While necessary to treat initial infection, antibiotics are also a predominant risk factor for recurrence because they can disrupt the gut microbiome, leaving the current treatment paradigm for recurrent infection incomplete.[57] • The findings from the Phase III trial "are very encouraging to both patients and healthcare providers, providing hope this potential new treatment could make a meaningful difference in the lives of patients with recurrent *C. difficile* infection."[58] • A Phase III trial is ongoing.[59]
GENITO URINARY SYSTEM AND SEX HORMONES		
Bardoxolone methyl Reata Pharmaceuticals Inc.	Chronic kidney disease (chronic renal failure) caused by Alport syndrome and various forms of chronic kidney disease (CKD)	• A synthetic triterpenoid compound that targets nuclear factor erythroid 2-related factor 2 (Nrf2). It is an antioxidant inflammation modulator (AIM), which are the most potent known inducers of Nrf2, an important emerging biological target that controls the production of many of the body's antioxidant and detoxification enzymes. • Administered orally (capsule). • In clinical studies, it significantly increased measured glomerular filtration rate, and further investigation is ongoing to evaluate whether it provides clinical benefit without major safety concerns in selected patients with chronic kidney disease (CKD).[60] • The CARDINAL trial is one of the largest interventional, randomized controlled trials in Alport syndrome conducted to date. Despite the use of medical therapies, patients were experiencing significant loss of kidney function prior to study entry.[61] The first-year results from the CARDINAL study are very promising and provide "hope to the entire Alport syndrome community that we could finally have the first therapy to treat this rare, genetic kidney disease."[62] • If approved, it would be first drug to treat CKD related to Alport syndrome. • Total global revenue forecasted to be $1.1 billion by 2027.*
Gepotidacin mesylate GlaxoSmithKline PLC	Cystitis; Urinary tract infections (UTI)	• A first-in-class triazaacenaphthylene bacterial topoisomerase inhibitor with a mechanism of action (MOA) distinct from any currently approved antibiotic.[63] • Works by selectively interacting with two key bacterial enzymes: DNA gyrase, and topoisomerase IV (type II topoisomerases), responsible for bacterial replication. Its MOA confers activity against most target pathogens resistant to established antibiotics, including fluoroquinolones.[64] • Administered orally (capsule, tablet) and by intravenous infusion.

		• It "has the potential to transform the treatment landscape for patients with uncomplicated urinary tract infection and urogenital gonorrhoea who currently have limited therapeutic options."[65] • Phase III trials are ongoing.[66,67] • Although there is limited information on efficacy/safety at this time, as a first-in-class, it has potential to change clinical management of this condition. • Total global revenue forecasted to be $309 million by 2027.*
HEMATOLOGICAL DISORDERS		
Bentracimab PhaseBio Pharmaceuticals Inc. 	Bleeding and clotting disorders	 • A recombinant human monoclonal antibody antigen-binding fragment and an antidote to ticagrelor that specifically reverses its antiplatelet effects. It competes with ticagrelor and its metabolite for binding with the receptor. Basing on its high affinity towards the receptor, the binding reverses both the antiplatelet activity of ticagrelor and the drug-induced bleeding. It also helps to prevent the formation of blood clots and reduces the occurrence of thrombotic events. • Administered intravenously. • Has been studied in Phase I and II clinical trials and has demonstrated the potential to bring life-saving therapeutic benefit through immediate and sustained reversal of the antiplatelet activity of ticagrelor, potentially mitigating concerns regarding bleeding risks associated with the use of this antiplatelet drug.[68] • According to a survey, ticagrelor-related bleeding is a major concern for cardiac surgeons. There is a significant unmet need that this ticagrelor reversal agent would address.[69] • A Phase III trial is ongoing.[70] • Total global revenue forecasted to be $361 million by 2027.*
Danicopan Alexion Pharmaceuticals Inc. 	Paroxysmal nocturnal hemoglobinuria (PNH)	 • A serine protease that inhibits complement factor D. • A first-in-class oral proximal, complement alternative pathway factor D (FD) inhibitor.[71] • Used in combination with a C5 monoclonal antibody for patients with paroxysmal nocturnal hemoglobinuria (PNH) who are sub-optimal responders to a C5 inhibitor alone.[72] • Addition of danicopan led to meaningful improvement in hemoglobin and reduced transfusion requirements in PNH patients who were transfusion-dependent on eculizumab. These benefits were associated with improvement of FACIT-Fatigue.[73]

		• Has the potential to be the first oral PNH therapy, and offers an opportunity to enhance the well-characterized efficacy of C5 inhibitors without compromising safety.[74] • It remains to be seen whether it can be used long-term as a standalone drug "or whether its use will be relegated as an adjunct to C5 inhibition."[75] • A Phase III trial is ongoing.[76] • Total global revenue forecasted to be $352 million by 2027.*
HORMONAL DISORDERS		
ACP-014 Ascendis Pharma AS	Hypopara-thyroidism	• A sustained-release, long-acting prodrug of parathyroid hormone. • Administered once daily subcutaneously. • It enabled independence from oral active vitamin D and reduced calcium supplements (≤500 mg/day) for most subjects, achieving normal calcium and phosphate levels, and demonstrating improved health-related quality of life. These results support it as a potential hormone replacement therapy for adults with hypoparathyroidism.[77] • Hypoparathyroidism affects over 200,000 people worldwide. "Current standard of care treatment with calcium and calcitriol (or the analogue alfacalcidol/alphacalcidol) does not effectively address both the short-term symptoms and long-term complications, or the quality-of-life impacts of hypoparathyroidism."[78] • Results from Phase II studies showed that 91% of subjects were off standard of care therapy defined as no active vitamin D and ≤600 mg/day of calcium supplements.[79] • A Phase III trial is ongoing.[80] • Total global revenue forecasted to be $972 million by 2027.*
INFECTIOUS DISEASES		
Oteseconazole Mycovia Pharmaceuticals Inc.	Recurrent vulvovaginal candidiasis (RVVC)	• A fungal, selective cytochrome p450-dependent sterol 14a-demethylase (CYP51) inhibitor. • Administered orally (tablet). • In clinical studies to date, it has demonstrated "impressive efficacy, a positive tolerability profile and hope for a superior RVVC [recurrent vulvovaginal candidiasis] treatment option." It was shown to be statistically superior to fluconazole regarding the proportion of patients with one or more culture-verified acute VVC episodes through week 50 in the intent-to-treat population: 42.2% of those in the fluconazole group vs. only 5.1% of participants in the oteseconazole group ($p < 0.001$).[81]

