



INTREPID ALLIANCE

INTERNATIONAL READINESS FOR PREVENTING INFECTIOUS VIRAL DISEASE

JANUARY 24, 2024

# INTREPID Alliance Antiviral Clinical Development Landscape

INTREPID Alliance: Antiviral Clinical Development Landscape. 24 January 2024.  
Available at [intrepidalliance.org](https://intrepidalliance.org).

# INTREPID Alliance Pandemic Preparedness

- INTREPID Alliance Landscaping Activities
  - Goal of the Landscape is to highlight strengths and weaknesses of the antiviral drug development pipeline for potential pandemic viral pathogens.
- Landscape
  - Airfinity information on diverse compound/indications
  - Initial Triage: preclinical vs. clinical
  - Detailed review and identification of most promising compounds
- Timing and Publication on Website
  - Initial Clinical Triage - January 24, 2024
  - Promising Clinical Compounds - February 2024
  - Initial Preclinical Triage - May 2024
  - Promising Preclinical Compounds - June 2024
  - Updated Quarterly

# Landscape Analysis Components

Airfinity monitors 12 viral families that pose the greatest risk of pandemic potential.

With thanks to Airfinity for its contributions to the presentation.



## Baseline Information Identified:

- Diverse Compound/Indications by Viral Family and Disease
- Phase of Development (e.g., Preclinical through Phase 4, Approved)
- MOA/Target
- Route of Administration
- Developer or Sponsor (Type, Location)
- Clinical Trials (Links, Status, Trial Site Locations)



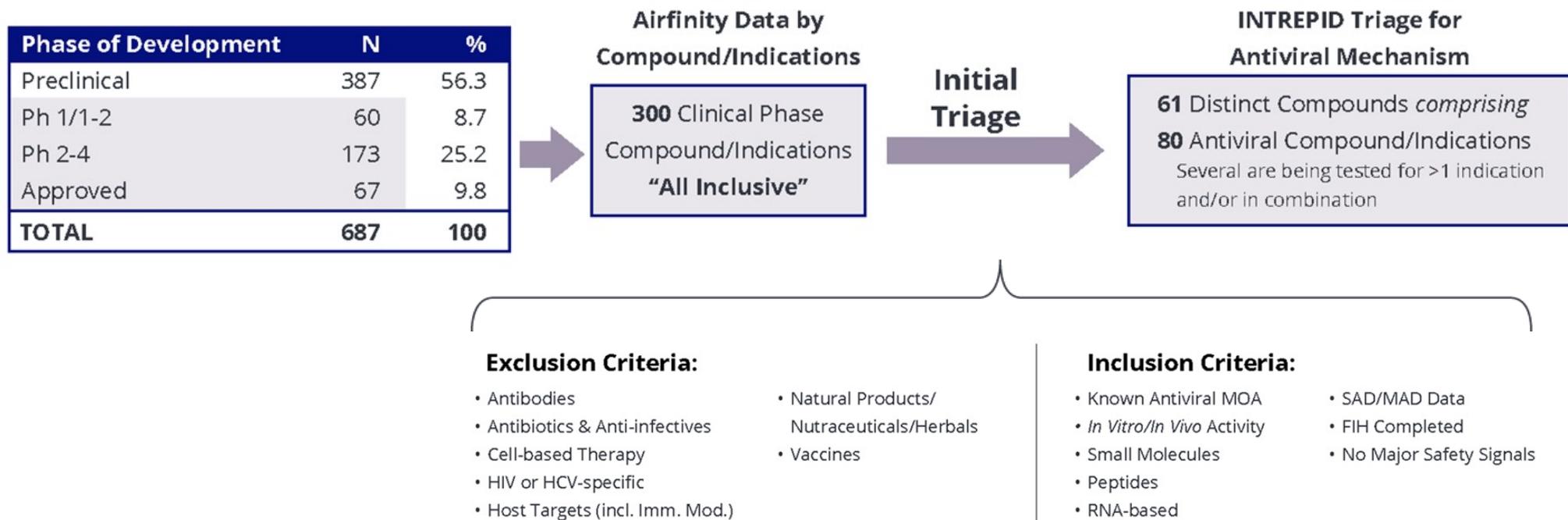
## Figures & Tables:

- 12 Viral Families of Interest for Pandemic Preparedness
- Total Pipeline by Viral Family
- Compounds by Viral Family and Phase of Development
- Compounds by Viral Family or Disease, and Phase of Development
- Compounds by MOA/Target and Viral Family or Disease
- Developer or Sponsor

- ▶ Emerging information is reviewed on a monthly basis.
- ▶ Antiviral Landscape updated on the INTREPID Alliance website on a quarterly basis.

