INA-RESPOND

INDONESIA RESEARCH PARTNERSHIP ON INFECTIOUS DISEASE

KEMENTERIAN KESEHATAN REPUBLIK INDONESIA

NEWSLETTER

September 2020

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NATIONAL INSTITUTE OF HEALTH RESEARCH AND DEVELOPMENT
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INA-RESPOND newsletter

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INA-RESPOND Newsletter

TRIPOD & PROACTIVE Study Updates

By: Eka Windari R., Lois E. Bang, Maria Intan Josi, Venty Muliana Sari

STUDY UPDATES

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PARTICIPANT STATUS

Per 01 Sep 2020, the total ongoing participants in the TRIPOD study are 31 out of 490 enrolled participants. From those 31 ongoing participants, eight are still on TB treatment while 23 are waiting for a 6-month post-treatment visit. Two hundred and twenty-five participants have completed the study, while 234 participants are terminated early (including death). Therefore, there are still 6.3 % participants from the total enrolled participants in the follow-up status. From the uploaded CRFs, all participant from site 520 and 570 have been completed the study. However, there are 1 participant from site 550 (RSUP dr. Wahidin Sudirohusodo Makassar) who still need to be followed up, 17 participants from site 560 (RSUP dr. Kariadi Semarang), 6 participants from site 580 (RSUP dr. Sardjito Jogjakarta), 6 participants from site 590 (RSUP Persahabatan Jakarta), and 1 participant from site 600 (RSUP dr. Adam Malik Medan).

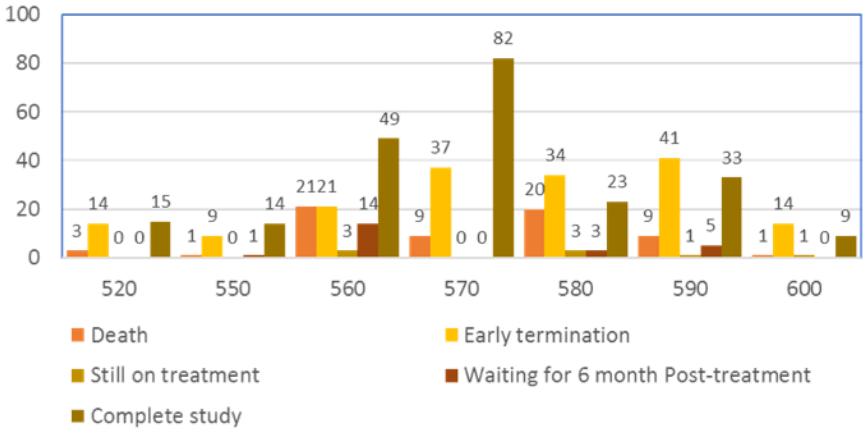

Figure 1. Participant status per site based on uploaded CRF per 1 Sept 2020

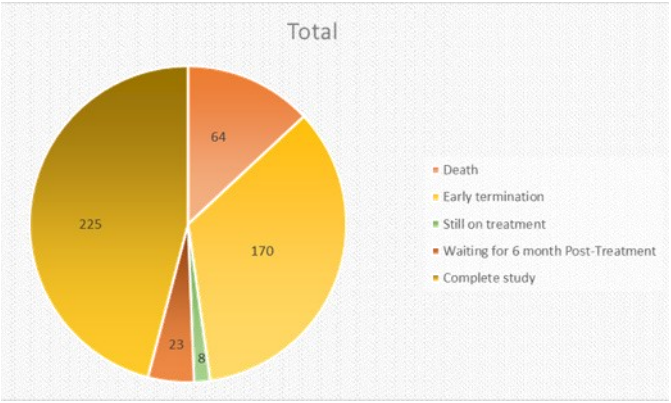

Figure 2. Total participant status based on uploaded CRF per 1 Sept 2020

TRIPOD MANUSCRIPT

The authors for the TRIPOD manuscript have been selected. A meeting with NIH will be performed to initiate the progress. The following are several manuscripts that being planned: a) focus on the baseline findings; b) treatment outcome and the related affected factors; c) related factors of TB and DM co-morbidity. The authors will be sorted according to enrolled participants. A discussion will be set up during the Clinical Research Protocol Writing Workshop.

Site number	Site name	Author
520	RS Sanglah Denpasar	dr. I Gede Ketut Sajinadiyasa, Sp.PD
550	RSUP dr. Wahidin Sudirohusodo	Dr. dr. Irawaty Djaharuddin, SpP(K)
560	RSUP dr. Kariadi	dr. Banteng Hanang Wibisono, Sp.PD-KP
570	RSUD dr. Soetomo	dr. Tutik Kusmiati, SpP (K)
580	RSUP dr. Sardjito	dr Bambang Sigit Riyanto, SpPD-KP, FINASIM
590	RSUP Persahabatan	dr. Diah Handayani, SpP
600	RSUP H Adam Malik	Dr. dr. Bintang YM Sinaga, M.Ked(Paru), Sp.P(K)

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The screening and enrollment of all 19 INA-PROACTIVE sites ended on 30 Jun 2020. As of 30 Jun, a total of 4,336 subjects were enrolled, consisted of 4,148 adults and 188 pediatrics from a total of 7,364 participants screened. Details are shown in figure 1.