		• If approved, it would mark significant improvements in the safety (fewer drug interactions) and effectiveness in the treatment of this condition.[82]
Ridinilazole Summit Therapeutics Ltd 	*Clostridioides difficile* infections (*C. difficile* associated disease)	 • A narrow-spectrum antibiotic with high bactericidal selectivity for *C. difficile* that does not disrupt the healthy gut bacteria. • Administered orally (capsule and coated tablet). • Given the promising results from the Phase II clinical trial, it may have the capability to lower the risk for *C. difficile* infection (CDI) recurrence, thus improving sustained clinical response rates, a current unmet medical need.[83,84] • Phase III trials are ongoing.[85,86,87] • Total global revenue forecasted to be $151 million by 2027.*
V-7 Immunitor Inc. 	Tuberculosis (TB)	 • A first-in-class, oral therapeutic vaccine (heat-killed) for the treatment of mycobacterium tuberculosis (TB). • Used as an immune adjunct for the chemotherapy of TB. When a daily dose of V-7 is taken along with standard TB drugs, it has been shown to clear TB bacteria within one month, the shortest treatment course available today.[88] • A Phase III trial has been completed.[89] Longer follow-up studies are needed to further substantiate findings.[90]
MEN'S HEALTH		
Fexapotide triflutate Nymox Pharmaceutical Corp. 	Benign prostatic hyperplasia (BPH)	• A first-in-class, selective pro-apoptotic injectable protein that induces focal cell loss in the prostate leading to prostate volume reduction with both short- and long-term symptomatic improvement. It also promotes programmed natural cell death (apoptosis) selectively in prostate glands, thus promoting apoptosis of pancreatic cancer cells. • Administered as an intraprostatic injection. • Long-term studies have shown statistically significant improvement in benign prostatic hyperplasia (BPH) symptoms and objective outcomes including significant reduction in both spontaneous acute urinary retention as well as the subsequent incidence of BPH surgery.[91] The clinical trials also demonstrated improvements in sexual function and a lower incidence of the need for bladder catheterization, with none of the typical side effects associated with current drug treatments.[92] • Several Phase III trials have been completed .[93,94,95,96,97]

METABOLIC DISORDERS		
Birtamimab Prothena Corp PLC	Primary systemic amyloidosis	• A monoclonal antibody that targets aberrant amyloid protein. It inhibits the circulating soluble and deposited aggregated amyloid that accumulates in patients with amyloidosis. • Administered intravenously as an added treatment to standard of care chemotherapy. • Compared to other agents, it possesses the advantage of high selectivity and low toxicity and could potentially become a "future game-changer" in this field.[98] • Although results of the VITAL study did not achieve statistical significance for the primary endpoint, post hoc analyses suggest a potential survival benefit for light chain (AL) amyloidosis patients with the highest risk of early mortality (i.e., Mayo Stage IV).[99] • Birtamimab is the only drug to date that has shown a significant survival benefit in Mayo Stage IV patients with AL amyloidosis in a placebo-controlled study.[100] • A Phase III trial is ongoing.[101] • Total global revenue forecasted to be $128 million by 2027.*
Donislecel (Lantidra) CellTrans Inc.	Type 1 diabetes (T1D; juvenile diabetes)	• A stem cell therapy comprised of allogeneic human islets of Langerhans for the treatment of brittle type 1 diabetes (T1D). • For those suffering from brittle T1D, islet transplantation fulfills a significant medical need, is effective at restoring good glycemic control in most patients, can slow or possibly reverse common secondary complications of T1D, improves patient quality of life, and poses an acceptable safety risk.[102] • A Phase III trial is ongoing.[103]
KSI-301 Kodiak Sciences Inc.	Diabetic macular edema; Diabetic retinopathy	• An anti-vascular endothelial growth factor (VEGF) biopolymer conjugate comprising two components: a recombinant, full-length humanized anti-VEGF monoclonal antibody and a branched, optically clear phosphoryl-choline biopolymer which is stably attached to the antibody and intended to augment the stability and residence time of the bioconjugate in the eye without compromising its anti-VEGF activity. • Administered through the intravitreal route. • Its extended duration of action (6 months), durability, safety profile, and efficacy all seem to address the issues with existing agents such as treatment burden of the frequency of injections and follow-up visits. As a result, it could lead to better real-world outcomes.[104,105]

		• The one-year data support a highly differentiated durability profile with strong efficacy and an encouraging safety profile. It has the potential to become the standard of care for patients with VEGF-mediated retinal diseases.[106] • Several Phase III trials are ongoing.[107,108,109,110] • Total global revenue forecasted to be $1.3 billion by 2027.*
ONCOLOGY		
Arfolitixorin (Modufolin) Isofol Medical AB	Metastatic colorectal cancer	• A folate-based drug that acts as a thymidylate synthase inhibitor. • Administered intravenously. • A biologically active enantiomer of [6R] 5, 10-methylenetetrahydrofolate that does not require metabolic activation. • Expected to be efficacious in a larger proportion of patients with less inter- and intra-individual variability compared with, for example, leucovorin.[111] • Has demonstrated superior activity in combination with 5-fluorouracil (5-FU) compared to the standard of care therapy.[112,113] • A Phase III trial is ongoing.[114]
Elacestrant A. Menarini Industrie Farmaceutiche Riunite SRL	Human epidermal growth factor receptor 2 negative breast cancer (HER2-breast cancer); Metastatic breast cancer	• A non-steroidal, orally bioavailable, selective estrogen receptor degrader (SERD). At lower doses, it acts as a selective estrogen-receptor modulator (SERM) and at higher doses it acts as a SERD. • In clinical trials to date, it has demonstrated a statistically significant and clinically meaningful improvement of progression-free survival (PFS) when compared to endocrine standard of care in patients previously treated with endocrine therapies (e.g., fulvestrant) and CDK 4/6 inhibitors (e.g., palbociclib). The results provide a significant advancement for patients suffering from this devastating disease. • Positive data were also shown for patients with ESR1 mutations, which are known to confer additional resistance to standard endocrine therapy.[115] • Assuming preliminary safety and activity data are confirmed in Phase III trials, elacestrant could further improve the management, outcomes, and quality of life in HR-positive breast cancer.[116] • A Phase III trial is ongoing.[117]
SGX-301 (HyBryte) Soligenix Inc.	Cutaneous T-cell lymphoma (CTCL)	• A photodynamic therapy utilizing safe visible light for activation. Synthetic hypericin is a photosensitizer which is topically applied to skin lesions and activated by fluorescent light. Hypericin is a heat-shock protein 90 (HSP 90) inhibitor.

