Next Generation Immunotherapy

June 2020
This slide presentation includes forward-looking statements

Forward-Looking Statements

Various statements in this slide presentation concerning the future expectations of BioNTech, its plans and prospects, including the Company’s views with respect to the potential for mRNA therapeutics and vaccines, its expectations with respect to the timing and results of clinical trials and release of clinical data (both in respect of its proprietary product candidates and of product candidates of its collaborators), the development of commercial capabilities and the transition of BioNTech to a fully integrated biopharmaceutical company, its expectations with respect to interactions with regulatory authorities such as FDA and EMA, including the potential approval of BioNTech’s or its collaborators’ current or future drug candidates, and expected royalty and milestone payments in connection with BioNTech’s collaborations, constitute forward-looking statements. Words such as "expects," "plans," "potential," "target," "continue" and variations of these words or similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Such statements are based on the current beliefs and assumptions of the management team of BioNTech and on the information currently available to the management team of BioNTech, and are subject to change. The Company will not necessarily inform you of such changes. These forward looking statements are subject to known and unknown risks, uncertainties, assumptions and other factors that could cause the Company’s actual results, performance or achievements to be materially different than any future results, performance or achievements expressed or implied by the forward-looking statements. Actual results may differ materially from those indicated by these forward-looking statements as a result of various important factors, including the initiation, timing, progress, results and cost of the Company's research and development programs and its current and future preclinical studies and clinical trials; the timing of and the Company's ability to obtain and maintain regulatory approval for its product candidates; the Company's ability to identify research opportunities and discover and develop investigational medicines; the Company's expectations regarding the size of the patient populations for its product candidates, if approved for commercial use; the Company's estimates of its expenses, ongoing losses, future revenue and capital requirements and its needs for or ability to obtain additional financing; the Company's ability to identify, recruit and retain key personnel; the Company's and its collaborators’ ability to protect and enforce its intellectual property protection for its proprietary and collaborative product candidates, and the scope of such protection; the development of and projections relating to the Company's competitors or its industry; the Company's ability to commercialize its product candidates, if approved; the rate and degree of market acceptance of the Company's investigational medicines; the Company's ability to manage its development and expansion; regulatory developments in the United States and foreign countries; the Company's ability to manufacture its product candidates with advantages in turnaround times or manufacturing cost; and the Company's ability to implement, maintain and improve effective internal controls. The preceding list is not intended to be an exhaustive list of all of the Company's forward-looking statements. Any forward-looking statements represent the Company's views only as of today and should not be relied upon as representing its views as of any subsequent date. The Company explicitly disclaims any obligation to update any forward-looking statements. The mRNA vaccines and other product candidates discussed in this slide presentation are investigational products being developed by BioNTech and its collaborators and are not currently approved by the FDA, EMA or any other regulatory authority.
Next generation immunotherapy

Harnessing the full potential of the immune system

- Broad suite of novel technology platforms
- Immunotherapies for cancer and infectious diseases
- Fully integrated with in-house GMP manufacturing
- Industry-leading global collaborations
**We collaborate with global leaders in our industry**

### Oncology Collaborations with at least one program in the clinic

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Genentech</td>
<td>Genmab</td>
<td>SANOFI</td>
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</tbody>
</table>

### Other Oncology, Infectious Diseases and Rare Diseases Collaborations

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>GENENTAN</td>
<td>Pfizer</td>
<td>University of Pennsylvania</td>
<td>BILL &amp; MELINDA GATES foundation</td>
<td>Lilly</td>
<td>FOSUNPHARMA</td>
</tr>
</tbody>
</table>

1. BioNTech and Pfizer have agreed to a Letter of Intent regarding the co-development and distribution (excluding China) of a potential mRNA-based coronavirus vaccine aimed at preventing COVID-19 infection
Our multi-platform approach

Our IO strategy exploits complementary therapeutic programs

mRNA Cancer Vaccines
FixVac, iNeST

Engineered Cell Therapies
CAR-T, TCRs

Antibody Targeting
Targeted Antibodies, RiboMabs

Small Molecule Immunomodulators
TLR agonist

In the clinic

2020

Targeting Cancer + Immunomodulation

Next Generation Immunomodulators
Bispecific Antibodies (CPI + co-stimulation)

Engineered Cytokines
Intratumoral cytokines, RiboCytokines

Potential for multiple blockbuster opportunities with powerful combinations
Compelling data generated from innovative immunotherapy approaches

Our multi-platform approach

- **FixVac Melanoma (BNT111):** Induces objective responses in CPI-experienced patients
- **iNeST (BNT122):** Currently in Phase 2 in combination with CPI in 1L Melanoma. 2 adjuvant trials planned in 2020

