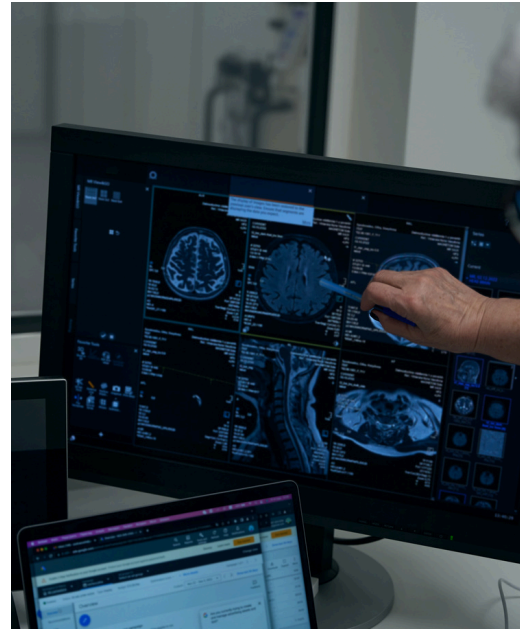


CROSSROADS

THE OFFICIAL NEWSLETTER OF THE PREMED SCENE



Dear medical newsletter readers,

Happy September! Today, we bring to you the most recent news in medical research! This month is Blood Cancer Awareness Month. Mahima Bhat is this month's Rising Stars in Medicine writer, talking about Dr. Bana Jabri and her work as a pediatric gastroenterologist. Mahima Bhat also talks about the benefits and risks of ice baths. Then, Siri Nikku elaborates on the connection between asthma and eczema. Finally, Ashby Glover ends by sharing exciting research about non-canonical amino acids.

Please enjoy reading The Premed Scene's September 2024 Medical Newsletter!

Alana Saidou

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Blood Cancer Awareness Month

BY ILANA SAIDOV

september is

Blood Cancer AWARENESS MONTH



In a groundbreaking study released by the Department of Biomedicine at the University of Basel, researchers have unveiled an innovative approach to treating blood cancers, particularly leukemia. This new therapy, which combines targeted cell deletion with the reconstitution of healthy blood stem cells, presents a promising alternative to traditional treatments. As the medical community continues to seek more effective therapies, this advancement could represent a significant milestone in the fight against blood cancers.

Blood cancers, including leukemia, have long been a formidable challenge for healthcare professionals and patients alike. Traditional treatments such as chemotherapy and radiation often cause severe side effects, as they target both cancerous and healthy cells. This can lead to many complications and a diminished quality of life for patients.

The researchers at the University of Basel have taken a different route. Their method involves 'deleting' the affected blood system—essentially targeting and eliminating the malignant cells—while introducing healthy donor blood stem cells to rebuild a functional blood system. This approach aims to ensure that the patient's body can restore healthy blood cell production without the harsh repercussions associated with conventional therapies.

As researchers continue to explore the potential of this gentler cell therapy, the implications for future treatments are vast. This approach could pave the way for more personalized and targeted therapies that minimize side effects and improve success rates. Moreover, it opens avenues for further research into similar strategies for other types of cancers, potentially transforming the landscape of oncological care.

Source:

University of Basel. "Gentler cell therapies for blood cancer." ScienceDaily. ScienceDaily, 22 May 2024. <www.sciencedaily.com/releases/2024/05/240522130437.htm>.

Rising Stars in Medicine: *Dr. Bana Jabri*

BY MAHIMA BHAT

Pediatric gastroenterologist Dr. Bana Jabri is a specialist in mucosal and innate immunity. Her professional interests have included autoimmune diseases, inflammatory bowel disease, and celiac disease. The William K. Warren, Jr. Prize for Excellence in Celiac Disease Research was given to her in 2009. Dr. Jabri is well-versed in human immunology, particularly in planning and executing investigations involving tissue samples from the intestines. Recently, she has been working on creating mouse models that replicate significant elements of immunological dysregulation observed in individuals suffering from inflammatory bowel diseases.



Dr. Jabri uses models from humans and mice to discover critical immunological pathways implicated in the onset and progression of autoimmune illnesses and intestinal inflammatory disorders. As the head of the research team at The University of Chicago Celiac Disease Center since 1999, Dr. Jabri is among the world's leading experts on celiac disease. Under her leadership, the research team at the University of Chicago Celiac Disease Center and the celiac disease community keep making significant progress in figuring out what causes the atypical sensitivity to gluten in celiac disease and are pursuing a solution.

Some of her publications include new insights on genes, gluten, and immunopathogenesis of celiac disease, restoring tolerance with antigen delivery, and the gut protist *Tritrichomonas Arnold* (regarding virus-mediated loss of oral tolerance).

Sources:

<https://immunology.uchicago.edu/faculty/bana-jabri-md-phd>

https://www.prweb.com/releases/renowned_celiac_researcher_bana_jabri_to_join_bioniz_s_scientific_advisory_board/prweb13058074.htm

Benefits and Risks of Ice Baths

BY: MAHIMA BHAT

An ice bath involves immersing your body in ice water for about 5-15 minutes. It's a type of cryotherapy, which is exposing your body to frigid temperatures for a short time. People have used ice baths for centuries because of their possible therapeutic health benefits.

Benefits:

- Relieves pain: the coldness narrows blood vessels and sends electrical impulses to the brain that have a pain-reducing effect.
- Reduces muscle soreness and improves muscle memory.
- Boosts mood and alertness, and improves self-esteem.