		• Because it uses fluorescent light, and not cancer-causing ultraviolet radiation, it should not be associated with long term actinic skin damage or increase the risk of skin cancer which is very important for cutaneous T-cell lymphoma (CTCL) patients who require chronic therapy.[118,119] • Clinical trials to date have shown a meaningful statistical benefit in treating CTCL, and a safety profile that exceeds second-line and off-label treatments.[120] • A Phase III trial is ongoing.[121] • Total global revenue forecasted to be $14 million by 2027.*
Motixafortide BioLineRx Ltd	Multiple myeloma (Kahler's disease)	• A high-affinity antagonist for chemokine (C-X-C motif) receptor 4 (CXCR4). CXCR4 is a chemokine receptor that is directly involved in tumour progression, angiogenesis (growth of new blood vessels in the tumour), metastasis (spread of the disease to other organs or organ parts), and cell survival. • Administered subcutaneously or intravenously. • Induces the mobilization of healthy hematopoietic stem cells from the bone marrow into the peripheral blood and also mobilizes cancer cells from the bone marrow and other sites. It may therefore expose these cells to chemo- and bio-based anti-cancer therapy and induce apoptosis (cell death). • Early clinical evidence has been encouraging.[122] • The results of the GENESIS study have been described as "extremely impressive," and all the more so when considering that almost 90% of the patients in the treatment arm proceeded to transplantation after only one apheresis session.[123] • If approved, motixafortide represents a significant advancement in stem cell mobilization to the benefit of patients and payers alike.[124] • Total global revenue forecasted to be $236 million by 2027.*
OPHTHALMOLOGY		
Avacincaptad pegol sodium (Zimura) Iveric Bio Inc.	Geographic atrophy (GA)	• An inhibitor of complement protein C5. • Administered through by the intravitreal route. • In a clinical trial, intravitreal administration led to a significant reduction of geographic atrophy (GA) growth in eyes with age-related macular degeneration (AMD) over a 12-month period and a further reduction over 18 months. Because C5 inhibition theoretically preserves C3 activity, it may offer additional safety advantages.[125,126] • One Phase III trial has been completed[127]and another is ongoing.[128]

		• Total global revenue forecasted to be $1.1 billion by 2027.*
NCX-470 NicOx SA	Ocular hypertension; Open-angle glaucoma	• A nitric oxide donating bimatoprost analog that acts by targeting prostaglandin F2 alpha receptor and soluble guanylate cyclase. • Administered by the ophthalmic route. • In a Phase II trial, it demonstrated superior efficacy against latanoprost, which is a current first-line treatment.[129] • It has the potential to become the most potent single-agent glaucoma drug on the market in terms of intraocular pressure (IOP) lowering efficacy.[130] • Phase III trials are ongoing.[131,132] • Total global revenue forecasted to be $178 million by 2027.*
TOXICOLOGY		
Avasopasem manganese Galera Therapeutics Inc.	Chemotherapy-induced oral mucositis	• A highly selective, small molecule, superoxide dismutase (SOD) mimetic designed to rapidly and selectively convert superoxide to hydrogen peroxide and oxygen, protecting normal tissue from damage associated with radiation therapy. • Administered as an intravenous infusion. • Has shown promising potential to reduce the incidence, severity, and duration of severe oral mucositis amongst patients being treated with concomitant chemoradiation for cancers of the head and neck.[133,134] • A Phase III trial is ongoing.[135] • Total global revenue forecasted to be $869 million by 2027.*
WOMEN'S HEALTH		
Fezolinetant Astellas Pharma Inc.	Vasomotor symptoms of menopause (hot flashes)	• A first-in-class, nonhormonal therapy that rapidly reduces moderate/severe menopausal vasomotor symptoms (VMS) by antagonizing the neurokinin-3 (NK3) receptor. • Administered orally. • Has been associated with higher responder rates than placebo and larger improvements in quality of life measures, including a reduction in VMS-related interference with daily life.[136] • Offers a non-hormonal alternative to hormone replacement therapy for the treatment of menopause-related VMS.[137] • In Phase III trials completed to date, all primary endpoints were met and there was a statistically significant reduction from baseline in the frequency and severity of moderate to severe VMS to week 4 and week 12 for women who received fezolinetant versus placebo.

		• Some Phase III trials have been completed[138, 139] and others are ongoing.[140,141,142] • Total global revenue forecasted to be $1.1 billion by 2027.*

* Consensus forecasts for global revenue data were collected from GlobalData, Q4-2021, and are given in US dollars.

Data source: GlobalData Healthcare database.

TABLE 5. Pipeline medicines retained from the 2020 *Meds Pipeline Monitor*

SELECTION CRITERIA						KEY ATTRIBUTES			
Increased safety and efficacy	Novel mechanism	Gene therapy	Breakthrough	Fast Track	Priority Review	Clinical trials in Canada	Rare or orphan designation	Biologic medicine	Add-on therapy

MEDICINE (TRADE NAME) COMPANY	INDICATION(S)*	DESCRIPTION AND KEY ATTRIBUTES
CENTRAL NERVOUS SYSTEM		
Gantenerumab Hoffmann-La Roche Ltd	Alzheimer's disease	• Phase III trials are ongoing.[143,144,145,146] • Fully human monoclonal antibody that binds aggregated amyloid-β (Aβ) and removes Aβ plaques by Fc receptor-mediated phagocytosis. • Several Phase III studies of its effect on cognition and functioning in participants with prodromal Alzheimer's disease are ongoing.[147,148,149,150] • Being tested in the dominantly inherited Alzheimer's network trials unit (DIAN-TU).[151] • Total global revenue forecasted to be $1.5 billion by 2027.*
GENETIC DISORDERS		
Pegunigalsidase alfa Chiesi Farmaceutici SpA	Fabry disease (FD)	• After granting it priority review, the US FDA rejected the application in April 2021 due to issues with facility inspections and manufacturing processes, partially caused by travel restrictions during the COVID-19 pandemic. The decision was not associated with concerns related to the therapy's safety or effectiveness shown in clinical trials.[152] • A novel PEGylated, covalently cross-linked form of α-galactosidase A enzyme replacement therapy (ERT).[153] • In the 12-month on-treatment Phase III BRIDGE study, interim data analysis indicates significant improvement in kidney function in patients switched from agalsidase alfa (Replagal) to pegunigalsidase alfa.[154] • May represent an advance in ERT for FD, based on its unique pharmacokinetics and apparent low immunogenicity.[155]