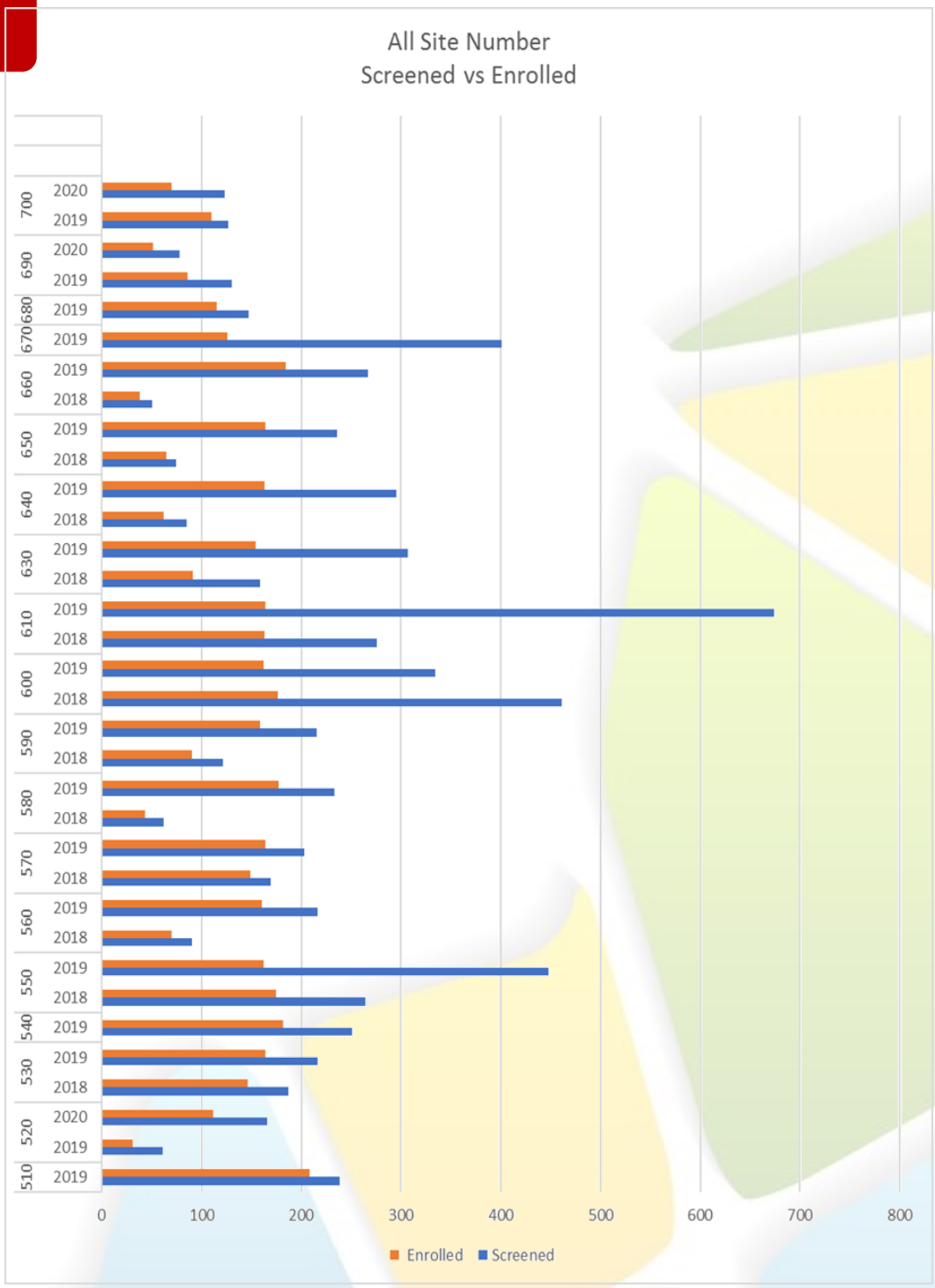


Figure 1. All Site Number Screened vs Enrolled

In addition, 175 participants ended their study because of various reasons such as death or moving to another city with no site or far from the INA-PROACTIVE study site hospital. Thus, there are 4,161 active participants of INA-PROACTIVE to date.

INA-PROACTIVE follow-up activity has been reopened as of 1 Sept 2020. INA-PROACTIVE site may continue to arrange subject follow up as long as they follow the COVID-19 disease prevention and control protocol.

Due to the shipping restriction and the increased workload of the Reference Laboratory team during the COVID-19 pandemic, the specimen shipping activity is limited up to 4 shipping per month. The remote monitoring for site 540 (Sulianti Saroso Hospital) was done on 21-22 July 2020, but no monitoring was scheduled in August and September 2020.

INA-RESPOND Newsletter

SITE 690: RSUD ABEPURA, JAYAPURA

By: dr. Widya Amalia Swastika

"Hen Tecahi Yo Onomi T'mr Ni Hanased" or "One Heart Builds a City for the Glory of God" is the motto of Jayapura. The city is the capital of Papua Province, which is located in the easternmost part of Indonesia. Jayapura is located in the Humboldt Bay and has a unique topography. The downtown area circles along the coastline with city roads going up and down the hillside. At night, Jayapura is even more beautiful, with lights illuminating its city and lighting up the sky.

The unique city center, bordering the Pacific Ocean and neighboring Papua New Guinea, also the natural conditions like lakes to hills make Jayapura has many interesting tourist attractions.

RSUD Abepura is one of the general hospitals in Papua Province located in the city area as an HIV referral center in Papua Province with seven special satellite services in handling HIV. The hospital, known as site 690, officially joined PROACTIVE as the site's first INA-RESPOND Study in February 2019 and made the site 690 one of the most eastern sites in Indonesia. We are very happy to participate in the INA-RESPOND study because we have new experiences and learn more about research.

This is our team at site 690 who always provides the best service for our patients. Let's have continuous strengthening of HIV/AIDS services towards 3 Zero: zero new infections, zero deaths, and zero discrimination by 2030. Together We Can.

Study Team Members

Principal Investigator : Dr. I. Made Gede Darmaja, Sp.PD

He was born in Sibangkap on 6 January 1965 and completed his undergraduate medical education and internal medicine specialist education at Udayana University. He worked in the first batch of PTT doctor (non-permanent employee) in 1992 at the Kepi Community Health Center, Merauke Regency, and was appointed as a Civil Servant in 1996. He worked at the Jagebob Community Health Center, Lepro Community Health Center, RSUD Merauke, Papua. Then, he took a Specialist Medical Education at Udayana University from 2000 to 2006. Afterward, he returned to RSUD Merauke in the VCT division from 2006 to 2008 and was transferred to RSUD Abepura from 2008 until now in the Internal Medicine division of RSUD Abepura and VCT Polyclinic.

Co-Principal Investigators : dr. Justina Sembring, Sp.PK

She was born in Tiganderket on 15 December 1976. She graduated from Samratulangi Medical School and took her clinical pathology specialist from UGM Medical School. She has worked in the clinical pathology laboratory at the RSUD Abepura and as a clinical pathology teaching staff at the Cendrawasih University Medical School since 2011. She aspires to provide quality and excellent laboratory services that are fast, accurate, and precise. She is interested in infectious diseases, especially those in Papua.

Dr. Immaculata Purwaningsih, Sp.A

She was born in Jayapura, 1 February 1973. She pursued medical education at Airlangga University. She served as a PTT doctor in Yiwika Kurulu, Jayawijaya, from 1998 to 2000 before joining RSUD Abepura. She is interested in infectious diseases in children in Papua. Her hobby is reading and singing.

Research Assistants

RA1: dr. Nuryanti

She was born in Semarang on 25 April 1974. She is a PTT doctor in Keerom, bordering PNG. She joined RSUD Abepura and was placed in internal disease and VCT Polyclinic since 2006. Since then, she has been interested in treating HIV-infected patients.

RA2: dr. Widya Amalia Swastika

Born in Jayapura, 14 September 1993, she studied medicine at Yarsi University. Because of her interest in research in Indonesia, Dr. Widya decided to join site 690 in September 2019. The PROACTIVE study was her first experience in research.

RA3: Nani Emma, SKM. MPH

Mrs. Nani Emma was born in Genyem on 31 January 1975. She has worked at RSUD Abepura since 1997. She was first stationed as a nurse in the operating room. In 2010, she transferred to the VCT Polyclinic and has been working there until today. She remains loyal to help treat HIV-infected patients.

Laboratory Technician : Sunarti, S.Si.,M.Imun

Mrs. Sunarti, who we always call Narti, was born in Jayapura on 14 August 1979. She got her master's degree in immunology from Airlangga University. Her hobby is cooking and baking; her cakes are to die for! Great for us, she often brings some and asks our team to try her various menus.

Nurse : Martha Ayer

Born in Abepura, 25 March 1963, Mrs. Martha, also known as "Mama Martha," is the most patient nurse in treating HIV patients. After Mama Martha graduated from the Jayapura Health Nursing School in 1984, she was placed in RSUD Dok 2 in the women's internal disease room from 1984 to 2004. Then, she transferred to Timika as an HIV counselor at the Timika Health Office and worked there from 2004-2008. Since 2008, Mama Martha has served at RSUD Abepura as a counselor, case manager, and nurse for HIV-infected patients in the VCT Polyclinic. Mrs. Martha has dedicated herself to caring for HIV patients until now.

From left to right, top to bottom:
Site 690 / RSUD Abepura study team. Dr. I. Made Gede Darmaja, Sp.PD, dr. Justina Sembring, Sp.PK, Dr. Immaculata Purwaningsih, Sp.A, dr. Nuryanti, dr. Widya Amalia Swastika, dr. Nani Emma, SKM., Ms. Sunarti, S.Si.,M.ImunMPH, Ms. Martha Ayer

INA-RESPOND Newsletter

FAREWELL: FROM ONE HEART TO ANOTHER

By: INA-RESPOND Network

Dr. Chuen-Yen Corey Lau has been working with the INA-RESPOND network for many years and has given our network a lot. During the virtual Network Steering Committee meeting on 24 September 2020, we were informed that she is leaving her current post at the Collaborative Clinical Research Branch, NIH, for a new position in the NCI (National Cancer Institute), NIH, on 11 October 2020. We have asked dr. Chuen-Yen to write a few words for us before she officially leaves.

