**Expanded cGMP Production Facility**

### Introduction

The Duke Human Vaccine Institute’s 3,400 ft² expanded current Good Manufacturing Practice (cGMP) clinical supply production facility will be located on the second floor of the MSRB II building, at the Duke Health Campus in Durham, North Carolina.

The project is primarily renovation of existing laboratory space for the installation of substantial manufacturing and manufacturing support equipment. The project has been developed for the purpose of manufacturing a therapy for human use. Completion of the project is expected in 2019.

#### Production Capabilities:

- Recombinant protein vaccines expressed in mammalian cells
- mRNA produced by in vitro cell-free transcription
- Live-virus processes (BSL1/BSL2)
- Fermentation vaccine platforms
- Master Cell Bank production
- Nucleotide vaccines

### Our Approach / Methods

The operational philosophy for this facility will extensively leverage single-use closed systems to alleviate risks for contamination of product streams. Open operations will be limited to early cell culture expansion steps within class II biosafety cabinets and limited open downstream steps conducted in ISO7 suites. GMP parts wash and autoclave included in the design will afford process flexibility for use of dedicated reusable small parts that cannot be obtained as single use items.

#### Novel Capability for Add Flexibility:
- Master Cell Bank Equipment
- MCB Filler, Controller Rate Freezer
- Buffer Prep. Equipment
- Autoclave, Washer, Single Use Mixers
- Upstream Equipment
- Dual Purpose Bioreactors
- Dedicated Process Utilities
- ASTM Type II Water, Compressed Air

### Study Purpose

The facility design offers 1L – 500L scale capabilities and optimized single- or multi-product manufacturing flexibility. Compressed single-product, multi-lot campaigns or multi-product manufacturing may occur via procedural and physical separation controls, as determined through a process risk-assessment.

### Contribution to Duke / DHVI

The new cGMP facility is designed to provide the scale, flexibility, and throughput needed to support Duke’s vaccine and therapeutic portfolio, including cGMP production of diverse vaccine products like recombinant protein vaccines, fermentation vaccines, and mRNA. The facility design includes 4 dedicated bioprocess suites, parts wash/autoclave room, cGMP storage areas, and single-use bioprocess equipment to fully support delivery product for exploratory Phase I/II clinical studies in compliance with US and EU requirements.

#### Example of a “Pipeline of Products” Manufactured at DHVI

### Status

The development and publication of the User Requirement Specification (URS) and Basis of Design (BOD) document package for NIAID review is complete, was combined with the final construction documents, and received NIAID approval to proceed with construction in late summer of 2018.

Construction is scheduled to start in the Fall of 2018 with turnover to DHVI in the Spring of 2019.

#### Timeline

- **2017**: Planning and Design
- **2018**: Construction
- **2019**: Commissioning

### Conclusion

The DHVI cGMP team has expanded upon our existing 1,600 ft² facility with an additional 3,400 ft², creating 5,000 ft² of flexible manufacturing space to further accelerate Duke’s delivery of novel vaccines and medical countermeasures to the clinic. The facility is anticipated to be fully operational by **Summer of 2019**.

This expanded capacity for exploratory clinical trial material manufacture will address a critical bottleneck in the pursuit of new efficacious vaccines and is open to non-DHVI candidates.

- Facility designed to be flexible, while leveraging existing equipment portfolio and systems
- Project is ahead of schedule and on budget
- Facility offers enhanced capability
  - Multi-product capability
  - Live-virus containment
  - Fill-finish feasibility
  - MCB production

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