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Previously Defined Health

NEXT GENERATION THERAPIES FOR AUTOIMMUNE AND INFLAMMATORY DISEASES: READY FOR PRIME TIME OR IS THIS MARKET IMMUNE TO CHANGE?

August 6, 2019



Today's Moderators & Panelists

Moderators



David J. Lomb, PhD
Associate Principal
Cello Health BioConsulting



Danielle M. Marra, MS, MBA
Associate Principal
Cello Health BioConsulting

Panelists



Gary D. Glick, PhD
President & CEO
IFM Therapeutics



James Mathew, PhD
*Professor of Surgery &
Microbiology-Immunology*
Northwestern University

Co-Promoters

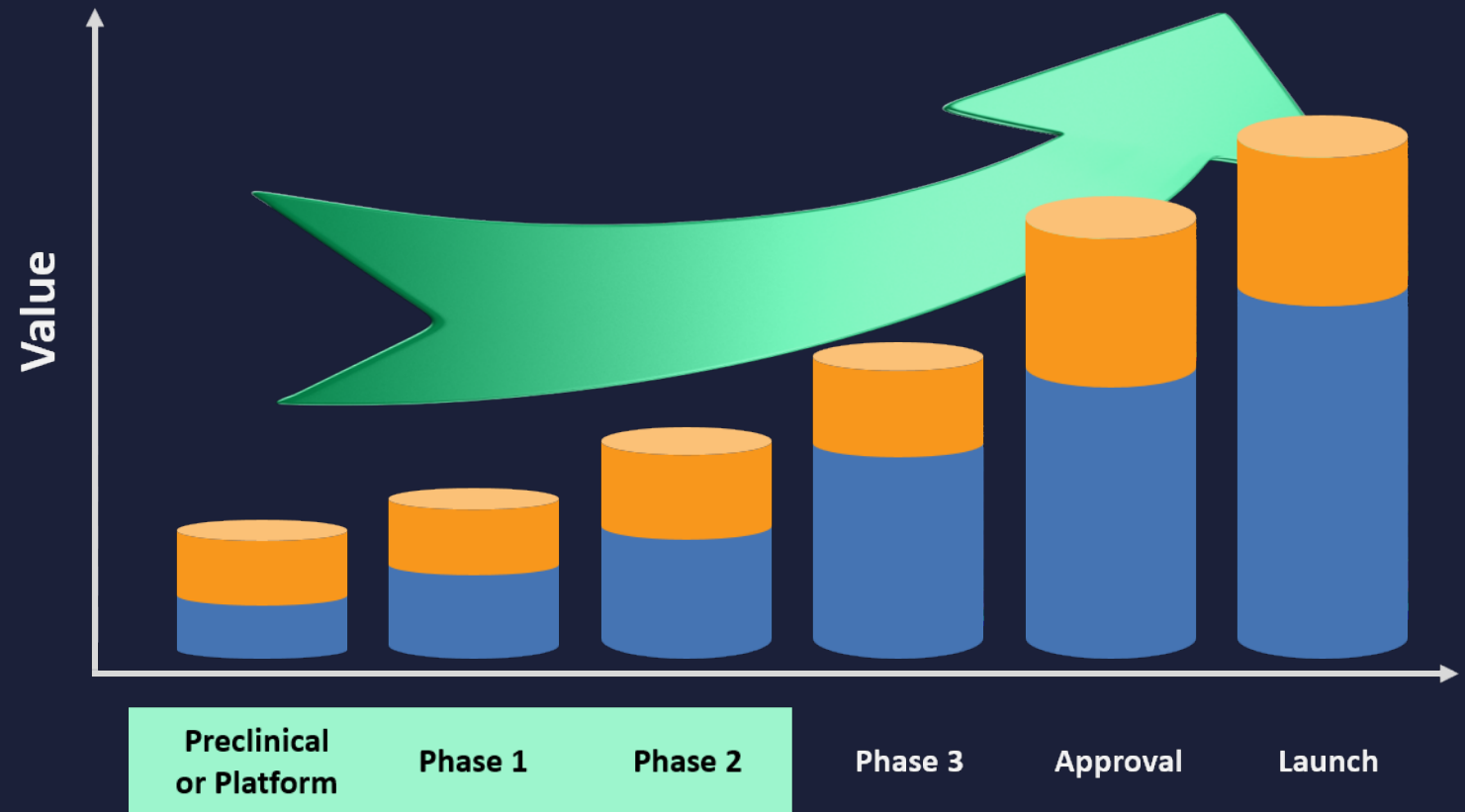


Cello Health BioConsulting

Strategic Focus on Value Creation for Early-Stage Biotech

We consult with the world's most innovative biopharma companies, applying our strategic insight to early-stage platforms and programs. Our advice reduces development and commercial risk and increases stakeholder value.

Our Strategic Advice, Given Early in Development (pre-PoC), Drives Value Along the Development Continuum and Influences Ultimate Outcome



We Are Cello Health

A passionate team of global advisors, expert at navigating healthcare clients to confident critical decisions

A THOUGHT-LEADING HEALTH ADVISORY FIRM, WITH EXPERTS IN SCIENCE, INSIGHT, STRATEGY, AND COMMUNICATIONS DELIVERED AS A SPECIALIST SERVICE OR AS A FUSION OF EXPERTISE