# INTREPID Alliance Antiviral Clinical Development Landscape: Initial Triage\*

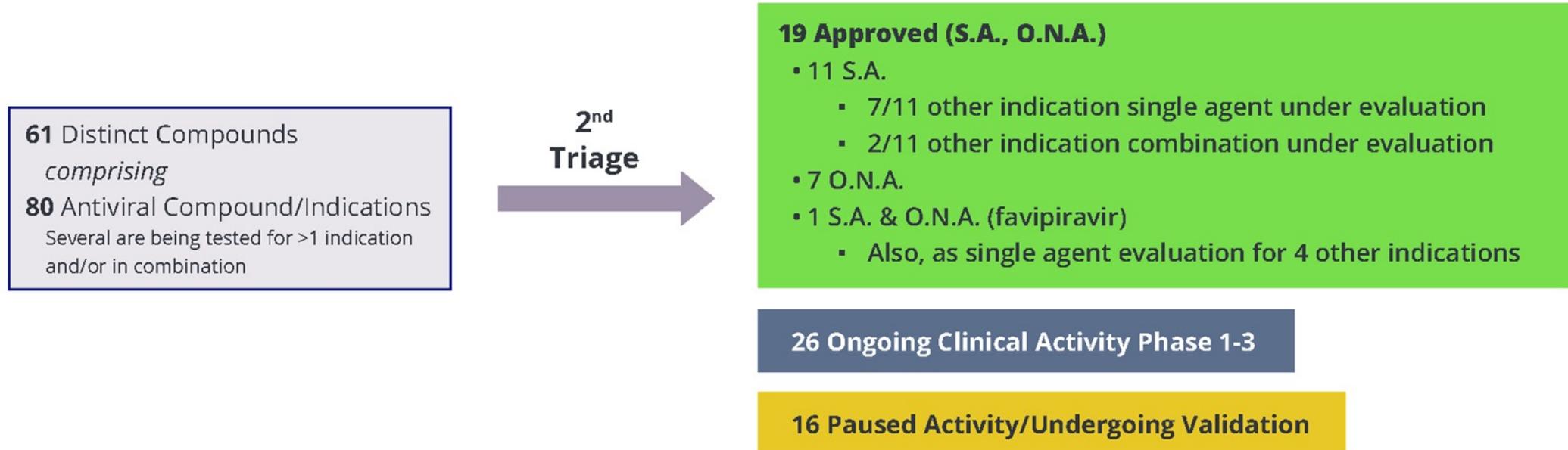
- Initial triage of clinical-level data (Phase 1-4 + “Approved”) included as of **November 16, 2023**
- Primary antiviral compounds of interest are those that are directed at specific viral targets.
- Preclinical compound triage and analysis will be performed following work on clinical antiviral compounds.



\*As of November 16, 2023

# INTREPID Alliance Antiviral Clinical Development Landscape: 2<sup>nd</sup> Level Triage\*

- 61 distinct clinical phase and approved antiviral compound/indications were further categorized by:
  - Stringent Authority “S.A.” or Other National Authority “O.N.A.”
  - Availability of information regarding antiviral mechanism and status of ongoing studies/activities



\*As of November 16, 2023

# INTREPID Alliance Antiviral Clinical Development Landscape: Overview of Priority Viral Families\*

As of November 16, 2023, the 61 clinical phase and approved antiviral compounds fall into 9 of 12 viral families with greatest risk of pandemic potential.

<b>Viral Family</b>	<b>Adenoviridae</b>	<b>Arenaviridae</b>	<b>Coronaviridae</b>	<b>Filoviridae</b>	<b>Flaviridae</b>	<b>Hantaviridae</b>
<b>Indication</b>	Human Adenovirus A-G	Lassa Fever Chapare hemorrhagic fever	SARS-CoV-2	Ebola	Dengue Japanese encephalitis	—
<b>Viral Family</b>	<b>Nairoviridae</b>	<b>Orthomyxoviridae</b>	<b>Paramyxoviridae</b>	<b>Peribunyaviridae</b>	<b>Picornaviridae</b>	<b>Togaviridae</b>
<b>Indication</b>	Crimean Congo hemorrhagic fever	Influenza	Hendra virus	—	Rhinovirus Polio	—

\*As of November 16, 2023



# 12 Compounds Approved by a Stringent Regulatory Authority (S.A.)\*

COVID-19 (n=4), Influenza (n=8)

Compound**	Developer/Sponsor	Mechanism/Target
<b>COVID-19</b>		
Ensitrelvir (S-217622)	Shionogi, Ildong	Protease - Mpro
Molnupiravir (MK-4482)	Merck & Co./Merck Sharp & Dohme (MSD), Ridgeback Biotherapeutics	Replication - RdRp
Nirmatrelvir/Ritonavir	Pfizer	Protease - Mpro
Remdesivir	Gilead Sciences	Replication - RdRp
<b>INFLUENZA</b>		
Amantadine	Novartis	Entry - Proton Channel M2
Baloxavir Marboxil	Shionogi, Roche	Replication - Endonuclease
Favipiravir	FUJIFILM Toyama Chemical	Replication - RdRp
Laninamivir	Daiichi Sankyo, Biota Pharmaceuticals	Assembly/Release - NA
Oseltamivir	Roche	Assembly/Release - NA
Peramivir	BioCryst Pharmaceuticals	Assembly/Release - NA
Rimantadine	Allergan	Entry - Proton Channel M2
Zanamivir	GlaxoSmithKline (GSK)	Assembly/Release - NA

\*As of November 16, 2023; WHO-defined Stringent Regulatory Authority (<https://www.who.int/publications/m/item/list-of-transitional-wlas>)

\*\* Favipiravir also has O.N.A. approval

## 8 Compounds Approved by Other National Authority (O.N.A.)\*

COVID-19 (n=5), Influenza (n=1), COVID-19 & Influenza (n=2)

Compound**	Developer/Sponsor	Mechanism/Target
<b>COVID-19</b>		
Azvudine	HeNan Sincere Biotech, Zhengzhou Granlen PharmaTech, Genuine Biotech, Fosun Pharma	Replication – RdRp
Favipiravir	Promomed, R-Pharm	Replication – RdRp
Leritreivir (RAY1216)	Guangdong Zhongsheng Pharmaceutical	Protease – Mpro
Simnotrelvir/Ritonavir	Simcere Pharmaceutical, Shanghai Institute of Materia Medica (SIMM), Jiangsu Simcere Pharmaceutical	Protease – Mpro
Mindeudesivir (VV116)	Shanghai Junshi Biosciences	Replication – RdRp
<b>INFLUENZA</b>		
Triazavirin	Medsintez Pharmaceutical	Replication – RdRp
<b>COVID-19 &amp; INFLUENZA</b>		
Enisamium (VR17-04)	Farmak	Replication – RdRp
Umifenovir	Pharmstandard	Entry – Fusion