- **Ribocytokine IL-2 (BNT151):** Amplification of vaccine induced T cell response in pre-clinical studies

- **BNT211:** Novel CLDN-6 CAR-T approach utilizing CAR-T Amplifying RNA Vaccine (CARVac)
  - Significant amplification of CAR-T cells in preclinical studies (published in Science, 2020)
## Targeting solid tumors

### A technology agnostic approach targets a broader addressable market

<table>
<thead>
<tr>
<th>Cancer segment</th>
<th>Patient Population</th>
<th>Challenge</th>
<th>Our Therapeutic Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>High mutational burden/adjuvant stage cancers</td>
<td>Significant portion of cancer patients</td>
<td>Poor risk-benefit profile of checkpoint inhibitors</td>
<td>• mRNA Neoantigen Immunotherapy (iNeST)</td>
</tr>
<tr>
<td>Low mutational burden cancers</td>
<td>&gt;60% of cancers</td>
<td>Poor response to checkpoint inhibitors</td>
<td>• Shared Antigens (FixVac, CAR-T cells, Antibodies)</td>
</tr>
<tr>
<td>“Immune desert” cancers</td>
<td>&gt;40% of high-mutational cancers</td>
<td>Poor infiltration and activation of T-cells in TME&lt;sup&gt;1&lt;/sup&gt;</td>
<td>• mRNA Immunotherapy&lt;br&gt;• Immunostimulatory Compounds (intratumoral, RiboCytokines)</td>
</tr>
<tr>
<td>Cancers with MHC / B2M loss</td>
<td>20-30% of CPI-experienced advanced cancers</td>
<td>Failure of immune system to recognize tumor cells</td>
<td>• Antibodies&lt;br&gt;• CAR-Ts</td>
</tr>
<tr>
<td>Refractory tumors</td>
<td>Patients with large tumors and multiple resistance mechanisms</td>
<td>Few treatment options</td>
<td>• Engineered Cell Therapies&lt;br&gt;• Combination Therapies</td>
</tr>
</tbody>
</table>

<sup>1</sup>Tumor microenvironment
<table>
<thead>
<tr>
<th>Drug class</th>
<th>Platform</th>
<th>Product Candidate</th>
<th>Indication (Targets)</th>
<th>Preclinical</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Rights Collaborator</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>mRNA</td>
<td>FixVac</td>
<td>(fixed combination of shared cancer antigens)</td>
<td></td>
<td></td>
<td></td>
<td>fully-owned</td>
<td>Report phase 1 data in 1H 2020;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BNT111</td>
<td>advanced melanoma (adjuvant &amp; metastatic)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Start phase 2 trial with registrational potential H2 2020</td>
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<td></td>
<td></td>
<td>BNT112</td>
<td>prostate cancer</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>BNT113</td>
<td>HPV16+ head and neck cancer&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Start phase 2 with registrational potential in 2H 2020</td>
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<tr>
<td></td>
<td>mRNA</td>
<td>iNeST</td>
<td>(patient specific cancer antigen therapy)</td>
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<td></td>
<td></td>
<td>RO7198457 (BNT122&lt;sup&gt;4&lt;/sup&gt;)</td>
<td>1L melanoma with CPI&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>Genentech (global 50:50 profit/loss)</td>
<td>Enrollment update in 2H 2020&lt;sup&gt;3&lt;/sup&gt;;</td>
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<td></td>
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<td>SAR441000 (BNT131)</td>
<td>solid tumors (IL-12sc, IL-15sushi, GM-CSF, IFNa)</td>
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<td></td>
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<td>Interim data update in 2021;</td>
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<td></td>
<td></td>
<td>BNT162</td>
<td>COVID-19</td>
<td></td>
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<td>Sanofi (global profit/loss share)</td>
<td>Data update in June 2020;</td>
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<td></td>
<td></td>
<td>BNT321</td>
<td>pancreatic cancer (sLea)</td>
<td></td>
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<td></td>
<td>Data update in June/July 2020</td>
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<tr>
<td></td>
<td></td>
<td>GEN1046 (BNT311)</td>
<td>multiple solid tumors (PD-L1×4-1BB)</td>
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<tr>
<td>Antibodies</td>
<td></td>
<td>GEN1042 (BNT312)</td>
<td>multiple solid tumors (CD40×4-1BB)</td>
<td></td>
<td></td>
<td></td>
<td>Genmab (global 50:50 profit/loss)</td>
<td>Data update in 2H 2020</td>
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<tr>
<td></td>
<td></td>
<td>BNT321 (MVT-5873)</td>
<td>pancreatic cancer (sLea)</td>
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<td></td>
<td>Next-Gen CP&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Immunomodulators</td>
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<td></td>
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<td>GEN1042 (BNT312)</td>
<td>multiple solid tumors (CD40×4-1BB)</td>
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<td>BNT321</td>
<td>pancreatic cancer (sLea)</td>
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</tbody>
</table>

