



ImmunityBio Simulations Reveal Why the New Strain of SARS-CoV-2 in South Africa is Spreading Fast and May 'Escape' Existing Immunity

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- Using Molecular Dynamic (MD) simulation, ImmunityBio scientists assessed the affinity of mutated spike receptor binding domain (RBD) of SARS-CoV-2 to its receptor on human cells, ACE2
- The mutations studied occur in the new UK and South African strains that have spread rapidly throughout those regions and now identified throughout the world
- One key mutation (E484K) that results a lysine at position 484 of the RBD region of spike results in very high affinity binding, reducing the movement of a highly flexible loop area of spike and 'locking it onto' ACE2 like a lasso
- Another mutation, found in both the South African strain (501Y.V2) and the UK strain (B.1.1.7), the N501Y mutation wherein a tyrosine is found at position 501 of spike, also showed high affinity
- Higher affinity is very likely the reason for greater transmissibility of both new variants
- The E484K mutation, particularly in the presence of both K417N and N501Y mutations (these three occur together in the South African 501Y.V2 strain) led to significant changes in the conformation of spike
- This higher risk of conformational change in the South African variant in spike RBD - a key region of the virus targeted by antibodies - may explain emerging reports that this new version of the virus can circumvent existing immunity and possibly re-infect previously infected people.
- Our MD simulation method has proved to be a valuable tool in the arsenal against the continued spread of SARS-CoV-2 and COVID-19 that can be used to predict relative transmissibility and/or the ability to escape existing immunity

CULVER CITY, Calif., January 19, 2021— ImmunityBio, Inc., a privately-held immunotherapy company, just reported their findings from a follow-up Molecular Dynamics (MD) simulation study of the SARS-CoV-2 spike receptor binding domain (RBD) and its binding to its receptor on human cells, angiotensin-converting enzyme 2 (ACE2).

In the first study, "*Millisecond-scale molecular dynamics simulation of spike RBD structure reveals evolutionary adaption of SARS-CoV-2 to stably bind ACE2*" using exceptionally long-duration millisecond scale MD simulation, ImmunityBio scientists revealed the evolutionary adaptation of spike RBD for binding to ACE2, and the regions of RBD that strongly bind ACE2. These findings provide targets for potential new therapeutics or vaccines.

In the new study, MD simulation was applied to the highly concerning new strains of SARS-CoV-2 including the predominating variant in South Africa 501Y.V2 and the UK variant B.1.1.7. The simulations were focused on the mutations found at the interface of the spike RBD and ACE2, [E484K](#), K417N, and N501Y, because these mutations are highly likely to affect binding and thus transmissibility. Indeed, both E484K and N501Y were found to increase affinity of RBD binding to ACE2.

A very notable finding of the simulations was that *the combination of [E484K](#), K417N and N501Y*, found only in the South African variant, results in the highest degree of conformational alterations of S RBD when bound to hACE2, compared to either E484K or N501Y alone. Conformation affects the recognition of an antibody to an antigen site.

Enhanced affinity of S RBD for hACE2 very likely underpins the greater transmissibility conferred by the presence of either E484K or N501Y; while the induction of conformational changes may provide an explanation for evidence that the 501Y.V2 variant, distinguished from the B.1.1.7 UK variant by the presence of E484K, is able to escape neutralization by existing first-wave anti-SARS-CoV-2 antibodies and re-infect COVID-19 convalescent individuals.

The manuscript and a video detailing the findings of the ImmunityBio molecular dynamic simulation studies is available on preprint server bioRxiv (see link [here](#)) and is concurrently undergoing scientific peer-review for publication.

About the T-Cell-Based Vaccine Candidate

Developed by ImmunityBio and manufactured by NantKwest, Inc. (NASDAQ: NK), this second generation hAd5-vector vaccine is unique in targeting both spike (S) and nucleocapsid (N) SARS-CoV-2 proteins potentially generating B and T cell memory to the COVID-19 antigens and long-term immunity to the virus. Most of the COVID-19 vaccines approved by the FDA or in late-stage clinical trials deliver only the spike protein on the surface of the virus, which has already mutated several times. Another unique characteristic of the hAd5 design is it uses a second-generation Ad5 platform that was developed to raise anti-SARS-CoV-2 immune responses even in Ad-immune individuals, meaning subjects can receive the vaccine multiple times, if necessary. The stimulation of anti-Ad5 immune responses is attenuated with the second-generation platform in comparison with the first-generation platforms, due to additional genetic deletions. Phase I trials have been initiated in the U.S. and recruitment is set to begin in February in Cape Town, South Africa with subcutaneous doses to be followed by trials using sublingual doses and room temperature-stable oral capsules.

