

# Towards a functional cure for HIV: Targeting essential RNA splicing

June, 2018

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## Today's presenters

#### ABIVAX core management team



Prof. Hartmut Ehrlich, M.D. Chief Executive Officer

Baxter

Lilly

SANDOZ

Ex-Head of Global R&D, Baxter BioScience



#### **Didier Blondel**

Chief Financial Officer & Board Secretary







Jean-Marc Steens, M.D. Chief Medical Officer





## Company highlights

| ABX464:         |
|-----------------|
| Targeting a HIV |
| functional cure |

- HIV remains an unresolved problem with a chronic treatment need and a global market of USD >20b
- Recent phase II studies confirm reduction of HIV viral reservoir in patients
- ABX464 final phase IIa results in mid 2018 to confirm profound effect on HIV viral reservoir and potential promise of functional cure; phase IIb to start in H2 2018

ABX464: Antiinflammatory potential

- ABX464 has further blockbuster potential in the USD 6b Ulcerative Colitis market
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- Phase IIa topline results expected in Sept 2018, and phase IIb to start in Q4 2018

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- ABX196 was safe and showed potent humoral and cellular immune responses in a phase I clinical trial in human volunteers
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# ABIVAX has three key core pillars of value



#### **ABX464 ABX196** Targets CBC 80/20 complex, thereby Targets and activates invariant inducing enhanced RNA splicing natural killer T immune cells **Ulcerative Colitis** 3 Hepatocellular Carcinoma HIV What: Long-lasting HIV viral suppression, as Upregulation of miRNA124 resulting in Specific enhancer of cellular immune shown in humanized mice reduced inflammation responses in cancer Decrease in HIV DNA in reservoir containing cells, as shown in patients Strong therapeutic potential in Promise: • A potential functional cure to HIV, Strong therapeutic potential in having already shown an up to 50% Ulcerative Colitis as demonstrated in a Hepatocellular Carcinoma (HCC) and other cancers in combination with viral reservoir reduction in the blood validated DSS mouse model of patients<sup>1</sup> checkpoint inhibitor Q4 2018: Start of US phase I/II study in Mid 2018: Three months results of Sept 2018: Results from ongoing Next: ongoing phase IIa study phase IIa study in 30 UC patients in **HCC** patients H2 2018: Start phase IIb study Europe

#### Multiple drug discovery platforms to drive drug candidate pipeline

- <u>Antiviral platform</u>: novel antiviral drugs for Respiratory Syncytial Virus, Influenza, Dengue
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## HIV therapy represents a growing multi-billion dollar market

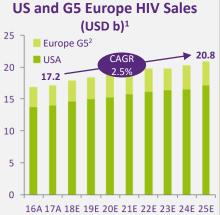


#### Current HIV therapies leave viral reservoir intact

- Targeting the reservoir is the opportunity for HIV therapy to move from chronic treatment to a potential functional cure
- Triple therapy targets circulating HIV (viral load), leaving the HIV reservoir intact
- Drug compliance with existing therapies remains poor; patients take drug holidays, risking: Rebound of HIV viral load, treatment resistance and spread of infection
- HIV reservoir is source of chronic inflammation

#### HIV represents a global USD 23b market

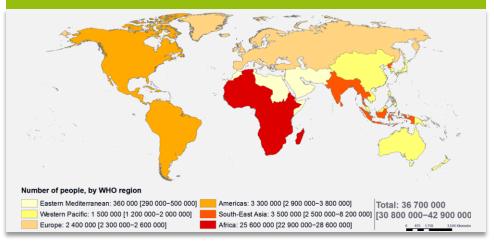
- Conventional antiretroviral drug prices are under pressure due to patent expiries
- HIV sales are rising due to growing population and life expectancy
- Abivax aims for a premium pricing model based on offering a potential functional cure
- Global HIV drug sales were USD 23.3b in 2017, according to J&J