"I originally joined NIAID in 2004 and came to the Collaborative Clinical Research Branch (CCRB) in 2011. While at CCRB, I met some of the Indonesia team through the Southeast Asia Infectious Disease Clinical Research Network (SEAICRN) and eventually started working closely with INA-RESPOND. I have enjoyed getting to know the INA-RESPOND team and seeing the wonderful progress of the network over the years. I am so happy to have you as my friends. My new position will be in Frank Maldarelli's lab, where I will work on strategies to image HIV, particularly in the CNS, as a step toward understanding and eradicating viral reservoirs. "

Surely, we are happy for Dr. Chuen-Yen for the opportunity she has been given, yet we are also sad about her leaving the INA-RESPOND network. I know that many of us will miss her smile and her great work ethic. Here are the farewells sent to us from the network sites.

Site 510 – RS Hasan Sadikin, Bandung

Dear Chuen-Yen,

When I came across the news that you are resigning from DCR, I had mixed feelings. I am happy that you have gotten such an amazing opportunity to move ahead in your career, but I was also a little sad because I will lose such a wonderful colleague. While it is with great sadness that I say goodbye, I can only imagine you are excited by the new adventures that await you in the future.

I would like to express my gratitude for your support in our researches. You gave us an insight into our studies and manuscripts with your aspiring comments and suggestions, which provided us with a new perception in accomplishing our objective. I hope we can finalize it.

It is truly an honor working with you these past years. We will always remember your dedication, accomplishments, and personal integrity. We wish you all the best for your future endeavors.

Regards,

Bachti, Syndi, and the INA-RESPOND team in Bandung

Site 520 – RS Sanglah, Denpasar

It has been wonderful years working with Chuen-Yen as our site learn and grow with INA-RESPOND through all ongoing study and studies that have been implemented. The support

and assistance provided by Chuen-Yen during meetings and all events have helped me and our site improve our capacity in conducting and managing multi-center studies. We would like to express our gratitude for all leadership and mentorship that Chuen-Yen shared with us and wish the best for Chuen-Yen in her future. May one day, our professional paths cross once again. "This is not a goodbye, just 'till we meet again."

Site 530 - RS Cipto Mangunkusumo, Jakarta

Dear Dr Chuen-Yen Lau,

It has been a good time, and I enjoyed every time we met and collaborated in the many INA RESPOND activities in Indonesia or the USA these whole years. You showed us your hard work and seriousness to finish our tasks, and at the same time, you were also very kind and always showed your genuine ways to solve any problems we encountered.

Thank you very much for your dedication to INA-RESPOND, and good luck with your endeavor in your new position.

Sincerely,
Pratiwi Sudarmono

Site 540 – RS Sulianti, Jakarta

Dear Chuen-Yen,

It is really grateful to know and have a collaboration with you in our study. I really appreciate everything that you ever did in our study. From developing and reviewing our protocol and making analysis together with the results until trying to help us writing articles for publication.

What have you done makes me feel motivated to do more even it is very thoughtful since my limited time and the resources in my hospital. But seeing you with so much passion to do more to our study it's always cheered up me and rise my spirit.

I do hope for your health and success in the future and you have the opportunity to do more and the best of you always.

Thanks again for all of your work with us. Waiting for doing more in other collaboration.

Warm regards,
Vivi, Sulianti Saroso

Site 550 – RS. Wahidin Sudirohusodo, Makassar

Dear Chuen-Yen,

Short but meaningful!!! I hope that is your experience while working with us, especially for site 550 - Wahidin Sudirohusodo Hospital Makassar. I hope that we are created good memories and build great respect for the advancement of research developments.

We feel sad knowing that you will leave us soon, but meeting and departing are the part of our lives. We have to grow and embrace what life has to offer.

I am fortunate that I got an opportunity to know such a wonderful person, not just professionally, but also personally. I had known Chuen-Yen as a serious but also a warm and family-oriented person. Every time we met, she did not forget to ask how my daughter was. A simple question but mean a lot.

Few of the many things I had remembered from her is her passion and detailed in every discussion. It was a great experience to work with you. I will miss your hard work and supporting acts. You helped us move ahead with unending motivation. Thank you for your influence, we've accomplished so far. Your contribution in INA Respond is really appreciable.

I am happy that your new workplace will gain an incredible person. You will surely be missed. I hope you will cherish the people you will leave behind and the friendship that we built.

On behalf of the my entire team, I wish you the best for your life, career, health and family. I hope that on your next journey, you will continue to have success. Maybe one day our professional paths will cross each other once again.

Keep in touch. Hope you also don't forget us.

"Goodbye" is not a word fot you. I'd much rather say "Hello". Hello to your new adventureJ

All the best!
Mansyur Arif

Site 560 – RS Kariadi, Semarang

Dear Chuen-Yen,

We have just been advised that you are no longer part of Inarespond, which came as a surprise to us. It's sad to see you go but we're forever grateful for your contributions and mentoring, especially your detailed feedback into our studies especially AFIRE study. Thank you for all your support to this fruitful collaboration. We wish you success in your new position.

M. Hussein Gasem, Site 560

Site 570 – RS Soetomo, Surabaya

Just like they say, every meeting leads to a parting, and so would this pleasing and fruitful acquaintance between Ms. Chuen-Yen Lau and me.

I can't convey my gratitude well enough, but I would like to thank Ms. Lau for her expertise, valuable advice, and assistance during this long journey through AFIRE, TRIPOD, PROACTIVE, and D2EFT. Site 570 study team and I are very grateful to have known of and have worked with Ms. Lau.

I would also like to apologize if there was any unintended mischief or wrongdoing that we unintentionally committed during our encounters in the past. Just like every meeting meets and end, every end meets a new beginning. Even though our collaboration through INA-RESPOND has come to an end, I hope our friendship does not meet the same fate. Whenever you visit Surabaya, I want you to know that you can always give me a ring anytime because you are always welcome here. You will be dearly missed, and I wish you all the best. Lastly, I hope that we all get through these difficult and trying times, so we can see each other again in the future, hopefully, in a better world.

Sincerely,
Usman Hadi

Site 580 - RS Sardjito, Yogyakarta

Dear Chuen-Yen,

I was quite surprised to hear the news of you leaving our beloved INA-RESPOND network for another job, but it is not a wonder that a great opportunity has knocked on your door since you are a wonderful coworker with so many resourses and potentials. Thank you for every support you have shown over the years. It was an honor to work with a coworker who is commited to their success and everyone else's. You definitely deserve the best!

I will remember you with warm thoughts and memories. Our whole team at RS. Sardjito wishes you the best of luck in the next step of your career. I look forward to staying in touch with you moving forward. Farewell, Chuen-Yen!

Best regards,
Dr. Abu Tholib and Team at RS Sardjito and Faculty of Medicine, UGM.

Site 590 - Persahabatan, Jakarta

Dear Chuen-Yen

Hopefully, you are always in good health. To be honest, I am quite surprised to hear that you will be resigning from the INA-RESPOND, considering the enormous contribution you have made during your work. Working with you is one of the most valuable experiences for me, considering the many opportunities for sharing knowledge and experiences during our work together. From my perspective as a co-worker, you are very diligent in carrying out your duties, thorough, and contribute outstandingly in each of your work, even though sometimes you do not hesitate to be firm in making decisions or in giving advice. And as a friend, you are kind, polite, and friendly to everyone. In the end, I think everyone in INA-RESPOND feels the same way and is happy to have had a colleague like you.

It's hard to let you go because you've become a part of our big family to us. But every time there is a meeting, there will be a farewell. I can only wish you health and success wherever you work. Even though I am no longer a co-worker, I hope that we can still keep in contact, don't ever feel uncomfortable to contact me if one day you need help.