\*As of November 16, 2023; WHO-defined Other National Authority (<https://www.who.int/publications/m/item/list-of-transitional-wlas>)

\*\*Favipiravir also has S.A. approval

## 26 Ongoing Activity Phase 1-3 Compounds (1)\*

COVID-19 (n=15), Influenza (n=6), Dengue (n=2), Lassa fever (n=1), Rhinovirus (n=1), plus Ribavirin with 4 indications

First 15 shown below approved for COVID-19

Compound	Developer/Sponsor	Mechanism/Target	Phase of Development
<b>COVID-19</b>			
ABBV903	AbbVie	Protease - Mpro	1
ALG-097558	Aligos Therapeutics	Protease - Mpro	1
ASC10	Asclepis Pharma	Replication - RdRp	1
ASC11/Ritonavir	Asclepis Pharma	Protease - Mpro	1
CDI-988	CoCrystal Pharma	Protease - Mpro	1
HY3000	Hybio Pharmaceutical	Entry - Fusion	1
S-892216	Shionogi	Protease - Mpro	1
HS 10517/Ritonavir	Abbott Laboratories, AbbVie, Gilead Sciences, Jiangsu Hansoh Pharmaceutical	Protease - Mpro	2
EDP-235	Enanta Pharmaceuticals	Protease - Mpro	2
PF-07817883	Pfizer	Protease - Mpro	2
FB2001	Frontier Biotechnologies	Protease - Mpro	3
GST-HG171	Fujian Cosunter Pharmaceutical	Protease - Mpro	3
Bemnifosbuvir	Atea Pharmaceuticals	Replication - RdRp	3
Obeldesivir (GS-5245)	Gilead Sciences	Replication - RdRp	3
QLS1128	Qilu Pharmaceutical	Protease - Mpro	3

\*As of November 16, 2023

## 26 Ongoing Activity Phase 2-3 Compounds (2)\*

COVID-19 (n=15), Influenza (n=6), Dengue (n=2), Lassa fever (n=1), Rhinovirus (n=1), plus Ribavirin with 4 indications