#### Today, over 2m patients live with HIV in the Western world

| Region              | 2016 HIV<br>prevalence <sup>3</sup> | 2016 HIV new annual cases <sup>3</sup> |  |  |
|---------------------|-------------------------------------|--|--|--|
| EU <sup>4</sup> +US | 2.1m                                | 73k                                    |  |  |
| RoW                 | 34.6m                               | 1.7m                                   |  |  |
| Global              | 36.7m                               | 1.8m                                   |  |  |
|                     |                                     |  |  |  |

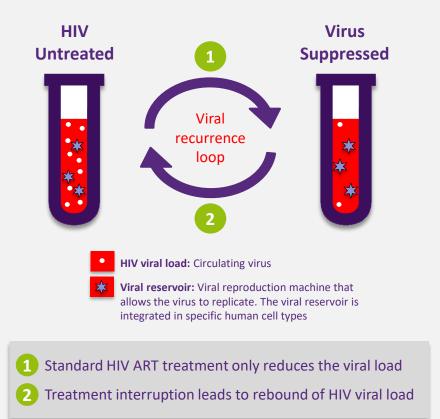
#### **Global HIV footprint recorded in 2016<sup>3</sup>**



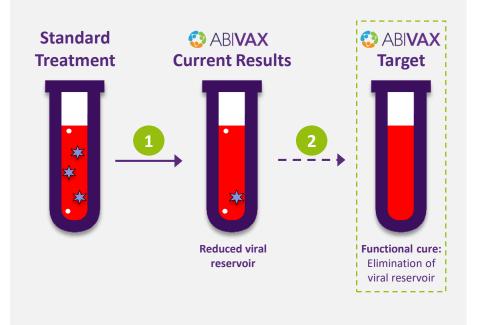
# The goal of ABX464: A functional cure for HIV



Standard ART<sup>1</sup> suppresses HIV as long as patients are compliant with treatment



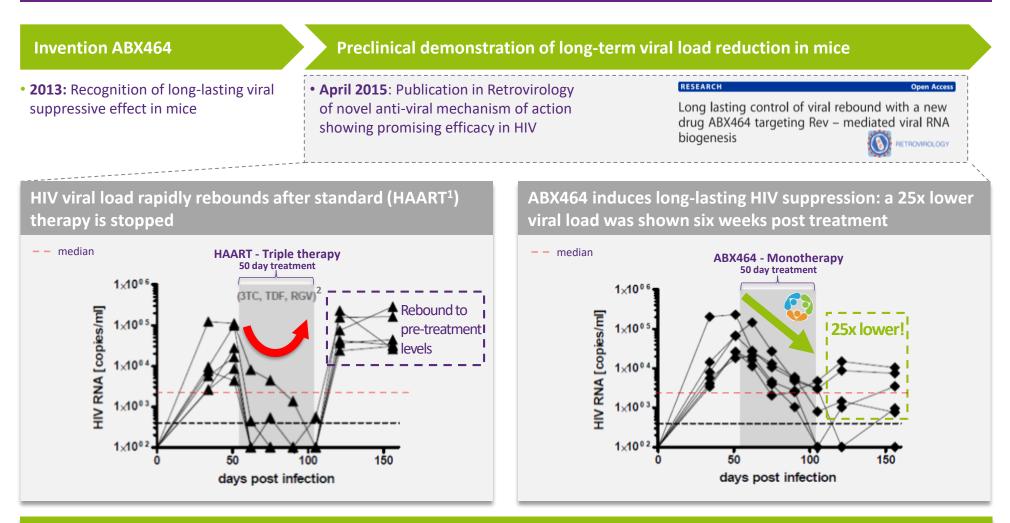
ABX464 aims to be a functional cure for HIV by reducing the viral reservoir



- BX464 reduces the HIV viral reservoir
- 2 ABX464 has the potential to be a first-in-class HIV functional cure