<sup>1</sup>BNT113 and BNT115 are currently being studied in investigator-initiated phase 1 trials; <sup>2</sup>Checkpoint Inhibitor; <sup>3</sup>Update on the ongoing study including patient enrollment number, efficacy and safety data for an interim update expected in the second half of 2021; <sup>4</sup>BNT122 (iNeST) is also being investigated in arm 2 (N=15) of the 3 arm TNBC-MERIT trial, with BNT114 as an optional treatment; BNT114 is investigated in arm 1 (N=12) and arm 3 (N=15) of the TNBC-MERIT trial (total patients in study: N=42); <sup>5</sup>As the trial is sponsored and conducted by Sanofi, the timing of data updates is not under our control, and is subject to change by Sanofi; <sup>6</sup>Checkpoint Immunotherapists in 12 ongoing clinical trials

**We intend to initiate up to 4 Phase 2 trials in 2020**
We plan to initiate FIH trials for our preclinical product candidates across all platforms

<table>
<thead>
<tr>
<th>Drug class</th>
<th>Platform</th>
<th>Product Candidate</th>
<th>Indication (Targets)</th>
<th>Rights Collaborator</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>FixVac</td>
<td>BNT116</td>
<td>NSCLC</td>
<td>fully-owned</td>
<td></td>
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<tr>
<td>mRNA</td>
<td>RiboMabs (mRNA-encoded antibodies)</td>
<td>BNT141</td>
<td>multiple solid tumors</td>
<td>fully-owned</td>
<td>Phase 1 start in 1H 2021</td>
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<tr>
<td></td>
<td></td>
<td>BNT142</td>
<td>multiple solid tumors (CD3+CLDN6)</td>
<td>fully-owned</td>
<td>Phase 1 start in 1H 2021</td>
</tr>
<tr>
<td></td>
<td>RiboCytokines (mRNA-encoded cytokines)</td>
<td>BNT151</td>
<td>multiple solid tumors (optimized IL-2)</td>
<td>fully-owned</td>
<td>Phase 1 start in 1H 2021</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BNT152+ BNT153</td>
<td>multiple solid tumors (IL-7, IL-2)</td>
<td>fully-owned</td>
<td>Phase 1 start in 1H 2021</td>
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<tr>
<td>Engineered Cell Therapies</td>
<td>CAR-T Cells</td>
<td>BNT211</td>
<td>multiple solid tumors (CLDN6)</td>
<td>fully-owned</td>
<td>Phase 1/2 start in 2H 2020</td>
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<tr>
<td></td>
<td>TCRs</td>
<td>undisclosed</td>
<td>Solid tumors</td>
<td>Eli Lilly</td>
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<tr>
<td></td>
<td></td>
<td>to be selected</td>
<td>all tumors</td>
<td>fully-owned</td>
<td></td>
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<tr>
<td>SMIM¹</td>
<td>Toll-Like Receptor Binding</td>
<td>BNT411</td>
<td>solid tumors (TLR7)</td>
<td>fully-owned</td>
<td>Phase 1 start in 2H 2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drug class</th>
<th>Platform</th>
<th>Product Candidate</th>
<th>Indication (Targets)</th>
<th>Rights Collaborator</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious Disease Immunotherapies</td>
<td>BNT161</td>
<td>Influenza</td>
<td>Pfizer</td>
<td>Start first study in H1 2021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>undisclosed</td>
<td>up to 10 indications</td>
<td>Penn²</td>
<td>First phase 1 trial to start 1H 2021</td>
<td></td>
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<tr>
<td></td>
<td>undisclosed</td>
<td>HIV and tuberculosis</td>
<td>Bill &amp; Melinda Gates Foundation</td>
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<tr>
<td>Rare Disease PRT³</td>
<td>BNT171</td>
<td>Not disclosed</td>
<td>Genevant (global 50:50 profit/loss)</td>
<td>First phase 1 trial to start in 1H 2021</td>
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<tr>
<td></td>
<td>undisclosed</td>
<td>4 additional rare disease indications</td>
<td></td>
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</tbody>
</table>

¹Small Molecule Immunomodulators; ²We are eligible to receive worldwide licenses; ³Protein Replacement Therapy; ⁴First in Human
### Significant newsflow expected over next 12-18 months