BUSINESS INSIGHT & ANALYTICS RESEARCH

STRATEGIC & SCIENTIFIC CONSULTING

SCIENTIFIC & CREATIVE COMMUNICATIONS



500
STAFF

52
COUNTRIES
COVERED

RANGE OF ONGOING CLIENTS

Partnering with the
top 24
Global Pharma companies

Supporting
100+
small, start-ups and
emerging biotechs



WORLDWIDE PRESENCE



LONDON, SAN FRANCISCO, NEW YORK, NEW JERSEY, PHILADELPHIA AND BOSTON

200 Market Researchers, Master Practitioners, Digital Specialists, Innovation leads, Field and Compliance

170 Communication Specialists, Scientists & Creatives including Client Service, Project Managers and Medical Writers

100 Consultants with a blend of industry experts and consulting specialists

60+ PhDs and MDs providing a depth of understanding into cutting edge science

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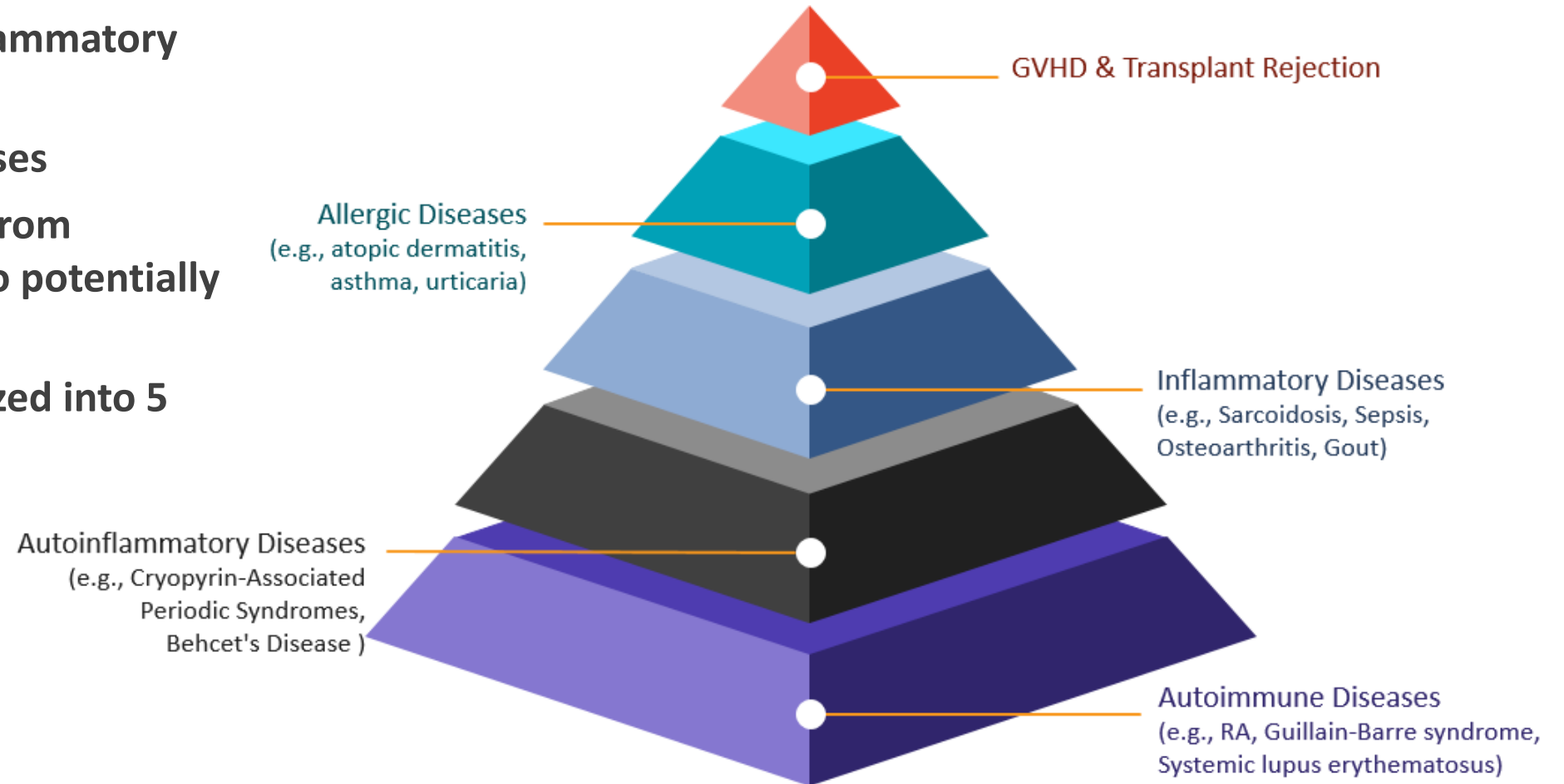
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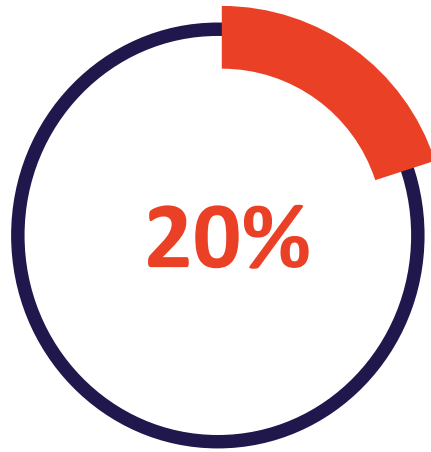
Autoimmune And Inflammatory Diseases Encompass More Than 150 Diseases and May Affect Up to 50 Million Individuals in the U.S. Alone

Autoimmune and inflammatory diseases (AIID)