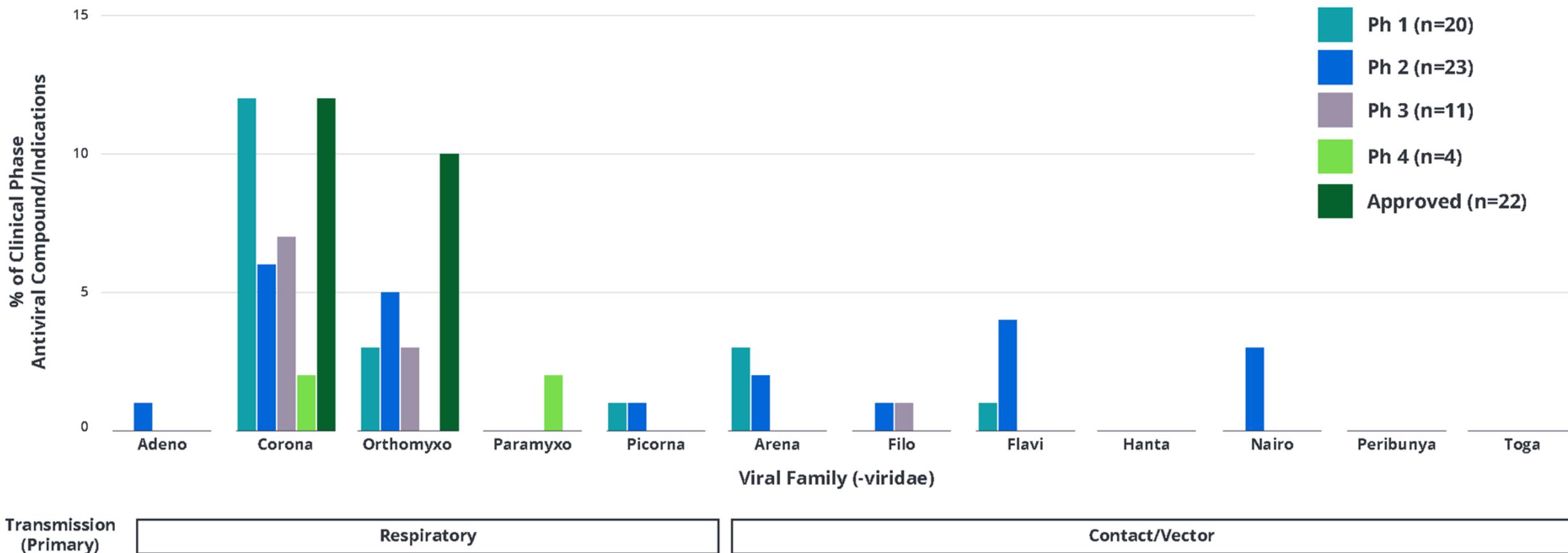
Remaining 11 shown below

Compound	Developer/Sponsor	Mechanism/Target	Phase of Development	Additional Indication(s)
<b>COVID-19 &amp; OTHERS</b>				
Ribavirin	Bausch Health (COVID-19); Bausch Health, Roche, Chugai Pharma (others)	Inosine-5'-Monophosphate Dehydrogenase 1 (IMPDH1)	4 COVID-19; 2 others	Crimean Congo hem. fever, Japanese encephalitis, Lassa fever
<b>INFLUENZA</b>				
CC-42344	CoCrystal Pharma	Replication – Flu A Pol	1	-
ZSP1273	Raynovent	Replication – DdRp	1/2	-
CD388	Cidara Therapeutics, Janssen Pharmaceuticals	Entry – Fc Drug Conjugate	2	-
Flufirvitide-3	Autoimmune Technologies	Entry – Flu HA	2	-
HNC042	Guangzhou Henovcom Bioscience Co. Ltd.	Assembly/Release – NA	2	-
GP681	Jiangxi Qingfeng Pharmaceutical	Replication – Endonuclease	3	-
<b>OTHER VIRAL DISEASES (Dengue, Lassa fever, Rhinovirus)</b>				
EYU688 (NITD-688)	Novartis	Replication – NS4B	2 (Dengue)	-
JNJ-1802	Janssen Pharmaceuticals	Replication – DENV NS3 Helicase; Potential Immune Evasion Function – DENV NS4B	2 (Dengue)	-
ARN-75039	Arisan Therapeutics	Entry – Fusion	1 (Lassa fever)	-
Vapendavir	Vaxart, Altesa Biosciences	Entry – Capsid	2 (Rhinovirus)	-

\*As of November 16, 2023

# The Majority of Clinical Phase Antiviral Compound/Indications Are Targeting Coronaviruses and Orthomyxoviruses\*

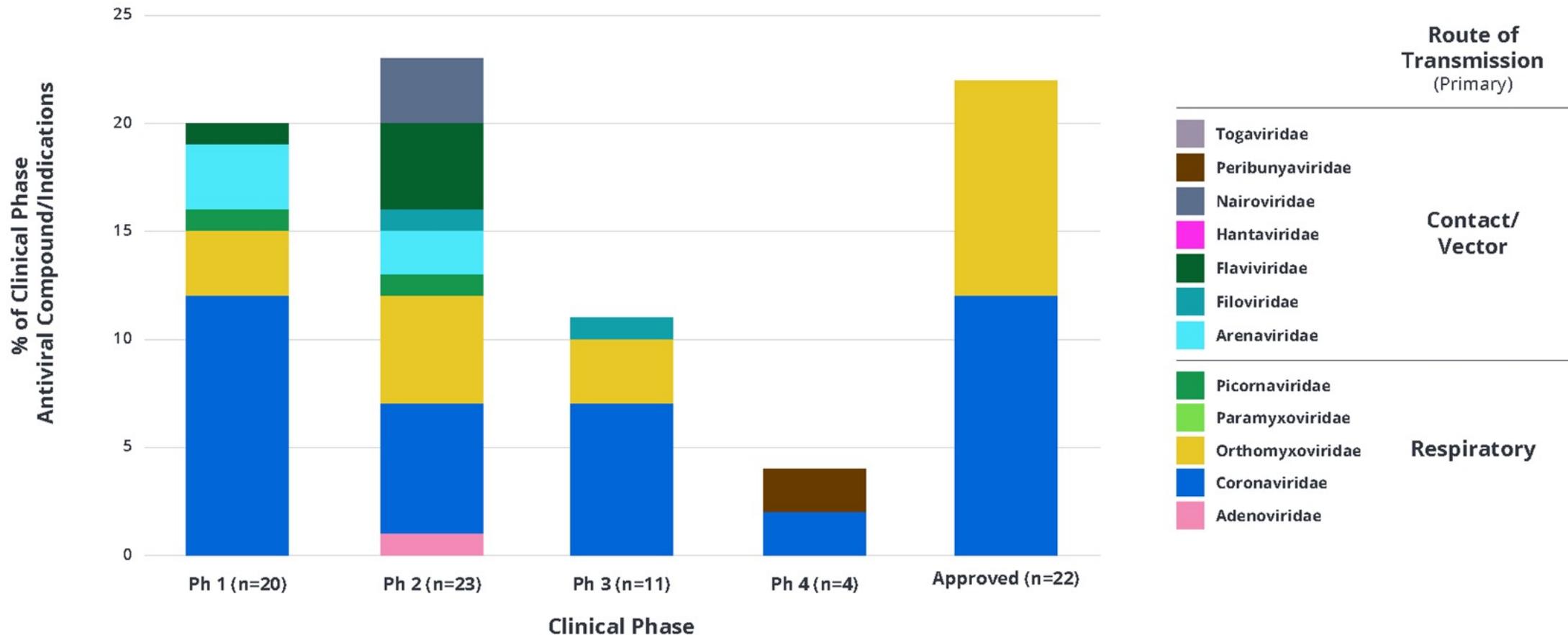
% Clinical Phase Antiviral Compound/Indications by Virus Family (N=80)