<table>
<thead>
<tr>
<th>Platform</th>
<th>Candidate</th>
<th>Indication (Target)</th>
<th>Next milestones &lt;sup&gt;3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>FixVac</td>
<td>BNT111</td>
<td>Advanced Melanoma</td>
<td>Start Phase 2 with registrational potential in 2H 2020</td>
</tr>
<tr>
<td></td>
<td>BNT112</td>
<td>Prostate Cancer</td>
<td>Report Phase 1: publication upcoming</td>
</tr>
<tr>
<td></td>
<td>BNT113</td>
<td>HPV16+ H&amp;N Cancer</td>
<td>Start Phase 2 with registrational potential in 2H 2020</td>
</tr>
<tr>
<td></td>
<td>BNT114</td>
<td>Triple Negative Breast Cancer</td>
<td>Data update Phase 1 in 2H 2020&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>iNeST</td>
<td>RO7198457</td>
<td>1L Melanoma with CPI</td>
<td>Data update Phase 1/2 at AACR Virtual II in June</td>
</tr>
<tr>
<td></td>
<td>(BNT122)</td>
<td>Multiple ST (basket trial)</td>
<td>Start Phase 2 in 2H 2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NSCLC (adjuvant)</td>
<td>Start Phase 2 in 2H 2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CRC (adjuvant)</td>
<td></td>
</tr>
<tr>
<td>mRNA</td>
<td>SAR441000</td>
<td>Solid tumors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(BNT131)</td>
<td>(IL-12sc, IL-15sushi, GM-CSF, IFNa)</td>
<td></td>
</tr>
<tr>
<td>Intratumoral Immunotherapy</td>
<td>BNT141</td>
<td>Multiple ST</td>
<td>Start Phase 1 in 1H 2021</td>
</tr>
<tr>
<td></td>
<td>BNT142</td>
<td>Multiple ST (CD3+CLDN6)</td>
<td>Start Phase 1 in 1H 2021</td>
</tr>
<tr>
<td>RiboMabs</td>
<td>BNT151</td>
<td>Multiple ST (Optimized IL-2)</td>
<td>Start Phase 1 in 1H 2021</td>
</tr>
<tr>
<td></td>
<td>BNT152/153</td>
<td>Multiple Solid Tumors (IL-7, IL-2)</td>
<td>Start Phase 1 in 1H 2021</td>
</tr>
<tr>
<td>RiboCytokines</td>
<td>BNT211</td>
<td>Multiple ST (CLDN6)</td>
<td>Start Phase 1/2 in 2H 2020</td>
</tr>
<tr>
<td>CAR-T Cells</td>
<td>BNT311</td>
<td>Multiple ST (PD-L1x4-1BB)</td>
<td>Data update Phase 1/2 in 2H 2020&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Next-Gen CP Immunomodulators</td>
<td>BNT411</td>
<td>Multiple ST (TLR7)</td>
<td>Start Phase 1 in 2H 2020</td>
</tr>
<tr>
<td>TLR7 Ligand</td>
<td>BNT161</td>
<td>Influenza</td>
<td>Start first study in 1H 2021</td>
</tr>
<tr>
<td></td>
<td>BNT162</td>
<td>COVID-19</td>
<td>Data update in June/July 2020</td>
</tr>
<tr>
<td>Others</td>
<td>BNT114</td>
<td>Up to 10 Infectious Disease Indications</td>
<td>Start phase 1 in 1H 2021</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Rare Disease Indications</td>
<td>Start First Phase 1 in 1H 2021</td>
</tr>
</tbody>
</table>

<sup>1</sup> We expect this update to include an update on the ongoing study, including patient enrollment numbers, with full efficacy and safety data for an interim update expected in the second half of 2021; <sup>2</sup> As the trial is sponsored and conducted by Sanofi, the timing of data updates is not under our control, and is subject to change by Sanofi. <sup>1</sup>Our expectations for timing of milestones beyond 2020 are premised on and subject to the achievement of earlier milestones on their expected timelines. Press releases will be issued once first patient has been dosed. <sup>4</sup>BNT122 (iNeST) is also being investigated in arm 2 (N=15) of the 3 arm TNBC-MERIT trial, with BNT114 as an optional treatment; BNT114 is investigated in arm 1 (N=12) and arm 3 (N=15) of the TNBC-MERIT trial (total patients in study: N=42); ST: solid tumors
Update on estimated COVID-19 impact on ongoing / planned clinical trials

• Intend to initiate Phase 2 trials for BNT111, BNT113 and BNT 122 (iNeST, adjuvant) as planned
  – Regulatory and trial start-up activities continuing
  – End of year 2020 anticipated start dates provide time for stabilization of clinical trial environment