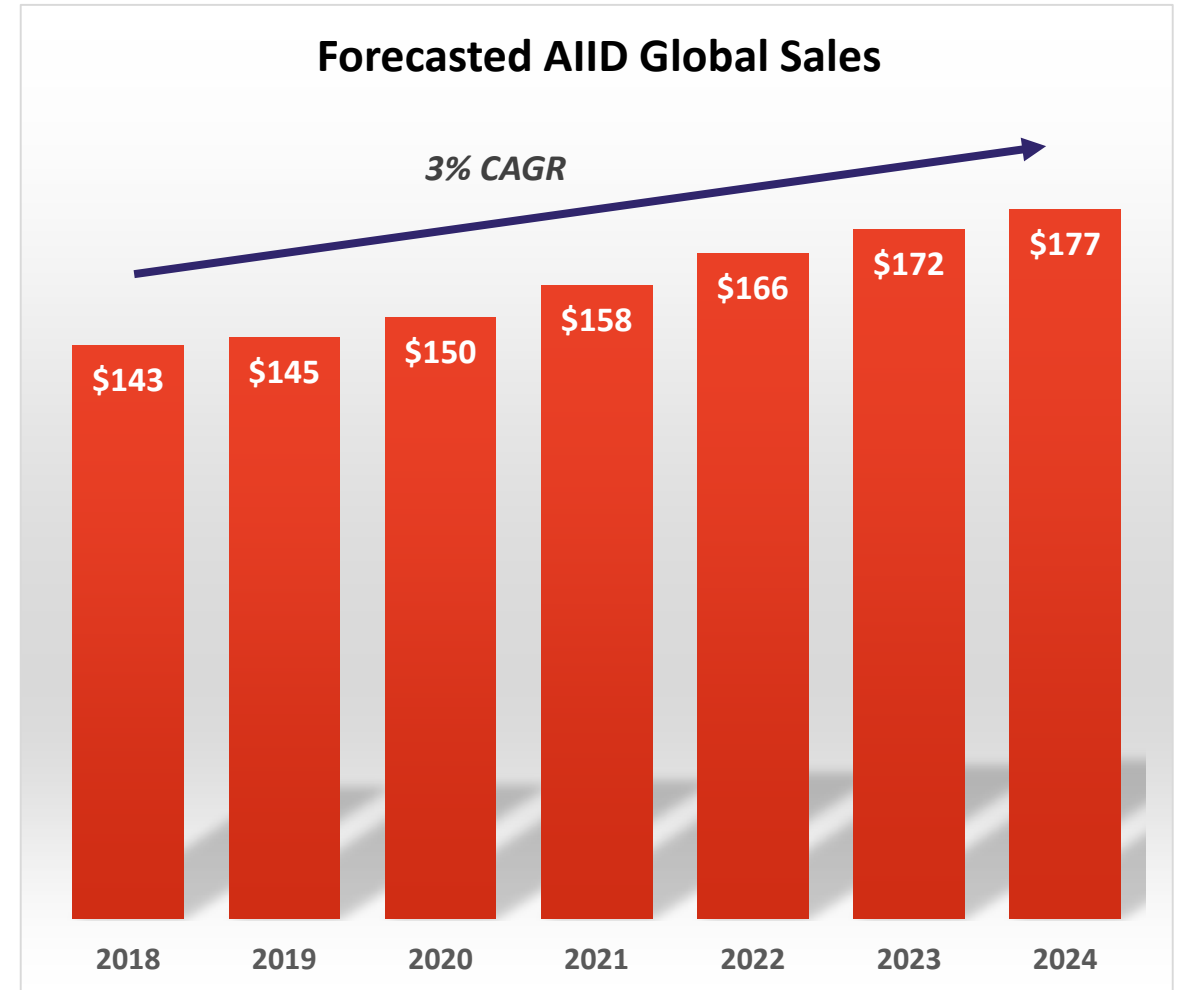
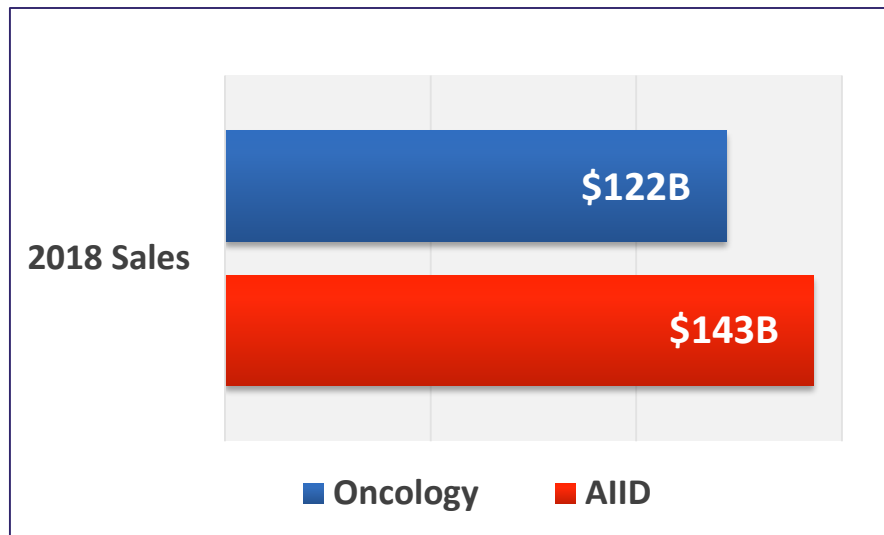
- >150 unique diseases
- Range of severity from relatively benign to potentially fatal
- Broadly characterized into 5 sub-categories