Joint Collaboration Agreement with NantKwest

Under the terms of a definitive agreement announced on August 24, 2020, ImmunityBio and its affiliate NantKwest agreed to share equally the costs of development, manufacturing, marketing and commercialization of the products each is developing related to COVID-19, including the hAd5 vaccine

candidate. Should a product be commercialized successfully, the companies have agreed to a 60-40 percent split of net profits, with the larger share going to the company that developed the product. The agreement also details the structure of shared governance of the joint collaboration.

NantKwest Transaction

As previously announced, on December 21, 2020, ImmunityBio entered into an agreement to combine in a stock-for-stock transaction with NantKwest. The combination, which is expected to close in the first half of 2021, will create a leading immunotherapy and cell therapy company focused on oncology and infectious disease.

About ImmunityBio

ImmunityBio, Inc. is a late-clinical-stage immunotherapy company developing next-generation therapies that drive immunogenic mechanisms for defeating cancers and infectious diseases. The company's immunotherapy platform activates both the innate (natural killer cell and macrophage) and adaptive (T-cell) immune systems to create long-term "immunological memory." This novel approach is designed to eliminate the need for high-dose chemotherapy, improve upon the outcomes of current CAR T-cell therapies, and extend beyond checkpoint inhibitors.

ImmunityBio's platform is based on the foundation of three separate modalities: antibody cytokine fusion proteins, synthetic immunomodulators, and second-generation human adenovirus (hAd5) vaccine technologies.

Anktiva™ (ImmunityBio's lead cytokine infusion protein) is a novel interleukin-15 (IL-15) superagonist complex and has received Breakthrough Therapy and Fast Track Designations from the U.S. Food and Drug Administration (FDA) for BCG-unresponsive CIS non-muscle invasive bladder cancer (NMIBC). The company is also in Phase 2 or 3 trials for indications such as first- and second-line lung cancer, triple-negative breast cancer, metastatic pancreatic cancer, recurrent glioblastoma, and soft tissue sarcoma in combination with the company's synthetic immune modulator (Aldoxorubicin).

ImmunityBio is also developing therapies, including vaccines, for the prevention and treatment of HIV, influenza, and the coronavirus SARS-CoV-2 with its second-generation human adenovirus (hAd5) vaccine technologies.

About NantKwest

NantKwest ([NASDAQ: NK](#)) is an innovative, clinical-stage, immunotherapy company focused on harnessing the power of the innate immune system to treat cancer and infectious diseases. NantKwest is the leading producer of clinical dose forms of off-the-shelf natural killer (NK) cell therapies. The activated NK cell platform is designed to destroy cancer and virally-infected cells. The safety of these optimized, activated NK cells—as well as their activity against a broad range of cancers—has been tested in phase I clinical trials in Canada and Europe, as well as in multiple phase I and II clinical trials in the United States. By leveraging an integrated and extensive genomics and transcriptomics discovery and development engine, together with a pipeline of multiple, clinical-stage, immuno-oncology programs, NantKwest's goal is to transform medicine by bringing novel NK cell-based therapies to routine clinical care. NantKwest is a member of the NantWorks ecosystem of companies. For more information, please visit www.nantkwest.com.

Forward-Looking Statements

This communication contains forward-looking statements relating to the proposed transaction involving NantKwest, Inc. ("NantKwest") and ImmunityBio, Inc. ("ImmunityBio"), including financial estimates and statements as to the expected timing, completion and effects of the proposed transaction and statements relating to NantKwest and ImmunityBio's future success in improving the treatment of various diseases and illnesses, including, but not limited to COVID-19 and cancer. Statements in this communication that are not statements of historical fact are considered forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the "Securities Act"), and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), which are usually identified by the use of words such as "anticipates," "believes," "continues," "could," "estimates," "expects," "intends," "may," "plans," "potential," "predicts," "projects," "seeks," "should," "will," and variations of such words or similar expressions. These forward-looking statements are neither forecasts, promises nor guarantees, and are based on the current beliefs of NantKwest's management and ImmunityBio's management as well as assumptions made by and information currently available to NantKwest and ImmunityBio. Such statements reflect the current views of NantKwest and ImmunityBio with respect to future events and are subject to known and unknown risks, including business, regulatory, economic and competitive risks, uncertainties, contingencies and assumptions about NantKwest and ImmunityBio, including, without limitation, (i) inability to complete the proposed transaction because, among other reasons, conditions to the closing of the proposed transaction may not be satisfied or waived, (ii) uncertainty as to the timing of completion of the proposed transaction, (iii) potential adverse effects or changes to relationships with employees, suppliers or other parties resulting from the announcement or completion of the proposed transaction, (iv) the outcome of any legal proceedings that may be instituted against the parties and others related to the potential transaction between NantKwest and ImmunityBio, (v) possible disruptions from the proposed transaction that could harm NantKwest's or ImmunityBio's respective business, including current plans and operations, (vi) unexpected costs, charges or expenses resulting from the proposed transaction, (vii) uncertainty of the expected financial performance of the combined company following completion of the proposed transaction, including the possibility that the expected synergies and value creation from the proposed transaction will not be realized or will not be realized within the expected time period, (viii) the ability of each of NantKwest or ImmunityBio to continue its planned preclinical and clinical development of its respective development programs, and the timing and success of any such continued preclinical and clinical development and planned regulatory submissions, (ix) inability to retain and hire key personnel, and (x) the unknown future impact of the COVID-19 pandemic delay on certain clinical trial milestones and/or NantKwest's or ImmunityBio's operations or operating expenses. More details about these and other risks that may impact NantKwest's business are described under the heading "Risk Factors" in NantKwest's most recent Quarterly Report on Form 10-Q and Annual Report on Form 10-K filed with the U.S. Securities and Exchange Commission ("SEC") and in subsequent filings made by NantKwest with the SEC, which are available on the SEC's website at www.sec.gov. NantKwest and ImmunityBio caution you not to place undue reliance on any forward-looking statements, which speak only as of the date hereof. NantKwest and ImmunityBio do not undertake any duty to update any forward-looking statement or other information in this communication, except to the extent required by law. No representation is made as to the safety or effectiveness of these product candidates for the therapeutic use for which such product candidates are being studied.