• Managing ongoing Phase 1 exploratory/dose escalation trials to support timely completion
  – Evidence of slowed enrollment given restrictions at clinical sites and travel restrictions for patients
  – BNT111 and BNT114 less affected given near completion of enrollment

• Optimizing ability to initiate and conduct FIH studies
  – Maintaining timing guidance for initiation of FIH trial for CARVac (BNT211) program in 2020
  – Expected delays for several other trial starts of approximately 3-6 months
    BNT141 and BNT142 (RiboMabs), BNT 151 and BNT152/153 (RiboCytokines), BNT161 (Influenza),
    BNT171 (Rare Disease) and BNT411 (TLR7)

As COVID-19 situation remains dynamic, BioNTech will continue to monitor the situation and provide further updates if necessary
Building a next generation immunotherapy company

- Rapid progress in key pipeline programs in both oncology and infectious diseases
- Multiple data read-outs & late-stage trial starts anticipated in 2H 2020
- Expanded transatlantic operations with newly established R&D hub in Cambridge, U.S.
- Strong momentum toward our vision of building a global immunotherapy company
Agenda

Overview and business outlook

Deeper dive on our key programs

- COVID-19 vaccine program (project “Lightspeed”)
- mRNA vaccines – FixVac and iNeST
- Antibodies
- CARVac platform – CLDN6 CAR-T
- RiboCytokines
**mRNA pharmaceuticals as pandemic vaccines**

- Synthetic variants of naturally occurring genetic molecules
- Biochemically defined biopharmaceuticals
- High purity and free of animal product
- Inherent immune-activating qualities with no need for additional adjuvant
- Stimulates both antibody and T-cell immune response at low doses
- More than 400 patients dosed in cancer setting since 2013 (both safety and efficacy)
- Highly scalable production with potential to manufacture hundreds of millions of doses

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**Diagram:**

- SARS-CoV-2
- Genetic Information
- Vaccine mRNA
- mRNA LNP
- Clinical Testing
One of the broadest mRNA toolkits in the industry

Our multi-platform approach

Multiple mRNA formats
- uRNA
- modRNA
- saRNA
- taRNA

Broad formulation spectrum
- Liposomes / LPX
- LNPs
- Polyplexes

Various delivery routes
- Local
- Intratumoral
- Systemic
- Tissue specific

Adjustable activity in vivo from minutes up to weeks
BNT162 COVID-19 mRNA Vaccines

Rapid progress for COVID-19 vaccine program with global consortium

- “Lightspeed” program includes both vaccines and therapeutics
- BNT162: mRNA-based vaccine aimed at preventing COVID-19 infection
- Exploits highly potent Lipid-Nano-Particulate (LNP) mRNA vaccine platforms for the prevention of infectious diseases
- Preclinical activity demonstrated in multiple infectious disease models including Influenza, Ebola Virus, Zika Virus, HIV and others
- To be manufactured at state-of-the-art GMP certified mRNA manufacturing facilities in Europe
- First cohorts of BNT162 Phase 1/2 clinical trial have been dosed in Germany and USA

- Collaboration for co-development and distribution outside of China
- R&D sites from both companies
- Builds on previous R&D collaboration for mRNA-based vaccines for influenza

- Joint development in China and collaboration to conduct trials in China
- BNTX to receive up to $135m in upfront, investment and milestones
- Companies to share gross profits from sales in China
Global BNT162 clinical development program ongoing

Phase 1/2 trials ongoing in Europe and US
• Testing of 4 vaccine candidates across different countries
• Evaluating safety, efficacy and optimal dose
• Evaluating effects of repeated immunization for 3 candidates using uRNA or modRNA and one prime-only using saRNA
• Potentially accelerated approval pathways being discussed with global regulators

Designs
• Europe: dose escalation part up to 200 healthy subjects aged 18 to 55
• US: seamless study design with several thousand subjects; Initial dose-finding part up to 360 healthy subjects aged 18-85
• Dose range 1 µg to 100 µg
• Single-dose and 2-dose regimens to be tested in initial trial

First cohorts dosed in each geography
First clinical data expected June/July 2020
BNT162 Manufacturing Update

Clinical supply

- BioNTech to manufacture all drug substance for clinical supply at its GMP manufacturing facilities in Idar-Oberstein and Mainz (both in Germany, partially 24/7 manufacturing)
- Drug product supply initially supported by BioNTech’s formulation partner Polymun, with Pfizer and BioNTech ramping up own capacity