\*As of November 16, 2023

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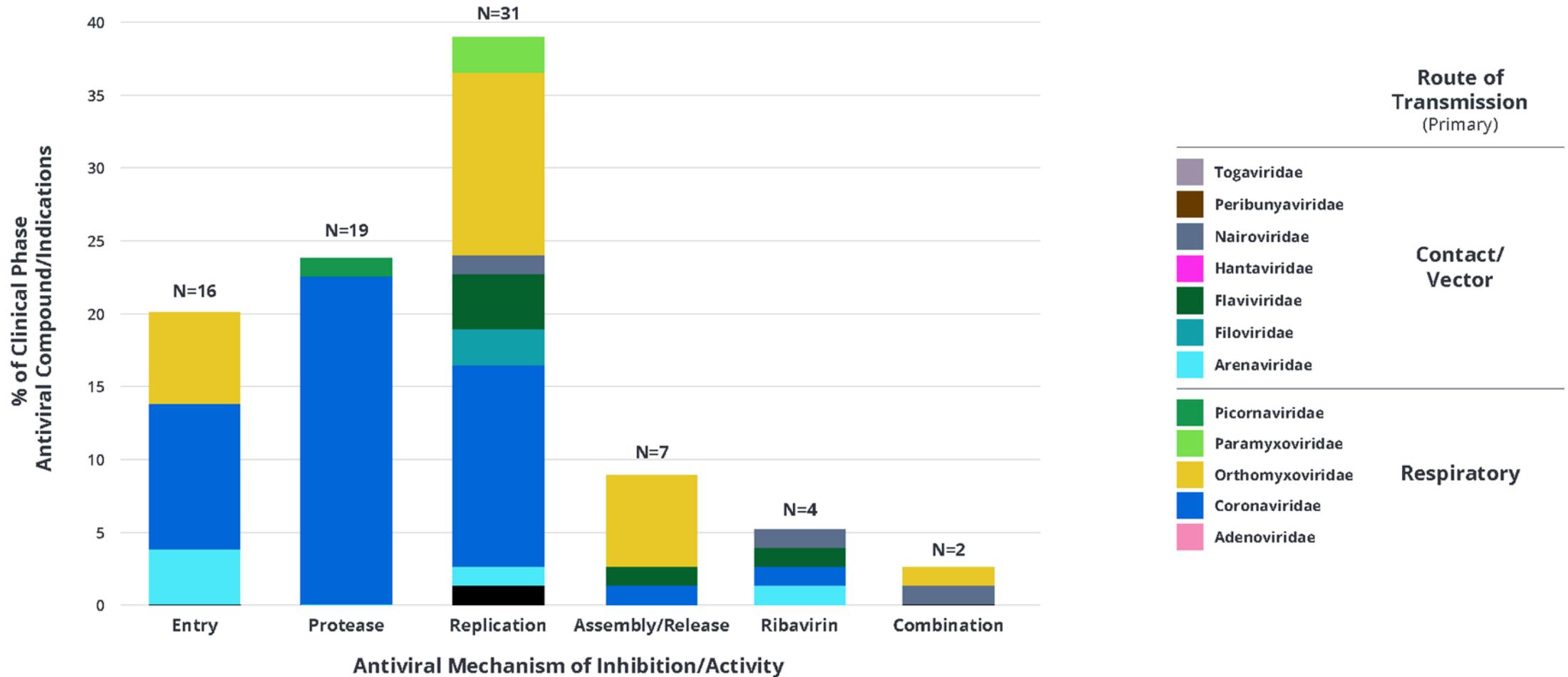


\*As of November 16, 2023

# Replication, Protease, & Entry Inhibitors Predominate\*

*Most are vs. Coronaviruses and Orthomyxoviruses*

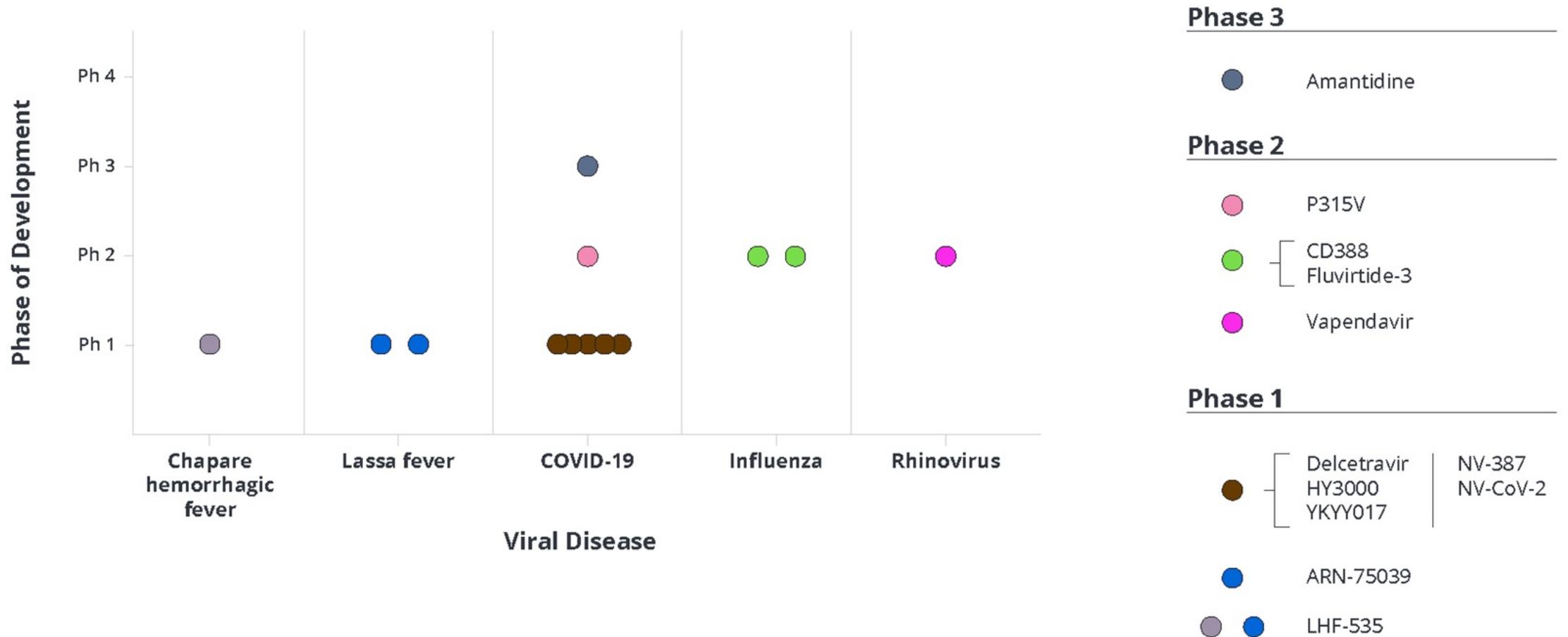
% Clinical Phase Antiviral Compound/Indications by Virus Target and Virus Family (N=80)