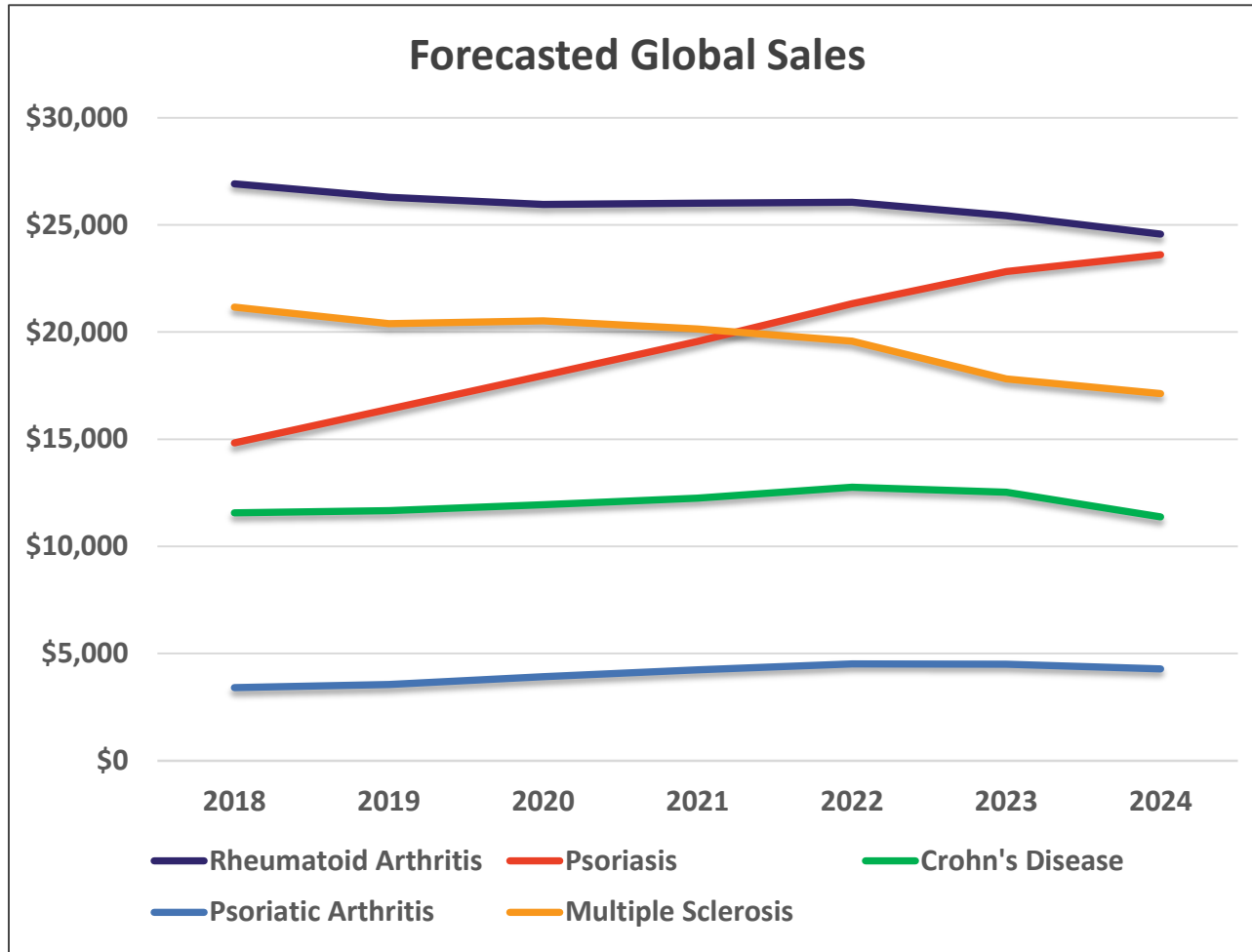
AIID Represents The Largest Pharmaceutical Market By Revenue Globally