Global pandemic and commercial supply capacities

- Joint establishment of pandemic supply capacities at many network sites
  - BioNTech: At Idar-Oberstein and Mainz facilities in Germany
  - Pfizer: At least at three U.S. sites (Massachusetts, Michigan, Missouri) and at Puurs facility (Belgium)
- BioNTech and Pfizer working closely together (joint teams) on scale-up, supply chain and network planning
Agenda

Overview and business outlook

Deeper dive on our key programs

- COVID-19 vaccine program (project “Lightspeed”)
- mRNA vaccines – FixVac and iNeST
- Antibodies
- CARVac platform – CLDN6 CAR-T
- RiboCytokines
Our mRNA vaccine platforms: FixVac and iNeST

**FixVac**
- **Off-the-shelf mRNA immunotherapy**
- **Targeting a fixed combination of shared antigens**
  - Non-mutated antigens shared among patients with a specific cancer type
  - Applicable for almost all types of tumor antigens

**iNeST**
- **Fully individualized mRNA immunotherapy**
- **Targeting 20 neo-antigens unique to each patient**
  - Vast majority of neo-antigens are unique to individual patients
  - Applicable across solid tumor types

- Proprietary RNA-LPX formulation for systemic dendritic cell targeting
- Strong immunogenicity observed *in vivo* via TLR7-driven adjuvant effect
- Potent induction of strong *ex vivo* CD4+ and CD8+ T cell responses

Kranz et al., Nature 2016
Our RNA-LPX vaccine approach

Strong vaccine-induced *ex vivo* CD8+ T cell responses\(^1\) across different cancer types

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Mutant Neoantigen</th>
<th>FixVac</th>
<th>iNeST</th>
</tr>
</thead>
<tbody>
<tr>
<td>NY-ESO-1 Melanoma</td>
<td>HPV16-E7 Head Neck Cancer</td>
<td>BNT111, Lipo-MERIT trial</td>
<td>BNT113, HARE40 trial</td>
</tr>
<tr>
<td>MAGE-A3 Melanoma</td>
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<tr>
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<tr>
<td>Mutant Neoantigen</td>
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</tbody>
</table>

\(^1\)T cell responses analyzed by *ex vivo* multimer staining analysis in blood
FixVac: BNT111 Interim clinical activity data in advanced melanoma

Summary

• Advanced melanoma patients (stage III, IV); dose range: 14µg - 100µg
• Out of 74 patients with available follow-up radiological imaging 42 patients were assessed for preliminary analysis as of July 29, 2019
• of 25 patients with metastatic melanoma who received BNT111 monotherapy following progression on CPI* and in some cases other therapies
  – 3 patients with partial response (PR)
  – 1 patient with metabolic complete response¹
  – 7 patients with stable disease (SD)
  – 14 progressive disease (PD)
• of 17 patients with metastatic melanoma who received BNT111 in combination with CPI after progression on CPI monotherapy
  – 6 patients with partial response (PR)
  – 2 patients with stable disease (SD)
  – 9 progressive disease (PD)
• Adjuvant cohort of 32 patients still in study

*CPI: Checkpoint inhibitor; ¹based on ¹⁸F-FDG-PET/CT analysis

Cumulative patient coverage of FixVac melanoma targets is over 90%

Report phase 1 data 1H 2020
Start phase 2 with registrational potential in 2H 2020
mRNA drug class | FixVac platform | BNT112 (FixVac Prostate Cancer)

FixVac: BNT112 in Prostate Cancer

Ph1/2: first patient enrolled in December 2019

- Multipronged vaccine: Targeted antigens of BNT112 are 5 prostate cancer specific antigens (PAP, PSA and 3 undisclosed antigens)

- RNA-LPX vaccine format validated by our FixVac Melanoma program
FixVac: a flexible format designed to be rapidly adapted for different tumors

<table>
<thead>
<tr>
<th>Product candidate</th>
<th>Preclinical</th>
<th>Phase 1</th>
<th>Phase 2</th>
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</thead>
<tbody>
<tr>
<td>BNT111</td>
<td>Advanced melanoma</td>
<td></td>
<td>Phase 2 with registrational potential start in 2H 2020</td>
</tr>
<tr>
<td>BNT113</td>
<td>HPV positive head &amp; neck cancer (IIT)</td>
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<td>Phase 2 with registrational potential start in 2H 2020</td>
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<tr>
<td>BNT114</td>
<td>Triple negative breast cancer</td>
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<tr>
<td>BNT112</td>
<td>Prostate cancer</td>
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<tr>
<td>BNT115</td>
<td>Ovarian cancer (IIT)</td>
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<tr>
<td>BNT116</td>
<td>NSCLC</td>
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</tbody>
</table>