# ABX464 showed long-lasting viral suppression in HIV mice



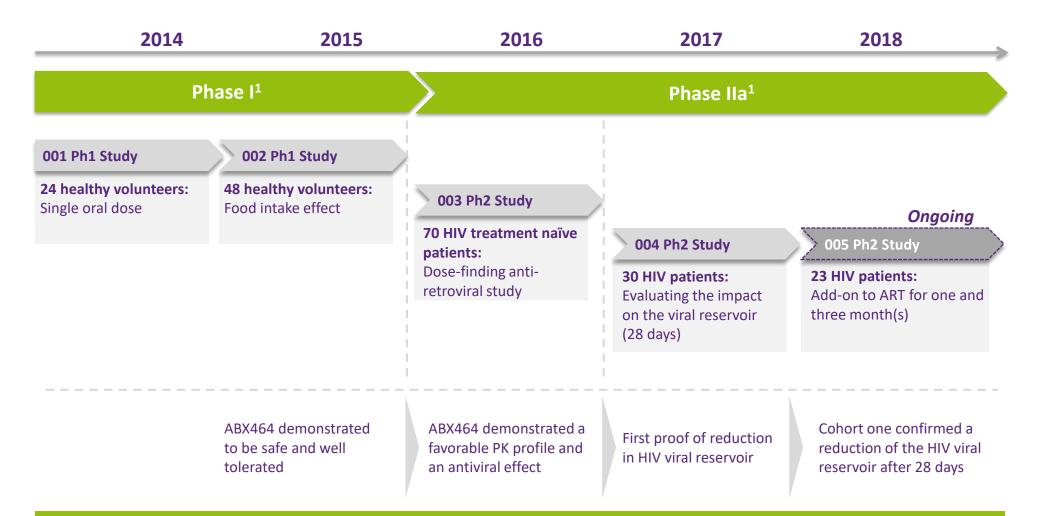


#### Long-term mice outcome data suggest a sustained response of the immune system

ABIVAX 1: HAART = highly active antiretroviral therapy; 2: 3TC = lamivudine, TDF = tenofovir disoproxil fumarate, RGV = raltegravir

## ABX464 has shown to be safe in over 180 people





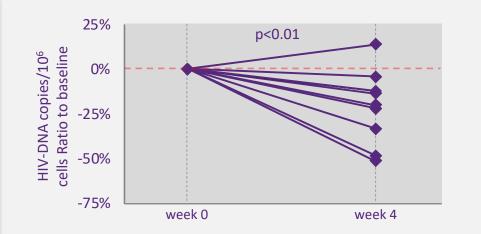
In addition to solid safety data, the 004 and 005 studies showed promising preliminary efficacy

ABIVAX 1: Clinical trial.gov study references: 001 = NCT02792686, 002 = NCT02731885, 003 = NCT02452242, 004 = NCT02735863, 005 = NCT02990325

## ABX464-005: Up to 50% viral reservoir reduction after 28 days



#### Significant viral reservoir reduction in HIV patients



#### **Results ABX464-005 (first patient cohort):**

The graph shows the difference in HIV-DNA copies in the blood of nine patients after 28 days of ABX464 treatment compared to baseline

#### Ongoing ABX464-005 study and next steps

- September 2017: Again, a reduction of the viral reservoir after 28 days of ABX464 treatment was shown (first patient cohort)
- Today: Based on final results of 004 study and the first cohort of 005 study, Abivax is preparing now for Phase IIb initiation
- Mid 2018: The results of three months ABX464 treatment (second patient cohort), will provide insights into the ability to further reduce the HIV reservoir

#### Building upon strong interim efficacy data, the next results are expected in mid 2018



## Upcoming phase IIb studies to support claim of functional cure

#### **Clinical development and upcoming milestones for ABX464** First ever shown Published results reduction in viral 004 reservoir in HIV Expected results patients Ongoing **Expected three** months results of 005 the second cohort Confirmed viral 006: Chronically ART reservoir reduction treated HIV patients at one month Long-term reduction in HIV reservoir to be shown in 006 and 007: Early ART 007 study treated HIV patients Today Mid H2 May Sept 2020 2018 2017 2017 2018