Best regards,
Erlina Burhan

NIHRD and INA-RESPOND Secretariat

Dear "speedy" Chuen-Yen,

Let us take this moment to acknowledge the deep gratitude we have for your many kindnesses and support during the years that we worked with you. You've been so dependable, supportive, encouraging, and honest. Thanks for all those times when you helped us in the data analysis and manuscript preparation that we need help with. It will be difficult to fill the void created by your absence. We have learned from you a lot about becoming a responsible author and critical yet helpful reviewer. Though we will do our best to uphold the work ethic and commitment that you are known for, our teamwork will not be the same when you leave. We're missing your valuable contributions. You've been a friend, colleague, and mentor whom we have treasured so much. It has been an honor working with you in these past years, and it has been the highlight of my time here.

Some people come into our network partnership and quickly go. Others stay awhile, make footprints on our hearts, and you are one of a few. We wish you the best in this next phase of your career. Congratulations! Best of luck, and please keep in touch.

Sincerely,
M. Karyana, Dewi Lokida, and Herman Kosasih

INA-RESPOND Newsletter

SCIENCE CORNER

SARS-COV-2 VACCINE DEVELOPMENT: A RACE TO HOPE AMIDST A PANDEMIC

By: Karine G Fouth Tchos

"*The Circassians (a Middle Eastern people) perceived that of a thousand persons hardly one was attacked twice by full-blown smallpox; that in truth one sees three to four mild cases but never two that are serious and dangerous; that in a word one never truly has that illness twice in life.*"

Voltaire, "On Variolation," Philosophical Letters, 1734.

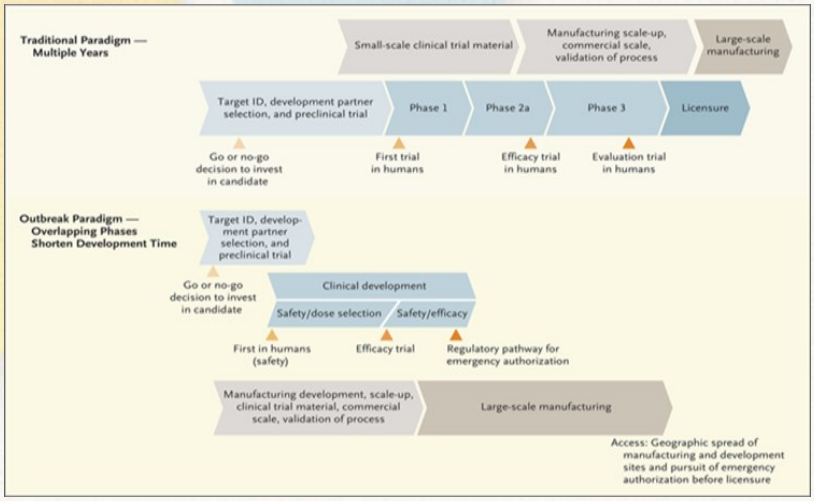
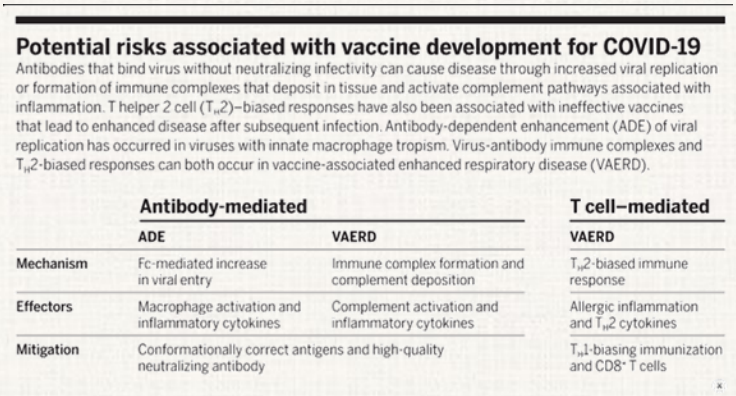


Figure 1. Difference Between Traditional Vaccine Development and Development Using a Pandemic Paradigm. N Lurie et al., New England Journal of Med, 2020.2

The ability of an infection to induce immunity was recognized long before germ theory (~1861) or the modern field of immunology (~1882). Since those early days, we have all benefited from groundbreaking findings and continuous advancement in immunology, and from the discovery of a multitude of vaccines that have contributed to the eradication and control of infectious diseases. Currently, researchers worldwide are on an urgent non-stop mission to discover a vaccine to control the deadly SARS-CoV-2 Pandemic, which originated in Wuhan, China, in December 2019 and has claimed 962,613 lives and 31,174,627 cases around the world to date (WHO, September 22, 2020). Global COVID-19 vaccine research was activated immediately after the disclosure of the full genome sequence on January 5, 2020, and the race to discover a life-saving vaccine to thwart this highly transmissible and deadly disease, still with only a few therapeutic options, had begun.

SARS-CoV-2 is by no means the first pathogen to demand a rapid vaccine response. Over the past decade, the scientific community and vaccine companies have been required to urgently respond to epidemics of H1N1 influenza, SARS, Ebola, and Zika. In these cases, the vaccine development process, which usually takes 12-15 years on average, must be accelerated safely and efficiently. In this rapid pandemic vaccine paradigm, clinical development phases can often overlap, as shown in Figure 1. Given the global significance and impact of SARS-CoV-2, this acceleration has reached new levels and is challenging researchers to re-examine various aspects of the vaccine research system, including regulatory assessment, licensing, advanced production, and distribution of the final vaccine. However, before we can reach those downstream topics, pathogen biology must be understood to produce a safe and effective vaccine.

SARS-CoV-2 is a positive-sense, single-stranded RNA virus with epithelial cell and respiratory system inclination, which can lead to life-threatening disease. The virus enters susceptible host cells when the receptor-binding domain (RBD) of the viral spike protein binds ACE-2 receptors, allowing viral fusion with the host cell membrane.[3] It is known that IgG and IgM antibody responses to SARS-CoV-2 are present in most COVID-19 patients, and many patients respond with neutralizing antibody titers correlating with disease severity, but there remains a pressing need for an improved understanding of SARS-CoV-2 immunopathology and immunology.



Potential risks associated with vaccine development for COVID-19

Antibodies that bind virus without neutralizing infectivity can cause disease through increased viral replication or formation of immune complexes that deposit in tissue and activate complement pathways associated with inflammation. T helper 2 cell (T_H2)–biased responses have also been associated with ineffective vaccines that lead to enhanced disease after subsequent infection. Antibody-dependent enhancement (ADE) of viral replication has occurred in viruses with innate macrophage tropism. Virus-antibody immune complexes and T_H2-biased responses can both occur in vaccine-associated enhanced respiratory disease (VAERD).

	Antibody-mediated		T cell–mediated
	ADE	VAERD	VAERD
Mechanism	Fc-mediated increase in viral entry	Immune complex formation and complement deposition	T_H2-biased immune response
Effectors	Macrophage activation and inflammatory cytokines	Complement activation and inflammatory cytokines	Allergic inflammation and T_H2 cytokines
Mitigation	Conformationally correct antigens and high-quality neutralizing antibody		T_H1-biasing immunization and $CD8^+$ T cells

Figure 2. Potential Risks Associated with Vaccine Development for COVID-19. Graham et al., Science, 2020;10:1126

In the case of SARS-CoV-2, optimization of the specific vaccine antigen is critical to ensure optimal immune response and avoid lung disease exacerbation, either directly or as a result of antibody-dependent enhancement (ADE), as was seen previously with vaccine candidates for SARS, MERS, and in limited in vitro studies SARS-CoV-2.[4] Such an adverse effect may be associated with a type 2 helper T-cell (Th2) response, as mentioned in Figure 2. Hence, testing in a suitable animal model and enforcing rigorous safety monitoring in clinical trials is critical.[2] Safety pitfalls such as ADE and vaccine-associated enhanced