5 programs in human trials
Individualized Neoantigen Specific Immunotherapy (iNeST)

Overview

- Targeting multiple neoantigens
- Intended to be a universal approach applicable for the majority of cancers
- 50:50 profit/loss share with Genentech

Preclinical

<table>
<thead>
<tr>
<th>BNT121</th>
<th>Phase 1</th>
<th>Phase 2</th>
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</thead>
<tbody>
<tr>
<td>i.n.</td>
<td>Metastatic melanoma (N=13)</td>
<td>Up to 60 months follow-up data</td>
</tr>
<tr>
<td>BNT122</td>
<td>Multiple solid tumors</td>
<td>Data update 2020</td>
</tr>
<tr>
<td>(IV)</td>
<td>First-line advanced melanoma in combination with pembrolizumab (Keytruda)</td>
<td>Trial progress update 2H 2020</td>
</tr>
</tbody>
</table>

Phase 2

- Phase 2 in NSCLC (adjuvant)
- Phase 2 in CRC (adjuvant)

Turnaround time reduced from three months to six weeks

Currently being evaluated in ≥ 8 solid tumor indications
**BNT121: Interim clinical activity data**

**Clinical status**
- Neo-epitope RNA production
- Neo-epitope RNA vaccination, continued treatment, follow up

**Clinical outcome in follow up**

- Stable Disease: 8
- Relapse free disease control: 8
- Complete Response: 1
- Partial Response: 1
- Complete Response (Combination with CPI): 1
- Progression after temporary disease control (+18 months): 1
- Lost to follow-up at 15 months: 1

**Metastatic melanoma (N=13)**
- First-in-human Phase 1 with 13 patients with melanoma stage IIIB, IIIC, and IV; intranodal delivery
- Immune responses against at least one neoantigen in all patients
- Cumulative rate of metastatic events significantly reduced, resulting in a sustained PFS
- 3 out of 5 pts with melanoma relapses developed treatment-related objective clinical responses
  - One complete response (CR), relapse-free 26 mon
  - One immunotherapy-related partial response (PR)
  - One CR in combination with anti-PD1
- 8 patients (no detectable lesions at start) relapse free and recurrence-free for the whole follow-up (12 to 23 months)

**High relapse risk melanoma patients (stage IIIB, IIIC, IV)**
- 13 patients
- Dose range: 14 µg-100 µg

**RNA vaccination**

**mRNA drug class | iNeST platform | BNT121**

Sahin et. al. Nature 2017
Update for BNT121 (as of October 2019)

*Melanoma Stage IIIB, IIIC, and IV, 13 patients, intranodal delivery against 10 neoantigens*

**Metastatic relapse analyses**

9 of 13 patients without documented PFS events

Has shown relapse free disease activity with BNT121 iNeST in adjuvant melanoma
iNeST: BNT122 updates expected for phase 1 in 2020, for phase 2 in 2021

**Phase 1a/1b in Multiple Solid Tumors:**
Open-label, dose-escalation study of safety and pharmacokinetics

- **Enrollment:** Up to 770
- **Tumor types:** Melanoma, NSCLC, bladder cancer, CRC, TNBC, renal cancer, H&N cancer, other solid tumors
- **Primary outcome measures in iNeST + atezolizumab treated participants compared with iNeST-only participants include:**
  - Dose-limiting toxicities
  - Adverse events
  - Single-agent escalation
  - Combo escalation (PCV + atezolizumab)

**Phase 2 in Advanced Melanoma:**
Interventional open-label, multicenter randomized study of efficacy and safety

- **Enrollment:** 132
- **Tumor types:** Advanced melanoma
- **Primary endpoint in iNeST+ pembrolizumab treated participants compared with pembrolizumab-only participants:** progression-free survival
  - Evaluate the efficacy and safety of iNeST in combination with pembrolizumab vs. pembrolizumab alone in participants previously untreated in advanced melanoma (first-line)

**Preliminary observations in ongoing trials with BNT122 (RO7198457) (IV administration, RNA-LPX):**
- iNeST can be manufactured for individual patients with clinically relevant turn-around times across a range of tumor types
- iNeST +/- atezolizumab (Tecentriq) has a manageable safety profile
- Strong immunogenicity across a range of tumor types
Digitization and automation for neo-antigen vaccine manufacturing

- 2 mRNA GMP production facilities: Idar-Oberstein (GMP since 2011) and Mainz (GMP since 2018)
- Construction and GMP licensure of new Mainz facility for iNeST expected in 2022/2023
- Partnered with Siemens to develop automated production processes
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Bispecific Next-Gen CP immunomodulators and targeted cancer antibodies