#### Two phase IIb studies will evaluate the effect of ABX464 on HIV viral reservoir over 12 months in combination with ART:



#### Phase IIb study ABX464-006:

150-180 chronically ART treated HIV patients:

- EU and US sites
- Duration: 1.5 year
- Time to maximum reduction of HIV reservoir, leading to treatment interruption

#### Phase IIb study ABX464-007:

60-90 early ART treated HIV patients:

- EU sites
- Duration: 1.5 year
- Time to maximum reduction of HIV reservoir, leading to treatment interruption

#### Long-term phase IIb 006 and 007 studies are planned to start in H2 2018

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# ABIVAX has three key core pillars of value



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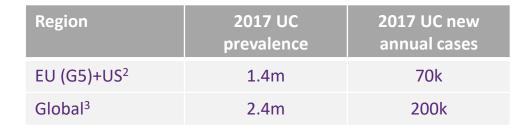
1: As demonstrated in phase IIa clinical studies after 28 days of ABX464 treatment

## Ulcerative Colitis continues to be a therapeutic challenge

#### The global Ulcerative Colitis market exceeds USD 6b

- Ulcerative Colitis (UC) represents one of the two major types of IBD, the other being Crohn's disease
- UC is associated with significant gastro-intestinal symptoms including pain, recurring diarrhea, fatigue, reduced appetite and weight loss
- Existing treatment options for UC aim for symptom reduction and result in a chronic treatment need
- 30% of UC patients eventually require surgery and lose their colon<sup>1</sup>
- UC pharma sales for Europe and the US were nearly USD 6b in 2017<sup>2</sup>

| Colon | Normal colon Colon with<br>Licerative colititis |
|-------|---|
|       |   |



Ulcerative Colitis (UC) is an inflammatory bowel disease (IBD) that causes chronic inflammation and ulcers (sores) in the latter part of the intestine (colon)

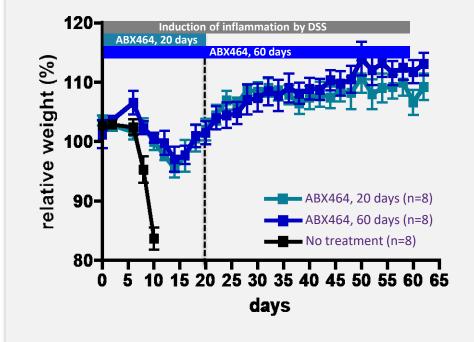
#### Despite the introduction of novel treatments, there remains a high unmet medical need in UC

1: NIH public access: PMC2753491 2: GlobalData; US, France, Germany, Italy , Spain, UK 3: GlobalData: US, France, Germany, Italy, Spain, UK, Japan, Australia, Brazil, Canada, India, Mexico, Russia, South Africa and South Korea

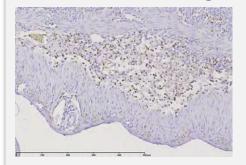
## ABX464 protects the intestine from inflammation



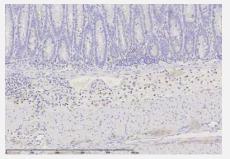
# Invention ABX464 Preclinical validation in Ulcerative Colitis (UC) mouse model • 2015: Recognition of ABX464 having strong anti-inflammatory properties (through miRNA124) • July 2017: Nature scientific reports publication of compelling anti-inflammatory efficacy in a DSS<sup>1</sup> mouse model SCIENTIFIC REPORTS Damendiate Abx464 Damendiate



# DSS without treatment leads to intestinal damage







#### **Upcoming milestones in UC:**

- Topline results in Sept 2018: ABX464 is currently evaluated in a randomized placebo controlled phase IIa POC study (30 UC patients)
- Phase IIb in Q4 2018: A multicenter US and EU study in 150-200 patients