Certain information contained in this communication relates to or is based on studies, publications, surveys and other data obtained from third-party sources and NantKwest's and ImmunityBio's own internal estimates and research. While NantKwest and ImmunityBio believe these third-party sources to be reliable as of the date of this communication, it has not independently verified, and makes no representation as to the adequacy, fairness, accuracy or completeness of, any information obtained from third-party sources. In addition, all of the market data included in this communication involves a number of assumptions and limitations, and there can be no guarantee as to the accuracy or reliability of such assumptions.

Finally, while NantKwest and ImmunityBio each believes its own internal research is reliable, such research has not verified by any independent source.

No Offer or Solicitation

This communication is not intended to and does not constitute an offer to sell or the solicitation of an offer to buy, sell or solicit any securities or any proxy, vote or approval in any jurisdiction pursuant to or in connection with the proposed transaction or otherwise, nor shall there be any sale of securities in any jurisdiction in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such jurisdiction. No offer of securities shall be deemed to be made except by means of a prospectus meeting the requirements of Section 10 of the Securities Act.

Additional Information and Where to Find It

In connection with the proposed transaction, NantKwest intends to file a registration statement on Form S-4 with the SEC, which will include a prospectus and joint proxy / solicitation statement of NantKwest and ImmunityBio (the "solicitation statement/prospectus"). NantKwest may also file other documents regarding the proposed transaction with the SEC. This communication does not constitute an offer to sell or the solicitation of an offer to buy any securities or a solicitation of any vote or approval. This communication is not intended to be, and is not, a substitute for such filings or for any other document that NantKwest may file with the SEC in connection with the proposed transaction. BEFORE MAKING ANY VOTING OR INVESTMENT DECISION, INVESTORS AND SECURITY HOLDERS ARE URGED TO CAREFULLY READ THE ENTIRE REGISTRATION STATEMENT AND SOLICITATION STATEMENT / PROSPECTUS, WHEN THEY BECOME AVAILABLE, AND ANY OTHER RELEVANT DOCUMENTS FILED WITH THE SEC, AS WELL AS ANY AMENDMENTS OR SUPPLEMENTS TO THESE DOCUMENTS, CAREFULLY AND IN THEIR ENTIRETY BECAUSE THEY WILL CONTAIN IMPORTANT INFORMATION ABOUT THE PROPOSED TRANSACTION. Investors and security holders will be able to obtain free copies of the registration statement and solicitation statement/prospectus and other documents filed with the SEC by NantKwest through the website maintained by the SEC at www.sec.gov. In addition, investors and security holders will be able to obtain free copies of the prospectus and other documents filed with the SEC on NantKwest's website at www.ir.nantkwest.com.

Participants in the Solicitation

NantKwest and certain of its respective directors and executive officers may be deemed to be participants in the solicitation of proxies from stockholders of NantKwest in connection with the proposed transaction under the rules of the SEC. Investors may obtain information regarding the names, affiliations and interests of directors and executive officers of NantKwest in NantKwest's proxy statement for its 2020 annual meeting of stockholders, which was filed with the SEC on April 24, 2020, as well as its other filings with the SEC. Other information regarding the participants in the proxy solicitation and a description of their direct and indirect interests, by security holdings or otherwise, will be included in the registration statement, solicitation statement / prospectus and other relevant materials to be filed with the SEC by NantKwest regarding the proposed transaction (if and when they become available). You may obtain free copies of these documents at the SEC's website at www.sec.gov. Copies of documents filed with the SEC will also be available free of charge from NantKwest using the sources indicated above.

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