

# New Vaccines on the Horizon

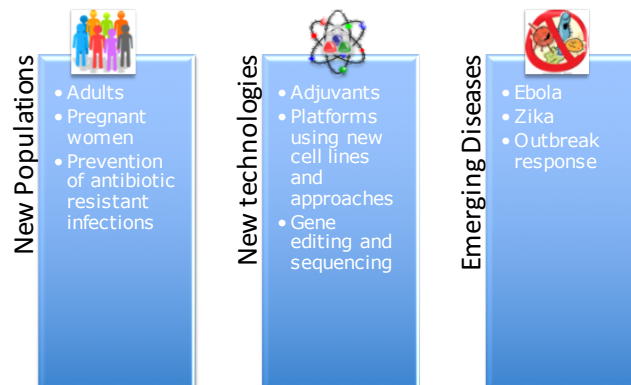
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## The Environment For Vaccine Development Is Broader and More Complex Than In The Last 10 Years

*But it presents a unique opportunity for all stakeholders to work together to reduce infectious diseases in diverse populations.*



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## Vaccines for Significant Global Diseases

| Disease | Phase 2 | Phase 3 | BLA or Licensed | Companies  |
|---------|---------|---------|-----------------|--|
| HIV     | 3       | 2       |                 | J&J, Sanofi Pasteur, Geovax, Immune Response BioPharma, InnaVirVax |
| Malaria | 3       |         |                 | GSK, Sanaria   |
| TB      | 3       |         |                 | J&J, GSK, Valneva  |
| Dengue  |         | 1       | 1               | Sanofi Pasteur, Takeda   |

Source: BioMedTracker from Sagient Research, as of May 2019  
 \*\* = Biologics License Application  
 \*\*\* = approved outside the US

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## Vaccines for Unmet Medical Needs

| Disease       | Phase 2 | Phase 3 | BLA or Licensed | Companies  |
|---------------|---------|---------|-----------------|--|
| Hepatitis B   |         | 1       | 1               | VBI Vaccines, Assembly BioSciences   |
| Pneumococcal  |         | 2       |                 | Merck, Pfizer  |
| RSV           | 3       | 1       |                 | Novavax, J&J, Bavarian Nordic, GSK   |
| Meningococcal | 2       | 2       |                 | Sanofi Pasteur, GSK, Pfizer  |
| Norovirus     | 1       |         |                 | Takeda   |
| Influenza     | 8       | 5       | 2               | Seqirus, GSK, Sanofi, Medicago, BiondVax, Nanotherapeutics // Mymetics, Imutex, GSK, Vaxart, BioDiem, Novavax, Altimmune, FluGen |

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## Vaccines for Targeted Populations

| Disease               | Phase 2 | Phase 3 | BLA or Licensed | Companies                |
|-----------------------|---------|---------|-----------------|--------------------------|
| Clostridium difficile | 1       | 1       |                 | Pfizer, Valneva          |
| Escherichia coli      | 2       |         |                 | J&J, IDVax               |
| Staph aureus          | 1       |         |                 | NovaDigm                 |
| Candidiasis           | 1       |         |                 | NovaDigm                 |
| CMV                   | 3       |         |                 | Merck, Hookipa, Fortress |

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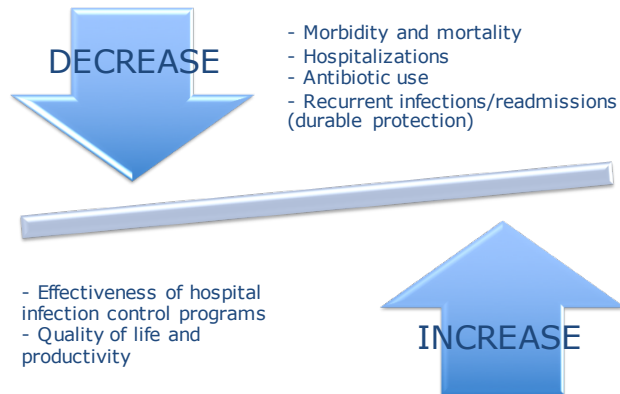
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## Unique Development Challenges for AMR Vaccines

- Limited populations compared to routine vaccines
- Defining at-risk patients to vaccinate may be difficult
- Target populations with high comorbidities
- Level of immunocompetence may affect vaccine response
- Rapid protection may be required

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## Opportunity: Prevention of HAI/AMR infections can...



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## Vaccines for Outbreaks and Bio-Threats

| Disease  | Phase 2 | Phase 3 | BLA or licensed | Companies                        |
|----------|---------|---------|-----------------|----------------------------------|
| Ebola    | 1       | 3       |                 | Merck, J&J, Bavarian Nordic, GSK |
| Zika     | 1       |         |                 | Takeda                           |
| Anthrax  |         | 1       |                 | Emergent BioSolutions            |
| Smallpox |         | 1       |                 | Bavarian Nordic                  |

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## Our Speakers Today

- Dr. Brian Ward, Chief Medical Officer, Medicago
- Dr. Shon Remich, Senior Director, Medical R&D, Pfizer
- Dr. Vivek Shinde, Vice President, Vaccine Clinical Development, Global Health, Novavax

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