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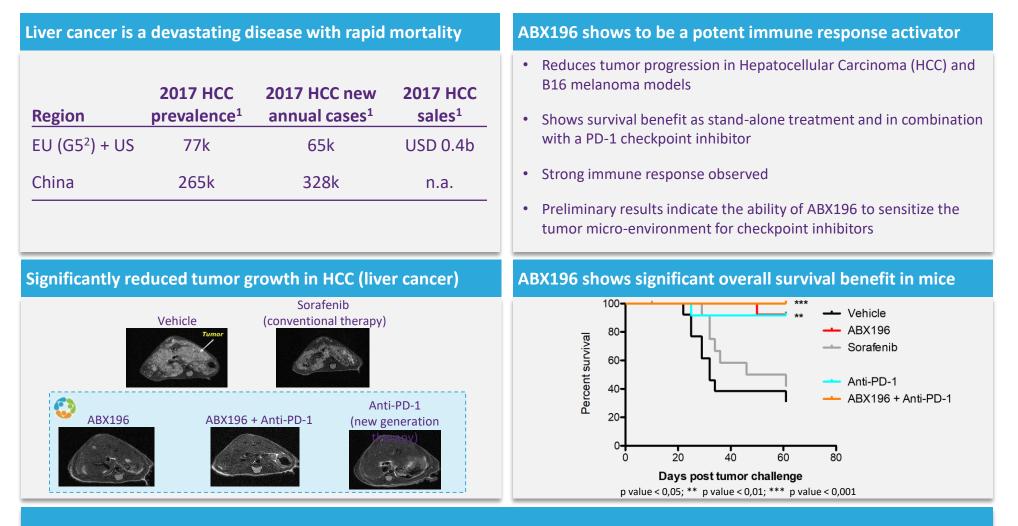
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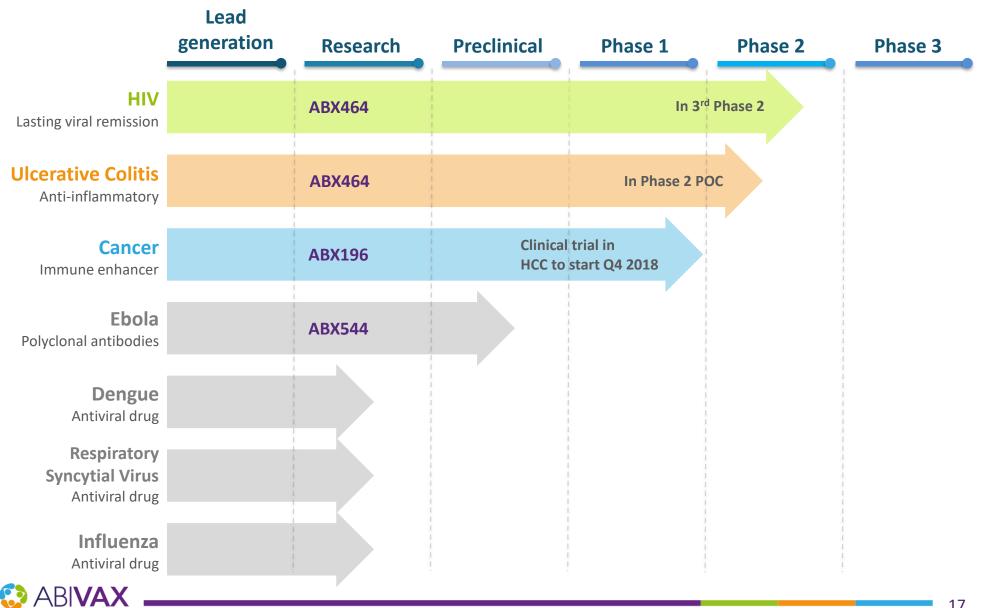
## ABX196 shows anti-cancer effects in mouse models





ABX196 will be evaluated in combination with a checkpoint inhibitor in HCC patients in Q4 2018