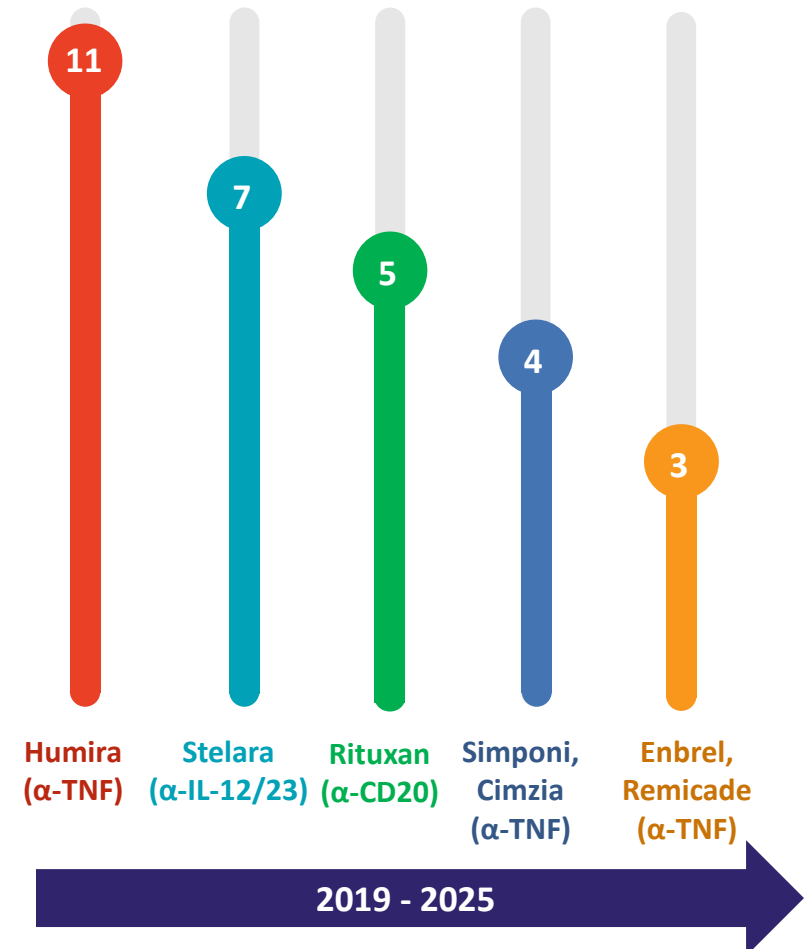
Nearly 20% of all global drug sales are for drugs for AIID







The Major AIID Markets Are Maturing And Biosimilars Are Looming



Expected Biosimilar Entries



However, Numerous Next-Generation Approaches Are In Development With Novel Targets And Modalities