Platform and Candidates	Licensed Platform	Speed	Advantages	Disadvantages
DNA Inovio Pharmaceuticals (NCT04336410)	No	Fast	No infectious material handling Long-term stability Rapid Design and production	A special approach may be required to administer (e.g., electroporation device) Uncertainty of safety issues
RNA mRNA-1273 Moderna/NIAID, LNP-mRNA Pfizer	No	Fast	No infectious material handling Easier to design Strong immune response Rapid manufacture but not yet tested	Inflammatory reactions possible Requires mRNA to be encapsulated otherwise unstable under physiological conditions
Viral Vector (both replicating/nonreplicating) Oxford/ AstraZeneca, ChAdOx1-S (NCT04324606)	Yes (Replicating) No (Nonreplicating)	Medium	Years of experience in the gene therapy field studying safety, immune responses High cellular and humoral immune responses	The risk for chromosomal integration and oncogenesis Preexisting antibodies to some vectors possible Potential for inflammatory AEs Variable immunogenicity Significant manufacturing hurdles
Protein NVX-CoV2373 Novovax NCT04368988 Recombinant GP nanoparticle/matrix M	Yes	Medium	No handling of infectious material Strong antibody responses Precedent for successful vaccines of this platform Viral protein complexes can be formulated to simulate virus patterning (VLPs)	Need for adjuvants Scale up of manufacturing can be challenging Potentially lacking correct glycan shield of native virus
Live virus attenuated	Yes	Slow	Proven technology Strong immune response, long-term immunity Multivalent	Requires dedicated biosafety level facilities Risk of reversion virus to pathogenic form Can be expensive to produce, complicated to scale up manufacturing
Virus inactivated Sinovac, (NCT04352608) Beijing Institute of Biological Sciences/ Wuhan Institute of Biological Sciences, (ChiCTR2000031809) Inactivated +/-alum	Yes	Medium	Proven technology Strong immune response Multivalent Simple formulation, high safety	Requires dedicated biosafety level facilities Complicated to scale up manufacturing

Table 1. Draft Landscape of COVID-19 candidate vaccines, WHO September 22, 2020

Table 2. COVID-19 vaccine candidates in Phase III trials (WHO, September 2020)

COVID-19 Vaccine Developer/ Manufacturer	Vaccine Platform	Type of Candidate	Number of doses	Timing of doses (days)
University of Oxford/AstraZeneca	Nonreplicating Viral Vector	ChAdOx1-S	1	
Gamaleya	Nonreplicating Viral Vector	Adeno-Based Viral-Vector(rAd26-S+rAd5-S)	2	0, 21
Janssen Pharmaceutical Companies	Nonreplicating Viral Vector	Ad26COVS1	2	0, 56
Sinovac	Inactivated	Inactivated	2	0, 14
Wuhan Institute of Biological Products/Sinopharm	Inactivated	Inactivated	2	0, 14 0, 21
Beijing Institute of Biological Products/Sinopharm	Inactivated	Inactivated	2	0, 14 0, 21
Moderna/NIAID	RNA	LNP-encapsulated mRNA	2	0, 28
BioNTech/Fosun Pharma/Pfizer	RNA	3 LNP-mRNAs	2	0, 28

respiratory disease (VAERD), which is a distinct clinical syndrome that occurred in the 1960s in young children given whole-inactivated virus vaccines for measles and respiratory syncytial virus (RSV), should be avoided. Safety is a primary goal for vaccines that are given to otherwise healthy people, and it should in no way be compromised.[5]

Unlike the early days of vaccinology, where vaccines only consisted of crude pathogen extracts or inactivated pathogens, there are many new strategies for vaccination. Table 1 shows the advantages and disadvantages of the main vaccine groups: genetic vaccines, viral vectors, protein-based, and whole virus vaccines.

Thirty-eight candidate vaccines are currently undergoing clinical evaluation, of which eight are in Phase III trials (Table 2). Among those with the greatest potential for speed are DNA- and RNA-based platforms, followed by recombinant subunit vaccines. RNA and DNA vaccines can be produced quickly as they use synthetic processes instead of cultures or fermentation. (WHO, September 2020)

Updates from the US

There are three entities with distinct roles working in the COVID-19 Response: Operation Warp Speed (OWS), Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV), COVID-19 Prevention Network (CoVPN).

OWS is a partnership with components of the Department of Health and Human Services (HHS), including the Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA), the National Institutes of Health (NIH), the Biomedical Advanced Research and Development Authority (BARDA), and the Department of Defense (DoD). The DoD also collaborates with private firms and other federal agencies to coordinate the HHS-wide efforts, including the NIH's Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV). As part of a comprehensive strategy to accelerate the development of countermeasures, OWS allocates resources and aims to deliver 300 million doses of a safe and effective vaccine for COVID-19 by January 2021. (HHS.gov). The candidates from Moderna, AstraZeneca, Novavax, Janssen, and Sanofi/GSK are supported by OWS. While ACTIV is an NIH established public-private partnership to coordinate the COVID-19 response, the COVID-19 Prevention Network consists of NIH Funded networks for Phase III trials execution.

Moderna-NIAID Collaboration: **Moderna mRNA-1273**, a vaccine candidate developed by Moderna and NIAID is a novel lipid nanoparticle (LNP) encapsulated nucleoside-modified messenger RNA (mRNA)-based vaccine that encodes for a full-length, prefusion stabilized spike (S) protein of SARS-CoV-2. Nonreplicating RNA genetic material is mixed with LNP formulation. More than 1500 injections of the Moderna's RNA formulations have been administered for Zika, RSV, CMV, Chikungunya viruses in other phase I and II clinical trials and were mostly well-tolerated.6 The lead scientist on the development of mRNA-1273 is Dr. Kizzmekia S. Corbett, an NIH Vaccine Research Center fellow, who had been working on assessing and improving the immunogenicity of novel vaccine platforms for coronaviruses and influenza prior to the pandemic. For instance, on the structure of stabilized coronavirus spike protein, its interactions with ACE2 and its conformational state.[7] As the scientific lead of the Coronavirus Vaccines & Immunopathogenesis (coVip) team, and relatively early in her career, she and her team are at the heart of the vaccine response efforts and when the fastest progress ever is awaited.

Phase I, an open label randomized (no placebo arm) trial begun on March 16, enrolled adults 18-55; 56-70 and 71+ years and older; two doses of 25/50/100/250 mcg were given 28 days apart to assess safety, reactogenicity and immunogenicity. The promising preliminary data showed good safety and immunogenicity profile, which allowed the administration of the safe and immunogen dosage of 100-μg in phase III within a double-blind placebo-controlled efficacy trial to n= 30000 volunteers ages 18 and older, in two doses given 28 days apart to assess whether mRNA 1273 can prevent COVID. The enrolment started on July 27 and is ongoing and is estimated to be completed by October 2022.8 The biggest question remains when final results proving mRNA-1273 is efficacious in preventing COVID-19 will be available and when an emergency use authorization will be granted.

The Janssen Ad26COVS1 non-replicating viral vector vaccine has demonstrated excellent protection in nonhuman primate models and began its US phase I trial on July 27; Phase II recruitment is still ongoing, and the recruitment for phase III, which started on September 21 should enroll up to 60,000 healthy volunteers ages 18 and older. (Clinicaltrials.gov). Novavax completed the phase I trial of SARS-CoV-2 rS/Matrix-M1 Adjuvant, its recombinant-subunit-adjuvanted protein vaccine in Australia and phase II is ongoing. Sanofi/GSK has begun a phase I/II trial of its SARS-CoV-2 Recombinant protein vaccine formulations (with or without adjuvant) in early September and is recruiting at multiple locations in the US. (Clinicaltrials.gov)

The host of trials are evolving rapidly, and the global community is anticipating updates on the multiple vaccine candidates.