## ABIVAX has a mature and growing pipeline



## ABIVAX has multi billion dollar revenue potential

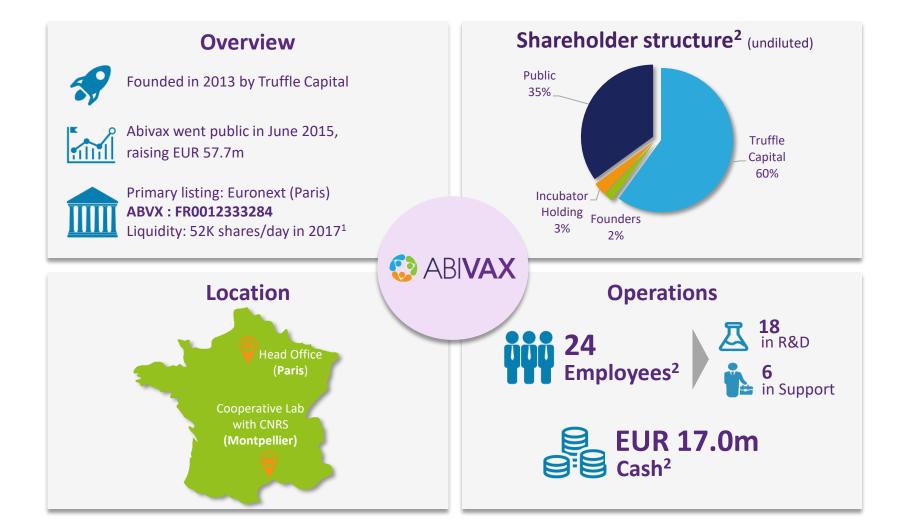
|        | Therapeutic indication      | Aimed ABIVAX<br>product positioning  |                  |               | Potential Peak<br>Market Share <sup>1,2</sup> | Potential Peak<br>Revenues <sup>1,2</sup> (\$) |
|--------|-----------------------------|--|------------------|---------------|---|--|
| ABX464 | HIV                         | Allow conventional HIV<br>drug free intervals                              | USD 23b          | 2%            | 15%   | USD 5b   |
| ABX464 | Ulcerative Colitis          | Second line therapy after 5-ASA <sup>3</sup> treatment                     | USD 6b           | 2.5%          | 15%   | USD 1b   |
| ABX196 | Hepatocellular<br>Carcinoma | Superior patient<br>outcome in<br>combination with<br>checkpoint inhibitor | USD 0.7b         | 15%           | 20%   | USD 0.5b                                       |
|        |                             |  | 😳 ABI <b>VAX</b> | Potential Pea | ak Revenues <sup>1,2</sup> :                  | USD 6.5b                                       |
|        | 1: Management estimate      | e based on GlobalData<br>t share, five years after product launch          |                  |               |   |  |

2: Estimated peak market share, five years after product launch

ABIVAX

3: 5-aminosalicylic acid (mesalamine) is the current standard first-line therapy for mild-to-moderate UC