Small Molecules 	Biologics 	Cell Therapies 	Therapeutic Immunization 
<p><u>NLRP3 Inflammasome Inhibitors</u></p> <ul style="list-style-type: none"> ▪ IFM Tre/Novartis ▪ Inflazone ▪ Jecure/Genentech ▪ NodThera, Zyversa, Olatec <p><u>ATPase Modulators</u></p> <ul style="list-style-type: none"> ▪ Lycera <p><u>cGAS-STING Inhibitors</u></p> <ul style="list-style-type: none"> ▪ IFM Due <p><u>Protacs</u></p> <ul style="list-style-type: none"> ▪ Kymera <p><u>Other Novel Targets</u></p> <ul style="list-style-type: none"> ▪ Kadmon (ROCK2) ▪ Symbiotix Biotherapies (Treg) 	<p><u>Checkpoint Agonists</u></p> <ul style="list-style-type: none"> ▪ Anaptys/Celgene (PD-1) ▪ ImmuNext (VISTA) ▪ Immuteq (LAG3) <p><u>Novel Targets</u></p> <ul style="list-style-type: none"> ▪ Cantargia (IL1RAP) ▪ Abcentra (oxLDL) <p><u>Treg Targeting</u></p> <ul style="list-style-type: none"> ▪ Delinia/Celgene (IL-2) ▪ Nektar/Eli Lilly (IL-2) ▪ Roche (IL-2) ▪ Pandion (IL-2) 	<p><u>T reg</u></p> <ul style="list-style-type: none"> ▪ Txcell/Sangamo ▪ BlueRock Therapeutics ▪ Tract Therapeutics <p><u>CAAR T</u></p> <ul style="list-style-type: none"> ▪ Cabaletta Bio <p><u>Expanded Adipose-derived Stem Cells (eASC)</u></p> <ul style="list-style-type: none"> ▪ TiGenix/Takeda <p><u>Facilitating Cells</u></p> <ul style="list-style-type: none"> ▪ Talaris Therapeutics 	<p><u>Peptide or Whole Autoantigens</u></p> <ul style="list-style-type: none"> ▪ Apitope ▪ Diamyd Medical ▪ ImmusantT ▪ Topas Therapeutics <p><u>DNA Drugs/Vaccines</u></p> <ul style="list-style-type: none"> ▪ Tolerion <p><u>Nanoparticles</u></p> <ul style="list-style-type: none"> ▪ Parvus <p><u>Antigen-Specific Treg Vaccine</u></p> <ul style="list-style-type: none"> ▪ Alma Bio Therapeutics

Pharma Has Demonstrated Interest in Novel AIID Approaches Through Several Sizeable Deals

Novartis ponies up \$310M for IFM Therapeutics' inflammation-focused unit

Lilly and ImmuNext Ink \$605 Million+ Autoimmune Research Pact

Gilead inks \$5B upfront deal to gain broad access to Galapagos' pipeline

Giant Roche wades into the preclinical NLRP3 pool, bagging Jecure for their anti-inflammatory team at Genentech

Celgene splashes out \$300M on Delinia autoimmune biotech buy

Sangamo to buy TxCell, cell therapy tech in \$84M deal

Takeda strikes €520M deal to buy cell therapy firm TiGenix

Lilly pays Nektar \$150M upfront to buy into phase 1 drug with broad immune and inflammatory applications