Updates from Russia

Between June 18 and August 03, 2020, 76 participants divided into two studies, each n=38 have been enrolled in phase 1 and 2 non-randomized trials assessing the safety and immunogenicity of a recombinant adenovirus rAd26 and rAd5 vector-based heterologous prime-boost COVID-19 vaccine in two formulations Gam-COVID-Vac (NCT04436471) and Gam-COVID-Vac-Lyo (NCT04437875). (Clinicaltrials.gov). Preliminary results were published, described a good safety profile and strong humoral and cellular immune responses in participants. However, to assess the effectiveness of this vaccine COVID-19 prevention, a large scale phase III trial with further investigation is needed.[9] On August 11, 2020, the news of the approval of this vaccine candidate developed by the Gamaleya National Center of Epidemiology and Microbiology (Moscow, Russia) by Russia as first vaccine against SARS-CoV-2 spread all over the world and raised a controversy based on an emergency use authorization prior to Phase III results.[10]

Updates from China

CoronaVac, an inactivated vaccine made by the private Chinese company **Sinovac Biotech** which Phase I/II trials with 743 volunteers found good safety and immunogenicity, had a Phase III trial launched in Brazil in July and in Indonesia in August. It is reported that the Chinese government granted the Sinovac vaccine an emergency approval for limited use in July. (The New York times)

Updates from the UK

On September 09, 2020 AstraZeneca announced the suspension of its Phase III Covid-19 trial of the vaccine candidate **ChAdOx1-S** being developed by AstraZeneca and the University of Oxford, which rolled out globally and with 62 sites across the United States of America (USA). This suspension followed a suspected serious adverse reaction in a participant in the United Kingdom in the form of neurological symptoms consistent with transverse myelitis, a rare but serious spinal inflammatory disorder, necessitating a review of safety data by an independent committee. (Nature September 2020). This vaccine candidate is one of the nine vaccines in the final, Phase III and AstraZeneca began its Phase III trial in the US in late August in 62 sites according to clinicaltrials.gov. Phase II/III trials were previously started in the UK, Brazil, and South Africa. The hold has been lifted, and the phase III trial has resumed. This case highlights the importance of awaiting and monitoring the results of large, appropriately designed trials to evaluate safety before vaccine approval.

The general safety evaluation of COVID-19 vaccines, including the size of the safety database to support vaccine licensure, should be no different than for other preventive vaccines for infectious diseases. (Development and Licensure of Vaccines to Prevent COVID-19 Guidance for Industry JUNE 2020). In fact, adverse events in a clinical trial of an investigational vaccine must be recorded and monitored and, when appropriate reported to FDA (for the USA) and others involved such as sponsors, IRBs, and investigators. In 21 CFR 312.32, 312.33, 312.50, 312.55, 312.56, 312.60, 312.62, 312.64, 312.66, the FDA provides guidance for sponsors, monitors, and investigators of

vaccine trials, with recommendations on assessing the severity of clinical and laboratory abnormalities in healthy adult and adolescent volunteers enrolled in clinical trials. A grading assist in defining a study's stopping rule or contribute to evaluating safety by identifying parameters to focus upon in subsequent product development. (FDA June 2020). The Data Safety and Monitoring Board (DSMB) responsible for each of the Phase III trials, is tasked with reviewing blinded data and stopping rules that are defined ahead of time for both futility and for overwhelming efficacy. Once a vaccine has been approved, the logistical operations become the main obstacle to be surmounted to guarantee worldwide distribution in a harmonized and efficient fashion for manufacturing, supply chain distribution, storage etc.

While the whole world is waiting for a breakthrough, there are several other additional components that scientists must carefully assess in the vaccine development such as adjuvants.

Adjuvants

Many, but not all, vaccines contain a powerful secondary component in addition to the pathogen antigen: adjuvants. Adjuvants are chemical or biological compounds that can be used to improve the magnitude and durability of antibody responses, influence T cell-derived cytokine patterns, and modulate immune responses in ways that an antigen alone cannot. However, due to this ability to influence the immune system, safety concerns have been raised regarding some adjuvants.[11] The risk that vaccination could make subsequent SARS-CoV-2 infection more severe is real. It has occurred in the past with vaccines based on whole-inactivated virus formulated in alum for a coronavirus of cats and for another distinct respiratory virus in children.[5] Some researchers argue that aluminum hydroxide has the most accessible adjuvant great potential in favor of rapid vaccine development and would be safe.[12] Should adjuvants be required to cause an adequate immune response, or for dose sparing, those triggering a Th1 response and demonstrating a high neutralizing-antibody response are theoretically more likely to be protective and avoid the risk of immunopathology. However, a careful regulatory review would be needed in all cases. Vaccines candidates such as SARS-CoV-2 rS/Matrix-M1 Adjuvant are adjuvanted, and for mRNA-1273, the lipid nanoparticle plays the role of an adjuvant.

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Researchers still have more questions to elucidate about SARS-CoV-2, and the question of mutations in circulating SARS-CoV-2 viruses is increasingly discussed.[13]

Mutations

Of interest is the spike protein since it is the primary virulence factor of the virus. While spike variant D614 was the most prevalent early in the outbreak, there appears to be a shift toward variant G614. Studies suggest that the G614 variant may have a fitness advantage and is more infectious in laboratory settings, but it remains unconfirmed whether viral spread is naturally increased in the wild. Current evidence says that the G614 variant does not cause more severe disease and is not any deadlier than D614.[14] Since treatment options do not specifically target the spike protein, treating patients should not be any different between the variants. More importantly, recent studies suggest that this specific spike mutation does not change the confirmation of the RBD to the point where current vaccines under development would be ineffective (Microbial Instincts July 2020).

Final thoughts

A safe and efficacious vaccine remains the most promising mean to sustainably end the current COVID-19 pandemic.

Vaccine efficacy in under-represented and vulnerable populations also remains an issue as most vaccine trials have focused on healthy people between the ages of 18–65 years, excluding populations such as the elderlies, pregnant women, and children. In the wake of the flu season, many challenges are anticipated. One would be the difficulty to differentiate between COVID-19 and flu symptoms, and therefore raises the issue of widespread testing. Despite efforts in fast-tracking vaccine development, completion dates for early clinical trials are estimated to be late 2020 to mid-2021, and it may still take longer before a vaccine is licensed for use globally.

The race to a COVID-19 vaccine requires an unprecedented effort from the scientific community working at "Warp speed" and encounters several challenges. To date, there are eight "finalists" candidates in Phase III, but safety and efficacy should not be compromised to prioritize speed to obtain a vaccine within the next few months. In this uncertain and life-changing time, where the whole world is grieving, the global economy has been paralyzed, mental health issues are escalating, the power of a hug is more than ever understood. The global community is desperate for HOPE, for a life-saving breakthrough. In the meantime, before a safe and efficacious vaccine is discovered, the application of good old public health measure, in the form of social distancing and mask-wearing remains crucial and our best preventive method.

References

1. Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet. 2020;395 (10224):565-574.

2. Lurie N, Saville M, Hatchett R, Halton J. Developing Covid-19 Vaccines at Pandemic Speed. N Engl J Med. 2020;382(21):1969-1973.

3. Machhi J, Herskovitz J, Senan AM, et al. The Natural History, Pathobiology, and Clinical Manifestations of SARS-CoV-2 Infections. J Neuroimmune Pharmacol. 2020:1-28.

4. Karthik K, Senthilkumar TMA, Udhayavel S, Raj GD. Role of antibody-dependent enhancement (ADE) in the virulence of SARS-CoV-2 and its mitigation strategies for the development of vaccines and immunotherapies to counter COVID-19. Hum Vaccin Immunother. 2020:1-6.

5. Graham BS. Rapid COVID-19 vaccine development. Science. 2020;368(6494):945-946.

6. Funk CD, Laferrière C, Ardakani A. A Snapshot of the Global Race for Vaccines Targeting SARS-CoV-2 and the COVID-19 Pandemic. Front Pharmacol. 2020;11:937.