HEMATOLOGICAL		
Etranacogene dezaparvovec CSL Ltd	Hemophilia B (factor IX deficiency)	• Data from the HOPE-B pivotal study showed that participants continued to demonstrate durable, sustained increases in factor IX (FIX) activity at 52 weeks after a single intravenous dose.[156] • Has the potential to be the first-ever gene therapy approved for hemophilia B, which may be life-changing and transformative, as it offers functionally curative benefits to people with hemophilia B with years of functional FIX levels generated by their own bodies.[157] • A recombinant AAV5 vector that includes a gene cassette containing the factor IX (FIX) Padua variant under the control of a liver-specific promoter.[158] • In clinical studies, it resulted in clinically relevant increases in factor IX (FIX) activity, cessation of bleeds, and abrogation of the need for FIX replacement.[159] • A one-time dose offers the potential to shift the disease to a milder phenotype and reduce or abrogate the bleed risk and FIX concentrate consumption.[160] • Total global revenue forecasted to be $49 million by 2027.*
Fidanacogene elaparvovec Pfizer Inc.	Hemophilia B (factor IX deficiency)	• A hepatotropic bioengineered adeno-associated virus (AAV) based vector that delivers a high activity factor IX (FIX) transgene driven by a liver specific promoter. [161] • Study data for 15 patients receiving one infusion demonstrated a marked reduction in bleeding frequency and exogenous FIX use at 52 weeks post-infusion. [162] • It is hoped that, once treated, patients will be able to produce factor IX themselves, rather than having to regularly inject factor IX. [163] • Total global revenue forecasted to be $470 million by 2027.*
Fitusiran Sanofi	Hemophilia A; Hemophilia B	• Phase III study was halted in 2020 after blood clots were observed, mainly among patients whose antithrombin (AT) levels dropped to 10% or lower. The dosing protocol for the fitusiran trials has been revised to 50 mg (down from 80 mg) administered every other month, which should keep most patients in the 15%-35% AT range.[164] • A small interfering RNA (siRNA) developed to suppress the hepatic synthesis of antithrombin.

		• Once-monthly subcutaneous administration of fitusiran resulted in dose-dependent lowering of the antithrombin level and increased thrombin generation in participants with hemophilia A or B who did not have inhibitory alloantibodies.[165] • Total global revenue forecasted to be $360 million by 2027.*
Vadadustat Otsuka Holdings Co., Ltd	Anemia in chronic kidney disease (CKD; renal anemia)	• A titratable prolyl hydroxylase domain (PHD) enzyme inhibitor that represents a novel pharmacological treatment of anemia. • Has been shown to increase hemoglobin (Hb) levels[166] and to maintain mean Hb concentrations in patients on hemodialysis previously receiving epoetin alfa.[167] • Under review by the US FDA.[168] • Total global revenue forecasted to be $894 million by 2027.*
METABOLIC DISORDERS		
Teplizumab Provention Bio Inc.	Type 1 diabetes (T1D; juvenile diabetes)	• The US FDA did not approve because of product quality issues (insufficient pharmacokinetic comparability data); sponsor plans to address.[169] • Multiple studies involving patients with type 1 diabetes have shown that it reduces the loss of beta-cell function, even as long as seven years after diagnosis.[170] • The first disease-modifying drug with data showing a long-term delay to insulin dependence.[171] • Total global revenue forecasted to be $522 million by 2027.*
ONCOLOGY		
Ipatasertib Genentech, Inc.	Metastatic hormone refractory (castration-resistant, androgen-independent) prostate cancer	• Phase III results have shown that adding ipatasertib to abiraterone significantly improved radiographic progression-free survival (rPFS) in patients with metastatic castration-resistant prostate cancer (mCRPC) and phosphatase and tensin homologue (PTEN) loss.[172,173]A first-in-class, oral, v-Akt murine thymoma viral oncogene homolog (Akt) inhibitor. • In metastatic castration-resistant prostate cancer (mCRPC), combined blockade with abiraterone and ipatasertib showed superior antitumour activity to abiraterone alone, especially in patients with phosphatase and tensin homolog (PTEN)-loss tumours.[174]

		• Total global revenue forecasted to be $753 million by 2027.*
Ofranergene obadenovec Vascular Biogenics Ltd	Epithelial ovarian cancer	• Met the interim prespecified efficacy criterion in the Phase III OVAL study in patients with platinum-resistant ovarian cancer; the trial continues without modification.[175,176] • A first-in-class, targeted anti-cancer gene therapy with a dual mechanism: anti angiogenic/vascular disruption and induction of an anti-tumour directed immune response; used in combination with paclitaxel for patients with platinum-resistant ovarian cancer.[177] • Favourable tumour responses and overall survival outcomes were associated with induction of an immunotherapeutic effect.[178] • Total global revenue forecasted to be $158 million by 2027.*
Ublituximab TG Therapeutics, Inc.; LFB S.A.	Chronic lymphocytic leukemia (CLL); Relapsed chronic lymphocytic leukemia (CLL); Relapsing multiple sclerosis (RMS)	• Demonstrated superiority versus teriflunomide in reducing annualized relapse rates and MRI brain lesions.[179] A next generation glycoengineered anti-CD20 monoclonal antibody. • Next-generation with higher complement-dependent cytotoxicity and antibody-dependent cellular cytotoxicity against malignant B-cells.[180] • Demonstrated efficacy in patients with high-risk CLL and B-non-Hodgkin lymphoma in both first line, subsequent lines, and in rituximab refractory patients.[181] • In combination with ibrutinib, resulted in rapid and high response rates in CLL.[182] • Total global revenue forecasted to be $1.3 billion by 2027.*

* Consensus forecasts for global revenue data were collected from GlobalData, Q4-2021, and are given in US dollars.

Data source: GlobalData Healthcare database.