\*As of November 16, 2023; Clinical Phase includes Ph 1-4 and Approved

# Entry Inhibitors\* by Viral Disease and Phase of Development

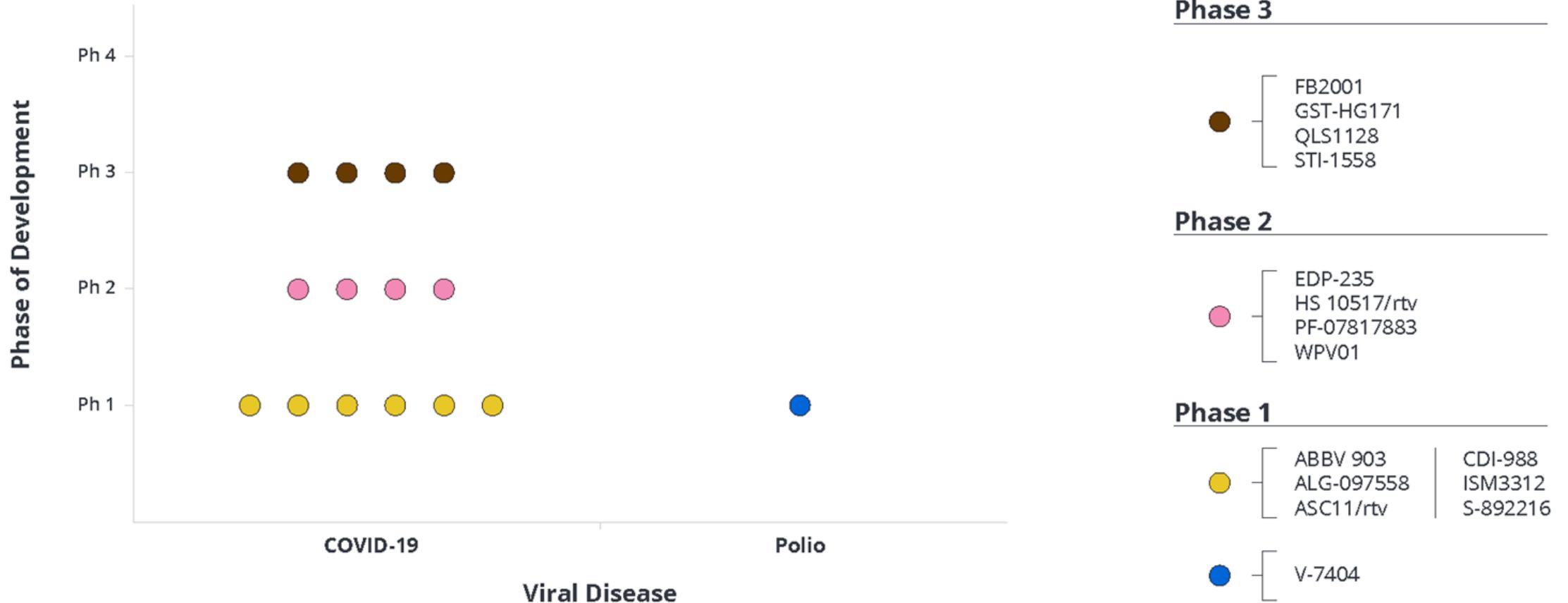
Phase of Development: Phase 1-4



\*As of November 16, 2023; Attachment, Capsid (Rhinovirus), Fusion, Viroporin

# Protease Inhibitors\* by Viral Disease and Phase of Development

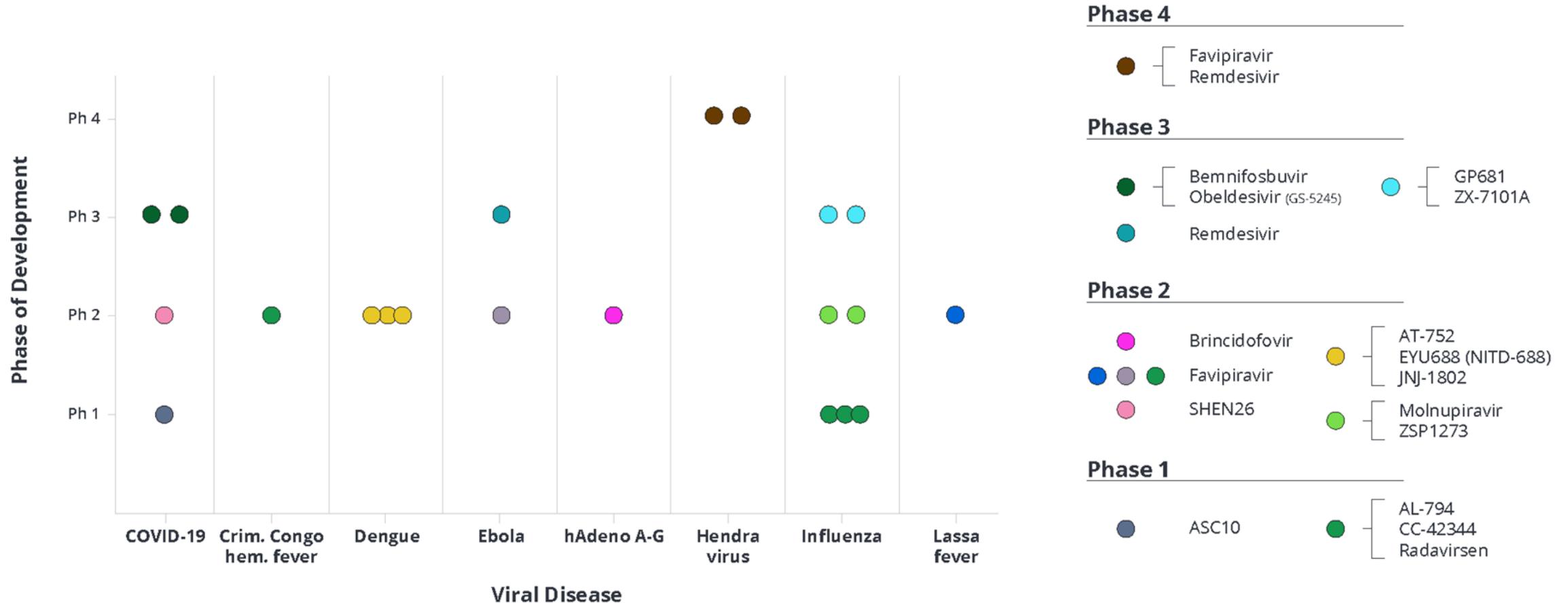
Phase of Development: Phase 1-4



\*As of November 16, 2023; Mpro (Coronavirus and Enterovirus)

# Replication Inhibitors\* by Viral Disease and Phase of Development

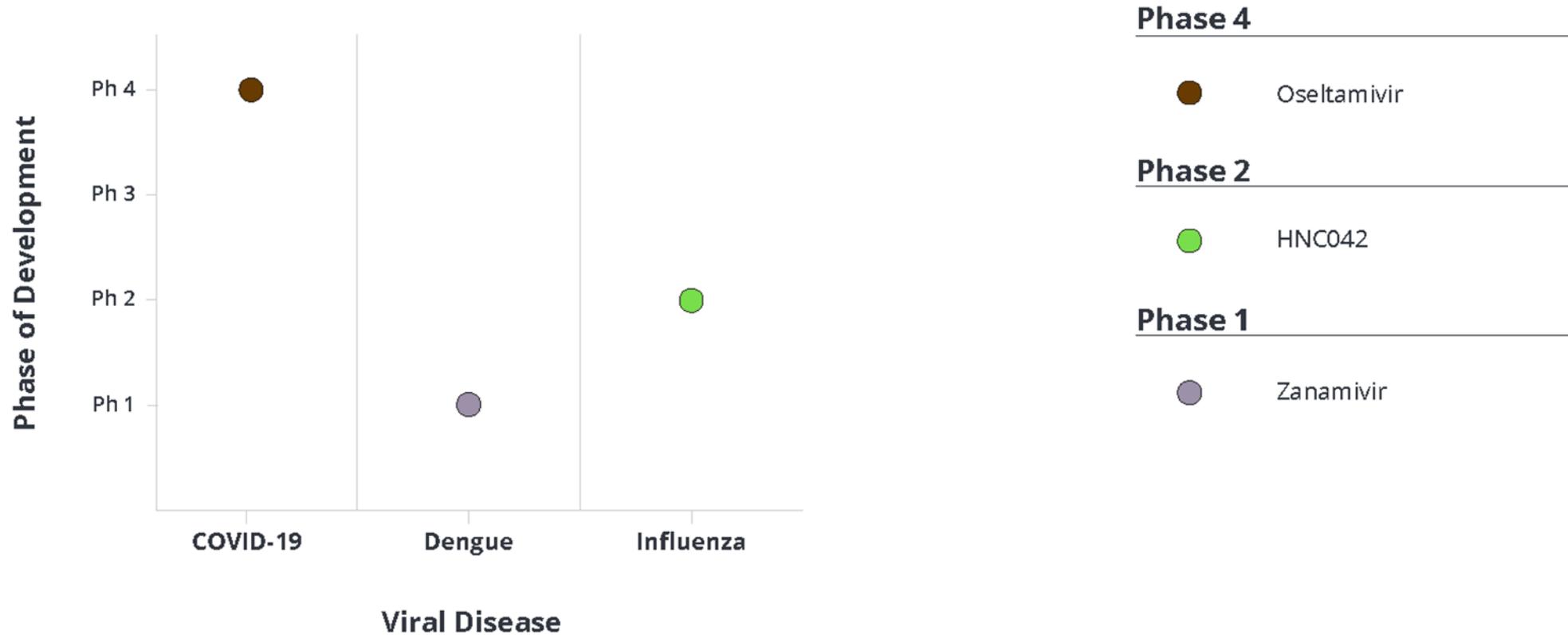
Phase of Development: Phase 1-4



\*As of November 16, 2023; Polymerase, Endonuclease, Replicase, DENV NS4B

# Assembly/Release Inhibitors\* by Viral Disease and Phase of Development

Phase of Development: Phase 1-4



\*As of November 16, 2023; Neuraminidase

# Ribavirin and Combinations\* by Viral Disease and Phase of Development

Phase of Development: Phase 1-4



\*As of November 16, 2023

# Summary of Antiviral Clinical Development Landscape Compound Triage\*

- Identified 61 distinct antiviral clinical compounds under evaluation:
  - Compound Name/Sponsor
  - Mechanism of Action
  - 80 Compound/Indications
  - Phase of Development
- For those compounds that have not yet achieved approval and licensure, further adjudication will narrow the lists to those that are most aligned with the objectives of the 100 Days Mission.
- Preclinical compounds and associated indications will be evaluated in a similar manner in the upcoming weeks.