7. Kirchdoerfer RN, Wang N, Pallesen J, et al. Stabilized coronavirus spikes are resistant to conformational changes induced by receptor recognition or proteolysis. Sci Rep. 2018;8(1):15701.

8. Jackson LA, Anderson EJ, Rouphael NG, et al. An mRNA Vaccine against SARS-CoV-2 - Preliminary Report. N Engl J Med. 2020.

9. Logunov DY, Dolzhikova IV, Zubkova OV, et al. Safety and immunogenicity of an rAd26 and rAd5 vector-based heterologous prime-boost COVID-19 vaccine in two formulations: two open, non-randomised phase 1/2 studies from Russia. Lancet. 2020.

10. Burki TK. The Russian vaccine for COVID-19. The Lancet Respiratory Medicine.

11. Souza CK, Rajão DS, Sandbulte MR, et al. The type of adjuvant in whole inactivated influenza a virus vaccines impacts vaccine-associated enhanced respiratory disease. Vaccine. 2018;36(41):6103-6110.

12. Peng S, Cao F, Xia Y, et al. Particulate Alum via Pickering Emulsion for an Enhanced COVID-19 Vaccine Adjuvant. Adv Mater. 2020:e2004210.

13. Kim SJ, Nguyen VG, Park YH, Park BK, Chung HC. A Novel Synonymous Mutation of SARS-CoV-2: Is This Possible to Affect Their Antigenicity and Immunogenicity? Vaccines (Basel). 2020;8(2).

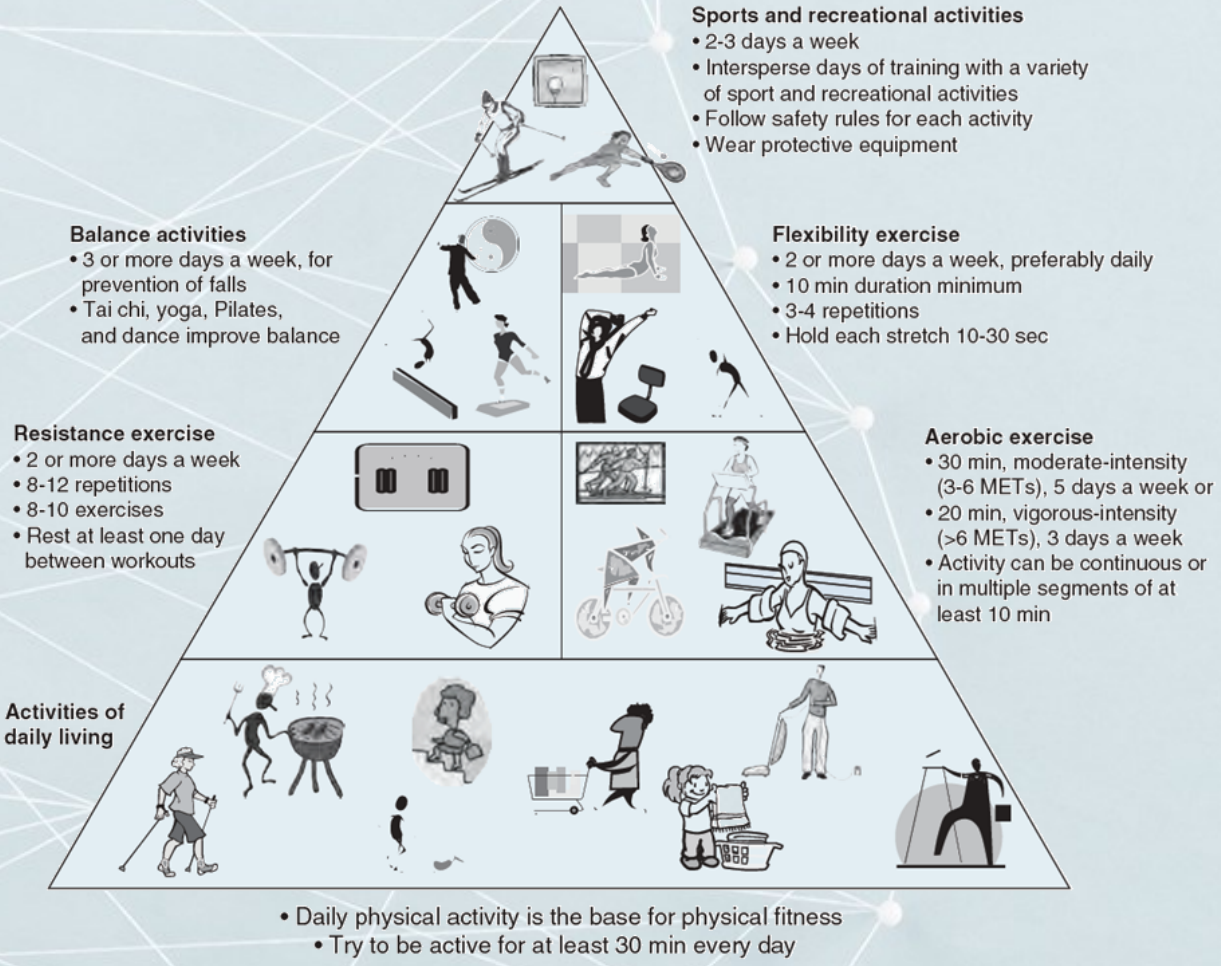
14. Korber B, Fischer WM, Gnanakaran S, et al. Tracking Changes in SARS-CoV-2 Spike: Evidence that D614G Increases Infectivity of the COVID-19 Virus. Cell. 2020;182(4):812-827.e819.

INA-RESPOND Newsletter

PROTECT YOUR MENTAL HEALTH

By: Caleb Leonardo Halim

The COVID-19 pandemic has hit the world for approximately half a year, and many new medical problems have emerged in the world community, ranging from increasing rates of obesity and sedentary behavior to various psychological and psychiatric issues. Fear, worry, and stress are overwhelming people throughout the world. The uncertainty of the pandemic and economic situation has left many people with stress, anxiety, and depression; some even lead to suicide. In Indonesia, this pandemic is ongoing, and only little signs of improvement are showing. Measures to reduce the spread of SARS-COV-2 virus infection like working from home and large scale social restrictions policies have been implemented. However, coupled with the increasing amount of negative or false news spread in social media like Whatsapp groups, which often cause stress without us realizing, various psychological and mental disorders start to occur. The anxiety and pressures during this pandemic can result in sleep/eating disorders, difficulty in concentration, worsening chronic health problems, substances use like alcohol, tobacco, etc.[1]



Adapted, by permission, from "Exercise and Activity Pyramid" Metropolitan Life Insurance Company, 1995.[5]

To manage our stress level, we need to avoid/reduce these stressors. Also, some exercises have been proven effective in reducing psychological symptoms and mental disorders. We have often heard about the many benefits of exercise for our body. It turns out it also has tremendous benefits for our mental health. Studies have proven that physical exercise has an impact on the hormonal system and neurotransmitters in our brain. For example, a low-intensity to high-intensity aerobic exercise gives positive effects when done from 20 to 120 minutes. Physical activity stimulates the brain to produce neurotransmitters and hormones such as Brain -Derived Neurotrophic Factor (BDNF), serotonin, dopamine, and endorphin. With these mechanisms, exercise can improve cognitive function, improve mood, and reduce stress. However, this effect only lasts a few hours to 24 hours. Therefore, it is highly recommended to do exercise every day.[2] In addition to aerobic exercise, resistance training also has a positive effect on our mental health. Although the mechanism is not yet clear, it is suspected that resistance training affects the central nervous system to produce neurotransmitters that have a positive impact on mental health. In one psychology study in the United States, resistance training has an anxiolytic effect, so it is useful for maintaining our mental state. The recommendation for resistance exercise is low to moderate intensity (<70% 1RM).[3] Strengthen your body, strengthen your mind. Apart from the two previous types of exercise, flexibility training also provides positive benefits for our mental health. One way is to do stretching. Stretching is known to improve blood circulation in the body and brain. Stretching can also relax our bodies and restore awareness of our mind. Amid our work, most of which are sitting in front of a computer screen, stretching is crucial. Do it several times a day every day. Stretch your body, stretch your mind.[4]