## Key company facts





1: Bloomberg 2: As of December 31<sup>st</sup>, 2017

## Company highlights

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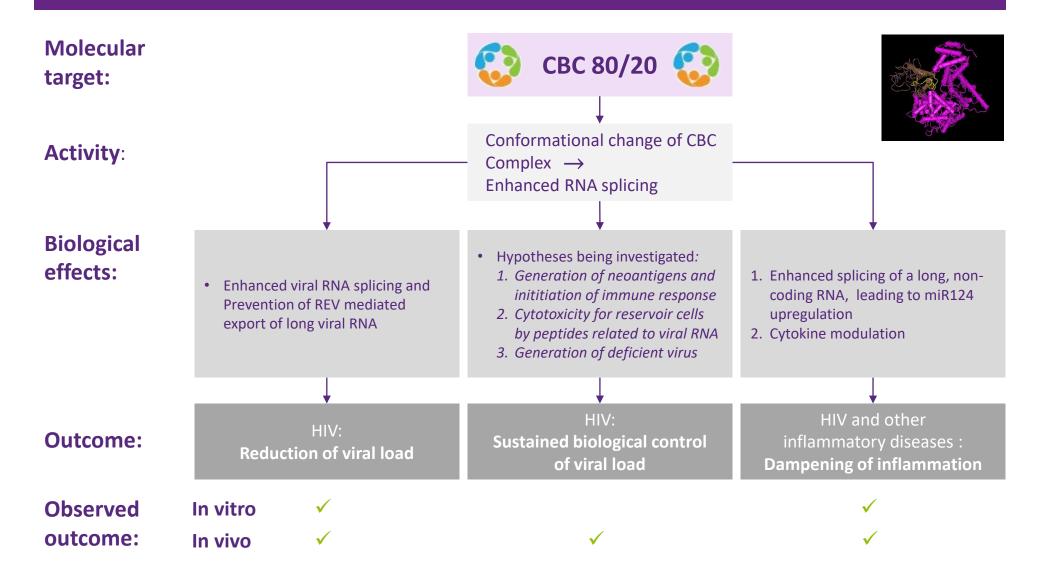
# Appendix

# Highly experienced Executive Committee



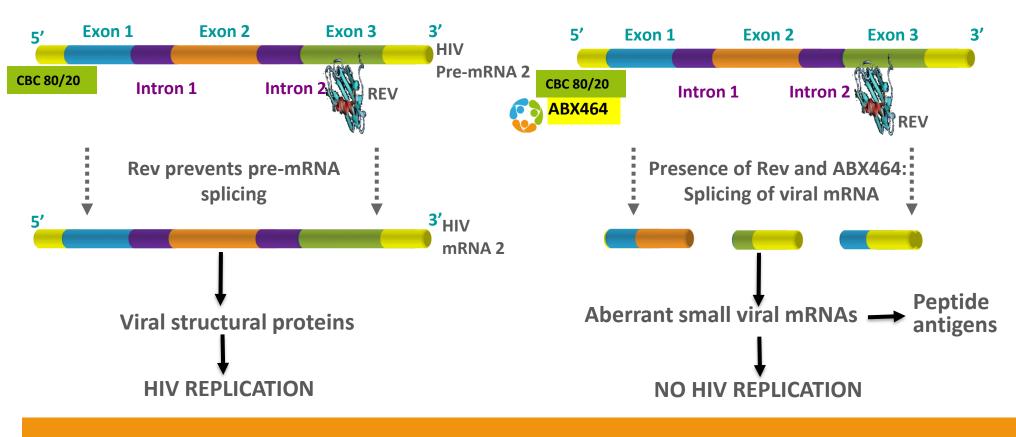
#### **Competencies from discovery to global commercialization**

## ABX464: Mechanism of Action



# ABX464: Effect on HIV-RNA Splicing

Viral unspliced mRNA biogenesis in HIV infected cells Effect of ABX464 on unspliced mRNA biogenesis in HIV infected cells



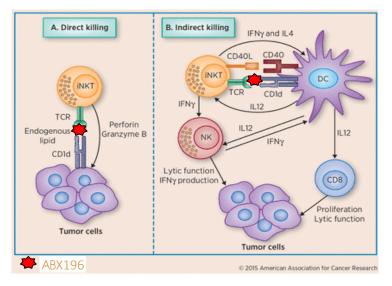
ABIVAX hypothesis: HIV peptide antigens tagging the surface of immune cells containing HIV-DNA



## iNKT agonists: Well-known Mechanism of Action

## By activating iNKT cells, ABX196 facilitates the induction of a rapid immune response

- ABX196 is a single synthetic compound that activates iNKT by binding to CD1d molecules, thereby:
  - Enhancing both innate and adaptive immunity and
  - Boosting desired immune response to weak antigens



Upon activation, iNKT cells induce a cascade of immune reaction:

- Interaction with Dendritic Cells (DC) leads to an early maturation, activation and licensing of DCs needed to sustain the priming reaction
- 2. Secretion of large quantities of cytokines (e.g. IFN $\gamma$ , IL-4)