\*As of November 16, 2023

# BACKGROUND SLIDE

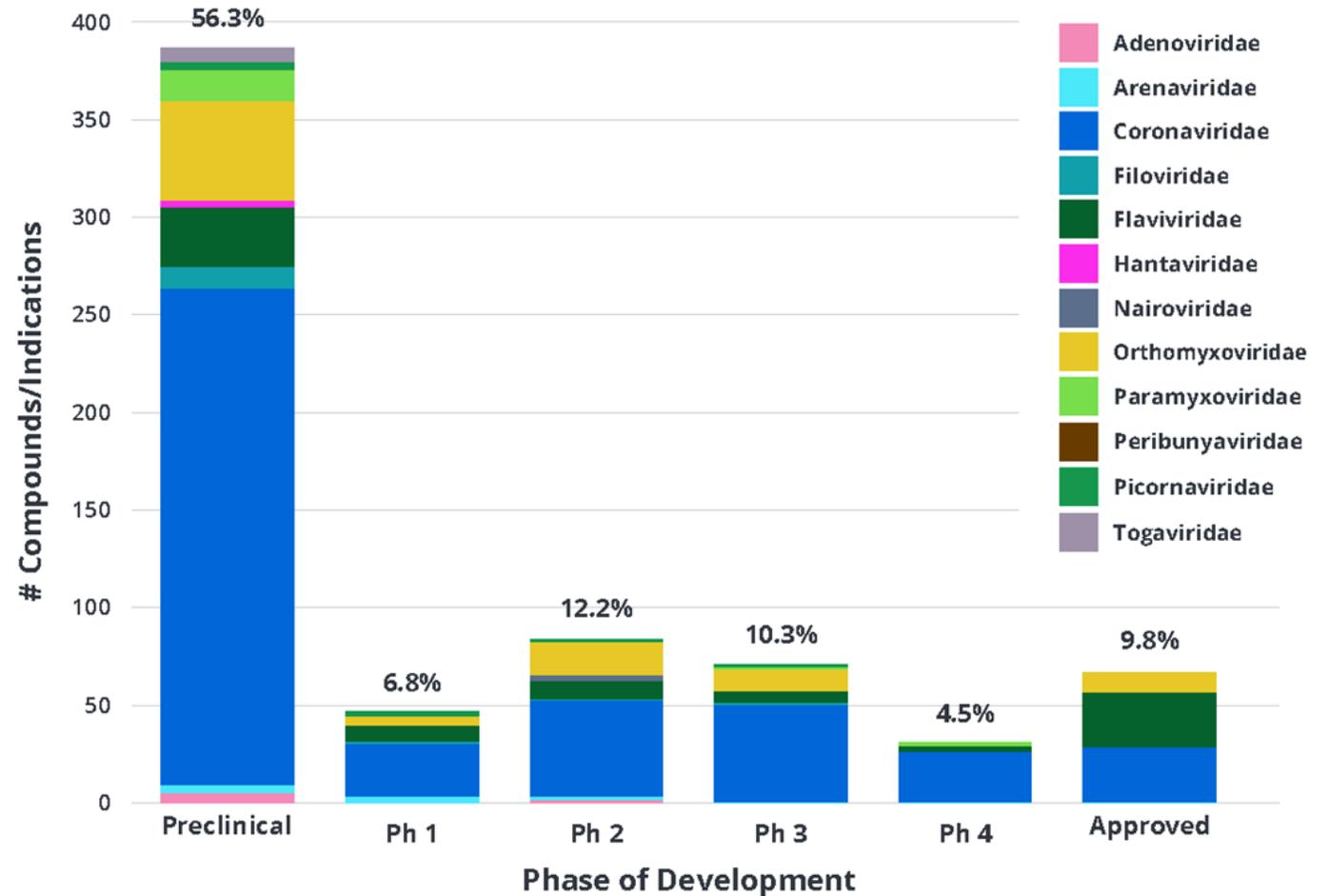
# Pipeline of Diverse Compound/Indications in Airfinity Database by Viral Family & Phase of Development\* (n=687)

The majority (n=387; 56.3%) of 687 diverse compound/indications for priority viruses in November 2023 are preclinical with the majority of those targeting SARS-CoV-2 (n=239/387; 61.8%).

The majority (56.3%) of the 687 diverse compound/indications for the 12 priority viral families of pandemic potential are in preclinical development. This is followed by Phase 2 (12.2%), Phase 3 (10.3%), Phase 1 (6.8%), Phase 4 (4.5%), and Approved (9.75%). *Peribunyaviridae* is currently the only priority viral family adjudged to have no compounds in development in November 2023.

## LIMITATIONS:

- Compound/Indications selected based on association with a viral disease irrespective of compound's mechanism of action.
- Compounds that have had no activity in the past 12 months are marked as inactive and excluded from this analysis.
- Compound/Indications list is being updated frequently.
- Pipeline shows those in preclinical/clinical development as well as approved by a global regulatory authority (stringent or other national authority).
- Preclinical compounds must have shown antiviral activity via *in vitro* or *in vivo* animal models in peer-reviewed publications or preprints.



\*As of November 16, 2023



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Interested  
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