Doing regular exercise, according to recommendations, should also be able to improve our overall physical fitness. Good physical fitness has a protective effect on psychological and psychiatric problems. Therefore, when we do physical exercise, don't just do the exercise but also do it properly. By doing exercises properly, over time, our physical fitness will also improve. Doing exercises/sports in the era of the COVID-19 pandemic will be quite challenging and require our creativity. All existing recommendations suggest that you keep exercise at home. For aerobic exercises, you can follow many video tutorials on the internet, or you can do the treadmill, ergo cycle, or rope jumping if available. Resistance exercises can use dumbbells/barbells if you have them, but if you don't have, you can do calisthenics exercise using your body weight. There are lots of instructions available on the internet. Tutorial flexibility exercises are also numerous on the internet for us to follow according to our abilities. We can start from simple stretching like the ones in yoga, and increase the level according to our wishes and abilities. There is no reason for us not to exercise even while we are at home. However, if we are compelled to do exercise/ sport outside the home and together with people who are not from our house, the health protocol for maintaining a safe distance and the use of mask must always be applied. Of course, the intensity of the exercise we do cannot be as high as when we exercise without wearing a mask, but wearing a mask is the safest way to be able to do exercise and also avoid COVID-19 infection.

Take home message; there is not much we can do to help solve this COVID-19 pandemic. However, by maintaining the health protocols provided by the government and maintaining our health, physical fitness, and mental health every day, we are participating in eradicating the COVID-19 pandemic.

Reference

1. Czeisler ME, Lane RI, Petrosky E, et al. Mental Health, Substance Use, and Suicidal Ideation During the COVID-19 Pandemic. 2020

2. Basso JC, Suzuki WA. The Effects of Acute Exercise on Mood, Cognition, Neurophysiology, and Neurochemical Pathways: A Review. Brain Plast. 2017;2:127-152.

3. Strickland JC, Smith MA. The anxiolytic effects of resistance exercise. Front Psychol. 2014;5:753.

4. Kwok JYY, Kwan JCY, Auyeung M, et al. Effects of Mindfulness Yoga vs Stretching and Resistance Training Exercises on Anxiety and Depression for People With Parkinson Disease: A Randomized Clinical Trial. JAMA Neurol. 2019;76:755–763.

5. Heyward, Vivian H. Advanced Fitness Assessment and Exercise Prescription. Champaign, IL: Human Kinetics, 7th Edition

INA-RESPOND Newsletter

[ALMOST] A SILVER BULLET CALLED A BALANCED DIET

By: Aly Diana

COMIC CORNER

Source: https://www.magzter.com/article/Business/Farmers-Weekly/What-Covid-19-Has-Taught-Us-About-Food-Security

First of all, this is not a review paper, so please don't expect more than a summary of a very complex interaction between nutrition and immune functions. At this specific time in our life (because of the pandemic), immunity seems to be more important than ever. People pay more attention (and more money) to improve their immunity. It has been well demonstrated that nutrients having key roles in supporting the human immune system and reducing the risk of infections. However, more and more inaccuracies related to the immune-boosting powers of certain nutrients or supplements circulate, leading to a lot of confusion. On the other side, it might make us spend more money than we would like on something that seems to give no extra protection.

To start, let's discuss the immune system and some nutrients that affect it. Again, only in brief, very brief actually. We should know that the immune system is always active, carrying out surveillance. To support the surveillance, we need all nutrients, mainly energy-yielding substrates (glucose, amino acids, and fatty acids) and a number of vitamins (A, B6, B12, folate, C, D, and E) and trace elements (zinc, copper, selenium, iron). Each of the nutrients named above has roles in supporting the antibacterial and antiviral defense. The highlight is we need to be well-prepared before we get infected. It would seem prudent for individuals to consume sufficient amounts of essential nutrients to support their immune system to help them deal with pathogens should they become infected.

During infection, the heightened immune activity is accompanied by an increased rate of metabolism, which requires additional energy sources, substrates for biosynthesis and regulatory molecules, which are all ultimately derived from the diet. Activation of the immune response induces the production of lipid-derived mediators such as prostaglandins and leukotrienes and many different types of protein, including immunoglobulins,

chemokines, cytokines, cytokine receptors, adhesion molecules, and acute-phase proteins. Amino acids (e.g., arginine) are precursors for the synthesis of polyamines, which have roles in the regulation of DNA replication and cell division. This requires the availability of the substrate fatty acids and amino acids, respectively.

In addition, various micronutrients (e.g., iron, folate, zinc, magnesium) are also involved in nucleotide and nucleic acid synthesis. Some nutrients, such as vitamins A and D, and their metabolites are direct regulators of gene expression in immune cells and play a key role in the maturation, differentiation, and responsiveness of immune cells. Creation of a pro-oxidant environment through the generation of damaging reactive oxygen species is one element of innate immunity; the host needs protection against these through classic antioxidant vitamins (vitamins C and E) and the antioxidant enzymes (superoxide dismutase, catalase, and glutathione peroxidase); the latter requires manganese, copper, zinc, iron, and selenium.

Thus, the roles for nutrients in supporting the function of the immune system are many and varied, and it is easy to appreciate that an adequate and balanced supply of these is essential if an appropriate immune response is to be mounted. In essence, GOOD NUTRITION creates an environment in which the immune system can respond appropriately to challenge, irrespective of the nature of the challenge. Conversely, poor nutrition creates an environment in which the immune system cannot respond well. Cherry-picking certain nutrition as an immune booster will not help if the other components are not available inside our body. Therefore, the main message here is, please eat a BALANCED DIET, which consists of all nutrients mentioned above. One type of food is less likely to provide all nutrients, so eating various plant and animal foods with various colors become important to fulfill the nutrition requirements.

However, that's true there are certain populations and situations in which one cannot always eat a variety of nutritious foods, or who have increased nutrient needs. In these cases, a vitamin and mineral supplement may help to fill nutritional gaps. Studies have shown that vitamin supplementation can improve immune responses in these groups. Low-income households, elderly, pregnant and lactating women, infants and toddlers, and the critically ill are examples of groups at risk.

A general multivitamin/mineral supplement providing the recommended dietary allowances (RDA) may be used in these cases. Megadose supplements (many times the RDA) do not appear justified, and can sometimes be harmful or even suppress the immune system (e.g., as with zinc). Remember that vitamin supplements should not be considered a substitute for a good diet because no supplements contain all the benefits of healthful foods.

We all know, an ultimate silver bullet doesn't exist. Try to eat as healthy as possible, various combinations of foods, enough carbohydrates, animal/plant proteins, vegetables, and fruits. If you can keep a healthy balanced diet, most likely, multivitamin/mineral supplements are not necessary. Megadose supplements need to be avoided most of the time, especially without a doctor's prescription/recommendation. And yes, to support a healthy immune system, we need more than only good nutrition, but it is certainly a very strong foundation.

References:

Childs CE, Calder PC, Miles EA. Diet and Immune Function. Nutrients. 2019 Aug 16;11(8).

Harvard T.H. Chan School of Public Health. Nutrition and Immunity. https://www.hsph.harvard.edu/nutritionsource/nutrition-and-immunity/

Calder PC. Nutrition, Immunity and COVID-19. BMJ Nutrition, Prevention & Health 2020;0. doi:10.1136/ bmjnph-2020-000085.

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