BNT311 and BNT312: Next-Gen checkpoint immunomodulators
Two bispecific antibodies partnered with Genmab
- Potential “first-in-class” bispecific antibodies
- Conditional activation of immuno-stimulatory checkpoint activity
- 50:50 profit/loss share
- Both programs are now in the clinic

BNT321: Ab targeting Cancer Associated Carbohydrate sLe⁰
- Subnanomolar affinity, potent cell killing by ADCC & CDC
- Targets sialyl Lewis A epitope (sLe⁰) present in a range of glyco-proteins (CA19-9): specifically expressed in pancreatic and other cancers
- CA19-9 also a prognostic marker and functionally associated with carcinogenesis¹

Preliminary data
- 6 patients evaluated in combo with chemotherapy
  — 4 / 6 met the criteria for PR and 2 / 6 met the criteria for SD
  — BNT321 was generally well tolerated by all 6 patients

PET/CT imaging study with MVT-2163 (PET conjugated Ab version; ⁸⁹Zr-DFO-HuMab-5B1)

1 Engle et al, Science 2019: The glycan CA19-9 promotes pancreatitis and pancreatic cancer in mice
CP: checkpoint; PR: partial response; SD: stable disease
Next-Gen checkpoint immunomodulator: GEN1046 (BNT311)

Characteristics

- Bispecific antibody combining constitutive CPI blockade and conditional co-stimulatory activity
- Enhanced proliferation of antigen specific activated T cells in the presence of PD-L1+ cells

Mode of Action

1. Constitutive PD-L1 blockade & conditional 4-1BB agonism

2. Increased tumor infiltrating lymphocyte (TIL) expansion in human tumor tissue cultures ex vivo

3. Induced tumor regression of murine tumors superior to pure PD-L1 blockage and is associated with an increase in tumor-specific CD8 T-cells

Antibodies drug class | bispecific antibodies | anti-PDL1, anti-4-1BB
Bispecific antibody GEN1046 (BNT311): Phase 1/2a in solid tumors

First-in-human, open-label, dose-escalation trial with expansion cohorts to evaluate safety of GEN1046 (PD-L1x4-1BB) in subjects with malignant solid tumors

- **Enrollment:** 192
- **Data update:** 2H 2020
- **Tumor types:** Malignant Solid Tumors

**Intervention:**
- GEN1046 (BNT311) is a PD-L1x4-1BB bispecific antibody that induces conditional activation of T cells through 4-1BB stimulation which is dependent on simultaneous binding to PD-L1
- GEN1046 (BNT311) IV once every 21 days
- Dose levels determined by the starting dose and the escalation steps taken in the trial

**Description:**
- Open-label safety trial
- Two parts, a dose escalation (phase 1, first-in-human) and an expansion part (phase 2a)

**Key Primary endpoints:**
- Dose limiting toxicity
- Adverse events
- Safety laboratory parameters
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BNT211: Next generation CAR-T targeting CLDN6 with CARVac “primer”

CAR-T cell therapy + RNA Vaccine to amplify CAR-T cell \textit{in vivo}

CLDN6 is \textit{not} present in healthy tissues

CLDN6 is expressed in multiple cancers

Ovarian cancer Testicular tumor Lung cancer

Eradication of advanced tumors demonstrated in an ovarian carcinoma xenograft model
BNT211: Next generation CAR-T targeting CLDN6 with CARVac “primer”

RNA-lipoplex vaccine shown to enhance expansion & persistence of CAR-T

Applicability shown for CLDN6, CLD18.2, CD19 CAR-T cells

1Reinhard et al, Science 2020: An RNA vaccine drives expansion and efficacy of claudin-CAR-T cells against solid tumors
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RiboCytokines: a novel therapeutic platform

The Concept

- Cytokines encoded by mRNA and produced in the patient
- Improved PK properties to improve tolerability and activity
- Cytokine design to improve immunological properties and tolerability

Therapeutic Goals

- Overcome resistance mechanisms by therapeutic synergy
- Improve activity of mRNA Vaccines

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<td>BNT151</td>
<td>Optimized IL-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNT152+BNT153</td>
<td>IL-7, IL-2</td>
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</tbody>
</table>

Expected to enter the clinic in 1H 2021
RiboCytokines boosted activity of vaccination and PD-L1 blockade in mouse model

**CT26 tumor model, vaccine antigen: gp70**

**Effect of tumor size on treatment success of vaccination + aPD-L1**

**RiboCytokines boost the clinical activity of vaccination + aPD-L1 in large tumors**