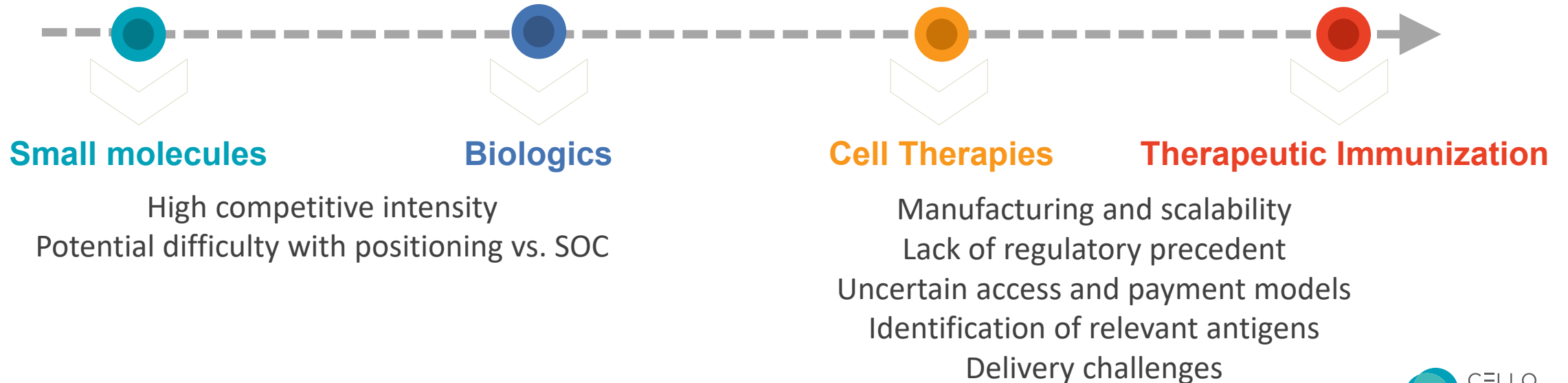
Yet A Number of Meaningful Barriers and Obstacles Remain For New Entrants

Mature or Maturing Indications

- ▼ Significant payer/access challenges
- ▼ Biosimilar entry
- ▼ High competitive intensity
- ▼ Limited addressable patient populations

Under-served or Rare Indications

- ▼ Difficult to study patient populations
- ▼ Little or no regulatory precedent
- ▼ Hard to demonstrate preclinical PoC



Key Questions



What are the key advantages of each of the next generation immunomodulatory approaches currently in development and what unmet needs are they expected to address?



What the key obstacles to successful commercialization of each next generation approach and what needs to be done to address these obstacles? Do we have data that could qualify as proof of concept/relevance?



Are the mature markets within the AIID category (e.g., RA, MS, psoriasis, Crohn's, psoriatic arthritis) "immune to change" or are any of these to susceptible to disruption by next gen immunomodulatory therapeutics? When will this disruption occur?



What sort of clinical profile would be required by physicians and payers to compete with or displace the anti-TNFs and other drugs that currently dominate the AIID space? What can be done in the near-term to de-risk these novel approaches?



Which of the next generation immunomodulatory approaches currently in development (e.g., small molecules, biologics, cell therapies, therapeutic immunization, etc.) have the greatest potential to disrupt the mature markets within AIID, why and when?



Is disruption of the mature markets within the AIID category even a realistic goal or should developers of next generation immunomodulatory therapeutics look elsewhere?



What are investors and Big Pharma looking for today when considering novel approaches for the treatment of autoimmune and inflammatory diseases?



Near Future Treg Therapy Plans at Northwestern University, Chicago

◆ Organ Transplantation

- ✓ A Phase II efficacy trial of polyclonal Tregs in kidney transplant patients (n=120)
- ✓ A combinatory trial of polyclonally expanded recipient Tregs and donor hematopoietic stem cells in kidney patients (n=22)
- ✓ A phase I safety trial of DONOR-specifically expanded Tregs in kidney patients (n= 10)

◆ Autoimmune Disease

- ✓ A pilot study of polyclonally expanded Tregs in Crohn's disease (n=10)
- ✓ A pilot study of polyclonally expanded Tregs in Autoimmune hepatitis (n=15)

These clinical trials are expected to be initiated by the end of 2019

Pursuing additional funding and commercialization path (TRACT Therapeutics Inc.) to advance technology further and to other indications