TABLE 6. Pipeline medicines from the 2020 *Meds Pipeline Monitor* that have gained market authorization

SELECTION CRITERIA						KEY ATTRIBUTES			
Increased safety and efficacy	Novel mechanism	Gene therapy	Breakthrough	Fast Track	Priority Review	Clinical trials in Canada	Rare or orphan designation	Biologic medicine	Add-on therapy

MEDICINE (TRADE NAME) COMPANY	INDICATION(S)*	DESCRIPTION AND KEY ATTRIBUTES
CARDIOVASCULAR		
Inclisiran (Leqvio) Novartis Pharmaceuticals Corp.	Atherosclerosis	• Approved by Health Canada (Leqvio; July 26, 2021); not yet marketed. • Approved by the EMA (Leqvio; December 12, 2020). • Total global revenue forecasted to be $2.5 billion by 2027.*
CENTRAL NERVOUS SYSTEM		
Aducanumab (Aduhelm) Biogen Inc.	Alzheimer's disease	• Approved by the US FDA (Aduhelm; June 7, 2021). • Also under review by Health Canada (as of June 2021). • Total global revenue forecasted to be $8.3 billion by 2027.*
IMMUNOLOGY		
Anifrolumab (Saphnelo) AstraZeneca PLC	Systemic lupus erythematosus	• Approved by the US FDA (Saphnelo; July 30, 2021). • Total global revenue forecasted to be $877 million by 2027.*
INFECTIOUS DISEASE		
Ibrexafungerp (Brexafemme) Scynexis Inc.	Vulvovaginal candidiasis	• Approved by the US FDA (Brexafemme; June 1, 2021) • Total global revenue forecasted to be $394 million by 2027.*

METABOLIC DISORDERS		
Dasiglucagon (Zegalogue) Zealand Pharma US Inc.	Hypoglycemia	• Approved by the US FDA (Zegalogue; March 22, 2021). • Total global revenue forecasted to be $288 million by 2027.*
ONCOLOGY		
Idecabtagene vicleucel (Abecma) Celgene Inc.	Refractory multiple myeloma; Relapsed multiple myeloma	• Approved by Health Canada (Abecma; May 26, 2021); not yet marketed. • Approved by the EMA (Abecma; August 18, 2021). • Total global revenue forecasted to be $2.4 billion by 2027.*
Lisocabtagene maraleucel (Breyanzi) Juno Therapeutics Inc.	Diffuse large B-cell lymphoma; Follicular lymphoma; Primary mediastinal large B-cell lymphoma	• Approved by the US FDA (Breyanzi; February 5, 2021). • Total global revenue forecasted to be $1.6 billion by 2027.*
Umbralisib tosylate (Ukoniq) TG Therapeutics Inc.	Marginal zone B-cell lymphoma (mucosa-associated lymphoid tissue or MALT-lymphoma); Follicular lymphoma (FL)	• Approved by the US FDA (Ukoniq; February 5, 2021). • Total global revenue forecasted to be $237 million by 2027.*
RESPIRATORY		
Tezepelumab (Tezspire) Amgen Inc.	Asthma	• Approved by the US FDA (Tezspire; December 2021). • Total global revenue forecasted to be $876 million by 2027.*

* Consensus forecasts for global revenue data were collected from GlobalData, Q4-2021, and are given in US dollars.

Data source: GlobalData Healthcare database.

SPOTLIGHT ON CANADA

This section includes a list of select medicines currently under review by Health Canada that may have a significant impact on future clinical practice and drug spending. Medicines included on this list are new to Canada but may have been approved in other jurisdictions.

Table 7 highlights four new medicines currently on Health Canada's Drug and Health Product Submissions Under Review (SUR) list that have a novel mechanism of action or have demonstrated improved safety and efficacy in clinical trials. Of the six medicines reported in the 2020 edition, five have since received market authorization from Health Canada while one application was cancelled by the sponsor.

The SUR is a publicly available source that identifies pharmaceutical and biologic drug submissions with new medicinal ingredients that have been accepted for review in Canada.

TABLE 7. Selected new medicines currently under review by Health Canada, 2021

SELECTION CRITERIA			KEY ATTRIBUTES						
Increased safety and efficacy	Novel mechanism	Gene therapy	Breakthrough	Fast Track	Priority Review	Clinical trials in Canada	Rare or orphan designation	Biologic	Add-on therapy

MEDICINE (TRADE NAME) COMPANY	INDICATION(S)*	DESCRIPTION AND KEY ATTRIBUTES
CENTRAL NERVOUS SYSTEM		
Sodium phenylbutyrate, ursodoxicoltaurine Amylyx Pharmaceuticals Inc.	Amyotrophic lateral sclerosis (ALS)	• A fixed-dose coformulation of sodium phenylbutyrate and ursodoxicoltaurine that is designed to target the endoplasmic reticulum and mitochondrial-dependent neuronal degeneration pathways in amyotrophic lateral sclerosis (ALS) and other neurodegenerative diseases. • Administered orally. • In a multicentre clinical trial including 137 participants, the combination resulted in slower functional decline than placebo as measured by the ALSFRS-R score over a period of 24 weeks. Secondary outcomes were not significantly different between the two groups.[183] • Longer term results suggest that the combination has both functional and survival benefits; it resulted in a 6.5 month longer median survival as compared with placebo.[184] • Has been described as "a significant development offering hope of a potential new treatment option that has been shown to slow ALS disease progression and extend the time families that face this life-threatening disease have together."[185]

		• Also under review by the US FDA.[186]
GENETIC DISORDERS		
Selumetinib (Koselugo) AstraZeneca Canada Inc.	Neurofibro-matoses type 1	• An inhibitor of mitogen-activated protein kinases 1 and 2 (MEK1/2). • Administered orally.[187] • In a Phase II trial, most children with neurofibromatosis type 1 and inoperable plexiform neurofibromas had durable tumour shrinkage and clinical benefit from selumetinib.[188] • If approved, this would be the first approved therapy to treat this rare genetic disease. No approved therapies exist for inoperable plexiform neurofibromas in patients with neurofibromatosis type 1.[189] Surgery has been the only potentially effective therapy for these tumours.[190] • Has been described as "an important treatment advance for patients and their families."[191] • Has been approved by the US FDA (Koselugo; April 10, 2020) and the EMA (Koselugo; June 17, 2021). • Total global revenue forecasted to be $378 million by 2027.*
ONCOLOGY		
Asciminib hydrochloride (Scemblix) Novartis Pharmaceuticals Canada Inc.	Chronic myeloid leukemia (CML)	• A specific inhibitor of the tyrosine kinase (TK) activity of native ABL1, together with that of the chimeric BCR-ABL1 oncoprotein (BCR-ABL1 inhibitor).[192] • Features a new mechanism of action as a STAMP (specifically targeting the ABL myristoyl pocket) inhibitor, and works by binding to the ABL myristoyl pocket.[193] • Administered orally. • In the pivotal Phase III ASCEMBL trial, it demonstrated significant and clinically meaningful superiority in major molecular response rate vs. bosutinib (25% vs. 13%) at 24 weeks, and more than 3X lower discontinuation rates due to side effects (7% vs. 25%).[194,195] • It represents an important development for patients who experience resistance and/or intolerance to currently available TK inhibitors, and provides a new therapy to patients with CML who are resistant/intolerant to ≥2 prior TK inhibitors.[196,197] The US FDA granted it accelerated approval (Scemblix; October 29, 2021).[198] • Total global revenue forecasted to be $494 million by 2027.*
Mogamulizumab (Poteligeo)	Mycosis fungoides	• A recombinant humanized monoclonal antibody that targets CC chemokine receptor 4 (CCR4)-expressing cells.[199] • Administered as an intravenous infusion.

Kyowa Kirin Inc. 		• In the Phase III MAVORIC study, it was compared to vorinostat (which was approved in Canada in 2009) and was found to have a superior progression-free survival with a median of 7.7 months compared to 3.1 months with vorinostat.[200] • Has been described as representing "an important addition to the armamentarium of pharmacotherapies" for this condition.[201] • Has been approved by the US FDA (Poteligeo; August 8, 2018) and the EMA (Poteligeo; November 22, 2018). • Total global revenue forecasted to be $293 million by 2027.*

* Consensus forecasts for global revenue data were collected from GlobalData, Q4-2021, and are given in US dollars.

Data source: GlobalData Healthcare database.

EMERGING COVID-19 THERAPIES

This section of the *Meds Pipeline Monitor* includes an overview of new and existing pipeline medicines that are under evaluation for indications related to the prevention and treatment of COVID-19. An analysis of global markets provides information on COVID-19 medicines in all phases of clinical trials and pre-registration.

Global markets

There have been significant strides in the COVID-19 drug pipeline worldwide. However, published information to confirm safety and efficacy of the various treatments for COVID-19 is continuously evolving.

In addition to the wide variety of vaccines under development, many novel and repurposed medicines are currently being evaluated in clinical trials for their potential benefits in the treatment of COVID-19. These include antivirals, monoclonal antibodies, mesenchymal stem cells, convalescent plasma, and cytokine adsorbers.[202]

A breakdown of COVID-19 pipeline vaccines and treatments by phase of clinical evaluation is given in Figure 5. For this snapshot, data was extracted for medicines indicated for the treatment of COVID-19 with a development stage of Phase I, II, III, or pre-registration. These medicines are presented in three categories: vaccines, which are used to prevent infection of the novel coronavirus; COVID-19 treatments (new), which are new medicines used for the prevention or reduction of some of the complications associated with COVID-19 (e.g., pneumonia or respiratory complications and hyperinflammation); and COVID-19 treatments (existing), which are previously marketed medicines that have been repurposed to treat COVID-19 or its symptoms.

Brief Insights

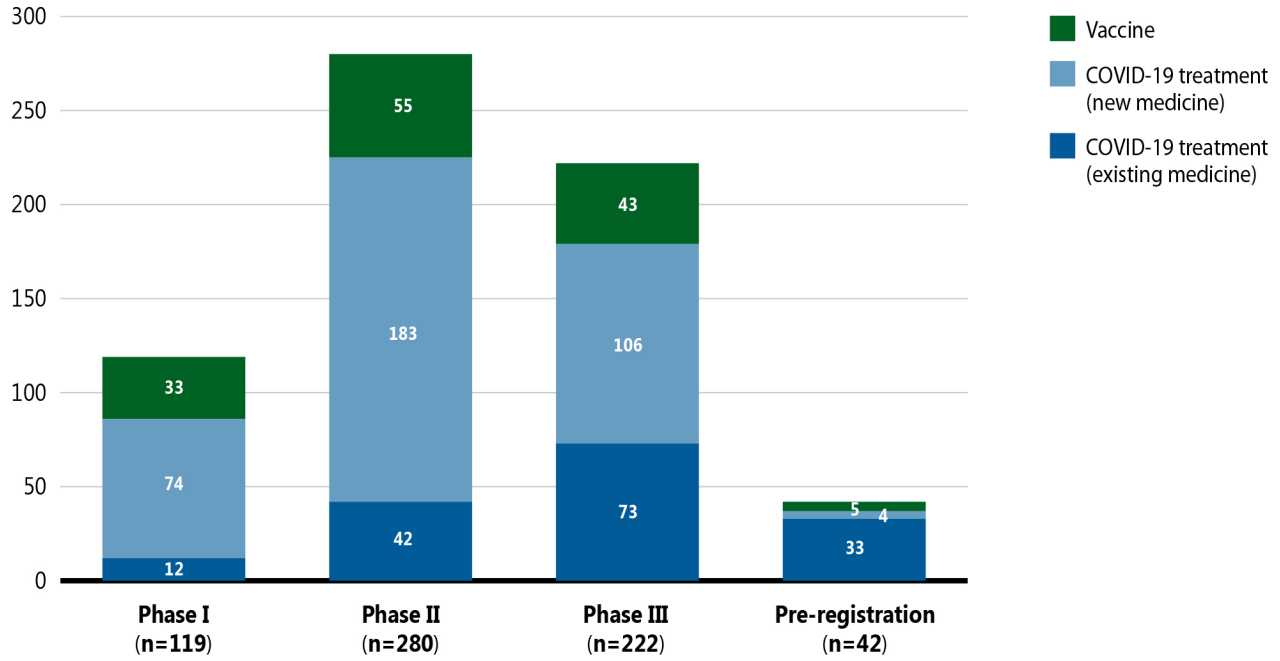
The pipeline for COVID-19 medicines is growing rapidly, with clinical investigations of novel and existing drugs:

- Current approaches to COVID-19 therapies generally fall into two categories: antivirals, which prevent the virus from multiplying; and immune modulators, which help the immune system to fight the virus.
- In 2020, there were 53 trials for COVID-19 categorized as pivotal/registration studies, whereas in 2021, this decreased to 41 trials. A pivotal or registration clinical trial is a trial seeking to prove the efficacy of new therapeutics and vaccines.
- As new strains of COVID-19, such as the Omicron variant, continue to raise the number of cases around the world, focus is placed on the efficacy of booster vaccinations.
- The 2020 pipeline had more ongoing and completed clinical trials while 2021 had a greater number of planned clinical trials.
- Following the approvals of the four most common vaccines used in Canada and the US—Pfizer/BioNTech's Comirnaty, Moderna's Spikevax, AstraZeneca's Vaxzevria, and the Janssen vaccine—sponsors continued to focus testing on different age groups in 2021 (e.g., authorization for Pfizer/BioNTech's Comirnaty vaccine for children aged 5 to 11 years).
- Vaccine manufactures have estimated that by the end of 2021, 12 billion COVID-19 vaccine doses will have been produced globally.

Source: Pharma COVID-19 Bulletin, GlobalData (December 30, 2021); Health Canada (December 2021).

Figure 5 illustrates the breakdown of vaccines and new or existing treatments for COVID-19 by highest development stage. The majority of treatments undergoing clinical evaluation are new medicines with an increasing proportion of existing medicines in the later stages of clinical development.

FIGURE 5. Number of medicines indicated for the prevention and treatment of COVID-19 by stage of development, 2021

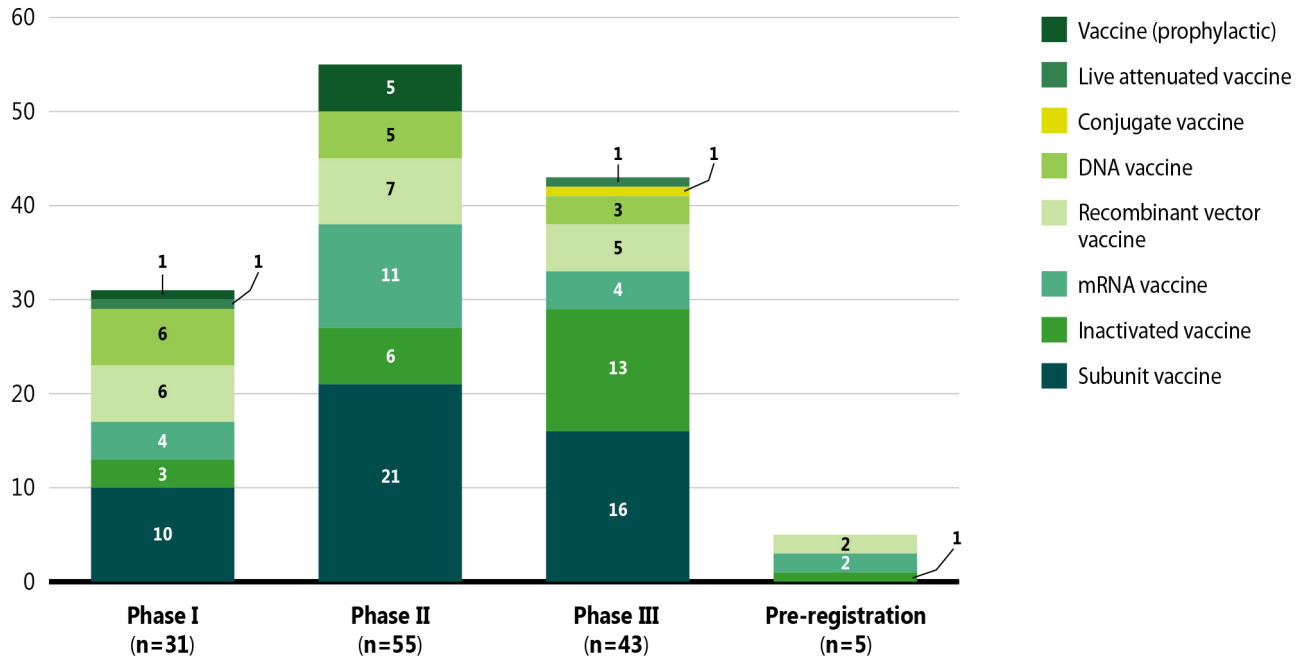


Data source: GlobalData (accessed September 2021).

Figure 6 breaks down the COVID-19 vaccines by mechanism of action and highest development phase.[vii] Vaccines are categorized into various vaccine types based on their mechanism of action; for example, while live attenuated vaccines target the whole virus, subunit and recombinant vaccines target one specific part of the virus.

[vii] Candidate vaccines in both clinical and preclinical evaluation are also reported by the World Health Organization. For a current list, visit their website: https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines

FIGURE 6. Distribution of COVID-19 vaccines by mechanism of action and phase of clinical evaluation, 2021



Data source: GlobalData (accessed September 2021).

Canada

As COVID-19 disease activity continues to accelerate, Canada's health authorities have committed to the immunization response plan published in December 2020. Key elements of Canada's immunization plan include securing sufficient supply; regulatory authorization for safety and efficacy; managing allocation and distribution of vaccines efficiently and securely; administering vaccines rapidly and equitably; and continuing to monitor vaccine safety, effectiveness and coverage. As of December 2021, the eligibility regulations for booster doses have permitted individuals 18 years and older residing in many Canadian provinces to receive a third shot.

Table 8 gives the number of medicines approved by Health Canada for the prevention and treatment of COVID-19, while Table 9 gives the number of COVID-19 medicines currently under review. As the COVID-19 pandemic remains a top priority in Canada, the current submissions undergoing Health Canada's review process for COVID-19 are being reviewed under expedited approval timelines. This effort has been supported by the use of interim orders intended to put temporary regulations into place in order to make drugs available to address large-scale public health emergencies. For example, the *Interim Order Respecting the Importation, Sale and Adversiting of Drugs for Use in Relation to COVID-19*, approved on May 23, 2020, introduced an alternate pathway to facilitate clinical trials for potential COVID-19 drugs and medicinal devices, while upholding strong patient safety requirements and validity of trial data.

TABLE 8. COVID-19 treatment and vaccines approved by Health Canada, 2021

THERAPEUTIC AREA	APPLICANT	MEDICINAL INGREDIENT(S)	OUTCOME OF APPLICATION	DATE OF DECISION/ OUTCOME
Antivirals for systemic use	**Veklury** Gilead Sciences Canada Inc.	Remdesivir (solution for injection)	Approved under: *Food and Drug Regulations*; Notice of Compliance issued under the NOC/c Guidance	27-Jul-20
Antivirals for systemic use	**Paxlovid** Pfizer Canada ULC	Nirmatrelvir and ritonavir (tablets for oral administration)	Approved under: *Food and Drug Regulations*; authorized with terms and conditions	17-Jan-22
Immune sera and immunoglobulins	**Casirivimab and imdevimab** Hoffmann-La Roche Ltd	Casirivimab and imdevimab (solution for injection)	Approved under: Interim order;* authorized with terms and conditions	09-Jun-21
Immune sera and immunoglobulins	**Bamlanivimab** Eli Lilly Canada Inc.	Bamlanivimab (solution for injection)	Approved under: Interim order;* authorized with terms and conditions	20-Nov-20
Immune sera and immunoglobulins	**Sotrovimab** GlaxoSmithKline Inc.	Sotrovimab (solution for injection)	Approved under: Interim order;* authorized with terms and conditions	30-Jul-21
Vaccines	**Covifenz** Medicago Inc.	Virus-like particles of SARS-CoV-2 spike protein	Approved under: *Food and Drug Regulations*; authorized with terms and conditions	24-Feb-22
Vaccines	**Nuvaxovid** Novavax Inc.	SARS-CoV-2 recombinant spike protein	Approved under: *Food and Drug Regulations*; authorized with terms and conditions	17-Feb-22
Vaccines	**Vaxzevria** AstraZeneca Canada Inc.	ChAdOx1-S [recombinant] (solution for injection)	Approved under: *Food and Drug Regulations*; authorized with terms and conditions Interim order	19-Nov-21 26-Feb-21
Vaccines	**Comirnaty** BioNTech Manufacturing GmbH	Tozinameran [mRNA vaccine, BNT162b2] (suspension for injection)	Approved under: *Food and Drug Regulations;* pediatric indication (ages 5-11) *Food and Drug Regulations*; booster dose *Food and Drug Regulations;* authorized with terms and conditions Interim order; pediatric indication (ages 12-15) Interim order	19-Nov-21 09-Nov-21 16-Sept-21 05-May-21 09-Dec-20

Vaccines	**Spikevax** Moderna TX, Inc.	Elasomeran (suspension for injection)	Approved under: *Food and Drug Regulations; Pediatric indication (ages 6-11)* *Food and Drug Regulations;* booster dose *Food and Drug Regulations*; authorized with terms and conditions Interim order; pediatric indication (ages 12-17) Interim order	 17-Mar-22 12-Nov-21 16-Sept-21 27-Aug-21 23-Dec-20
Vaccines	**Janssen Inc.**	AD26.COV2.S [recombinant] (suspension for injection)	Approved under: *Food and Drug Regulations*; authorized with terms and conditions Interim order	 23-Nov-21 05-Mar-21
Vaccines	**Covishield** Verity Pharmaceuticals Inc. / Serum Institute of India (in partnership with AstraZeneca Canada Inc.)	ChAdOx1-S (recombinant)	Approved under: Interim order;* authorized with terms and conditions	 26-Feb-21 (expired 16-Sept-21)

* The *Interim Order Respecting the Importation, Sale and Adversiting of Drugs for Use in Relation to COVID-19*, approved on May 23, 2020, introduced an alternate pathway to facilitate clinical trials for potential COVID-19 drugs and medicinal devices, while upholding strong patient safety requirements and validity of trial data.

Data source: Drug and vaccine authorizations for COVID-19: List of applications received, Health Canada (accessed February 2022): https://www.canada.ca/en/health-canada/services/drugs-health-products/covid19-industry/drugs-vaccines-treatments/authorization/applications.html

TABLE 9. COVID-19 treatment and vaccines under review by Health Canada, 2021

THERAPEUTIC AREA	APPLICANT	MEDICINAL INGREDIENT(S)	DATE SUBMISSION ACCEPTED
Vaccine	Pfizer Canada ULC/ BioNTech SE	Tozinameran	Feb-22
Vaccines - Booster dose	AstraZeneca Canada Inc.	ChAdOx1-S; [recombinant]	Dec-21
Vaccines - Booster dose	Janssen Inc.	Ad26.COV2.S	Dec-21
Vaccines	Novavax Inc.	NVX-CoV2373	Aug-21
Vaccines	Sanofi Pasteur Ltd	SARS-CoV-2 prefusion spike delta TM protein [recombinant]	Jul-21
Vaccines	Vaccigen Ltd	Whole virion inactivated coronavirus	Jul-21
Immune sera and immunoglobulins	AstraZeneca Canada Inc.	Cilgavimab, tixagevimab	Nov-21
Immune sera and immunoglobulins	Celltrion HealthCare Co. Ltd	Regdanvimab	May-21
Immune sera and immunoglobulins	Eli Lilly Canada Inc.	Bamlanivimab*	Jun-21
Immune sera and immunoglobulins	Hoffmann-La Roche Ltd	Casirivimab, imdevimab*	Sept-21
Immune sera and immunoglobulins	GlaxoSmithKline Inc.	Sotrovimab*	Oct-21
Immune sera and immunoglobulins	Eli Lilly Canada Inc.	Etesevimab	Sept-21
Immunosuppressants	Eli Lilly Canada Inc.	Baricitinib	Sept-21
Antivirals for systemic use	Gilead Sciences Canada Inc.	Remdesivir	Apr-21
Antivirals for systemic use	Merck Canada Inc.	Molnupiravir	Aug-21
CEASED REVIEWS			
Immune sera and immunoglobulins	CytoDyn Inc.	Leronlimab	Mar-21 (expired)

Antigout preparations	Pendopharm Division of Pharmascience Inc.	Colchicine	Jan-21 07-Jun-21 cancelled by sponsor
Other nervous system drugs	Sanotize Research & Development Corp.	Nitric oxide	Jun-21 01-Sept-21 cancelled by sponsor

* The applicant has filed a new drug submission under the *Food and Drug Regulations* to transition this product from the interim order. The product continues to be approved for sale in Canada during this transition period.
Data source: Drug and vaccine authorizations for COVID-19: List of applications received, Health Canada (accessed January 2022): https://www.canada.ca/en/health-canada/services/drugs-health-products/covid19-industry/drugs-vaccines-treatments/authorization/applications.html

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