Risks:

- Cold-induced rash
- Low body temperature
- Cold shock response/ice burns
- Nerve damage
- Raynaud's Syndrome (cold and stress narrow the blood vessels, which restricts blood flow and may cause tissue death if submerged longer than 15 minutes).

Warning Signs:

- Excessive shivering and numbness
- Exhaustion or lethargy
- Confusion and slurred speech

Source:

<https://www.health.com/ice-baths-8404207>





The Connection Between Asthma and Eczema

BY SIRI NIKKU

A strong correlation has been noticed between having eczema as a child and then getting asthma as an adult. Early allergen exposure and specific genes are possible contributions. Asthma and eczema, connected to inflammation, are usually caused by a reaction to environmental allergies. Even more, about 50% of people with eczema report having asthma, allergic rhinitis, or food allergies. One study revealed that babies who have eczema in the first years of life have a higher chance of developing asthma and rhinitis within the next five years compared to those without infant eczema. Eczema can be defined as skin inflammation caused by an environmental allergen, usually passed down through genes. Specifically, inheriting the filaggrin gene mutation results in a more “leaky” skin barrier, allowing more allergens into the body and more moisture to leave. This combination leads to dry and irritated skin.

Pollen, dander, and dust mites also contain enzymes that can weaken the skin barrier. An immune response to environmental allergens causes wheezing, coughing, and chest tightness symptoms from asthma. Inflammation of these allergens can lead to airways shrinking, making it harder to breathe. Pinpointing a singular cause for asthma is complicated and can vary from person to person. Environmental allergens are a commonality between eczema and asthma, so allergic reactions can occur when the body overreacts to a benign substance. This can result in increased inflammation. The immune system will release histamines to deal with these allergens, leading to nasal discharge and congestion, itchy and watery eyes, hives, and skin rashes. Allergies can cause immune responses in individuals with inhaling allergens to trigger eczema and asthma. Studies have indicated that developing eczema from being in contact with environmental allergens can decrease lung function. There are also shared triggers between eczema and asthma, such as cold or dry air, stress, infections, and exposure to irritants in the air or items like detergents. Some methods to combat these conditions include keeping pets out of the bedroom, changing bedsheets weekly, and vacuuming carpets and rugs weekly.

Source: <https://www.healthline.com/health/severe-asthma/asthma-and-eczema>

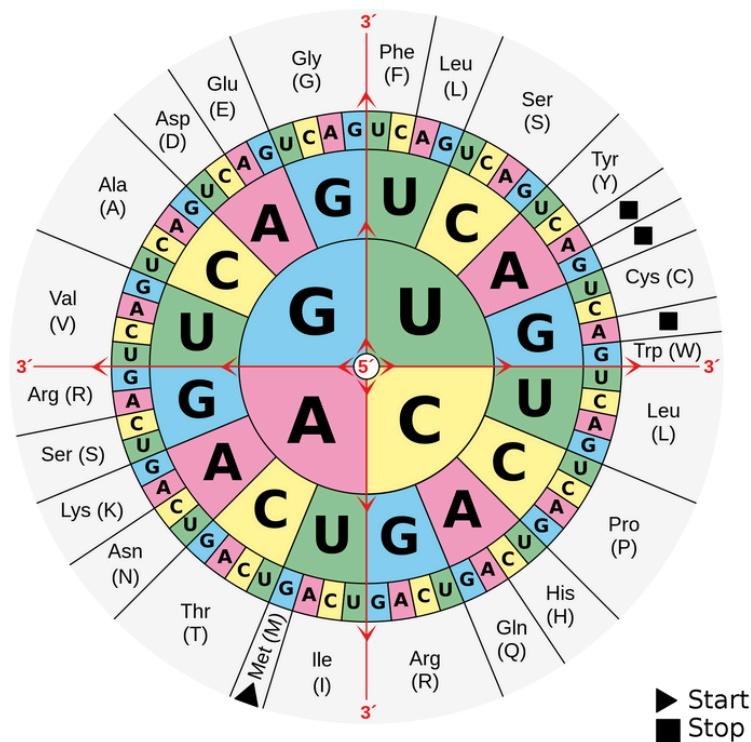
Four-Nucleotide Codon Expands Potential for ncAAs

BY ASHBY GLOVER

Non-canonical amino acids (ncAAs) are a unique class of amino acids widely found in nature but not incorporated into natural proteins.(1) Proteins are usually composed of 20 different amino acids. But for researchers trying to make biologic molecules with new functions, the 20 basic blocks can be limiting. Recent research has focused on developing ways to put new building blocks, the non-canonical amino acids, into proteins.

The first method researchers explored was to reassign a codon. RNA is made of nucleotides, and every three nucleotides is called a codon. Each codon codes for one amino acid. However, each amino acid may correspond to more than one possible codon. For example, in RNA, the sequence UAU and UAC both code for the amino acid tyrosine. Researchers tried a method where they linked one of those duplicates to a ncAA, as in UAU would correspond to a new amino acid, while UAC would still code for tyrosine. However, this method was incredibly challenging, because the researchers would have to comb through the entire genome, making sure that each instance of UAU, originally for tyrosine, would be changed to UAC, so that the new ncAA would not be integrated in unintended places. (2)

How could researchers get around this fundamental difficulty of working with the three-nucleotide codon? They needed a “plug-and-play” strategy, one where researchers would be able to only incorporate the chosen ncAA in specific places without having to edit the entire genome.(2) If the options for a three-nucleotide codon were limited, what if they could add another nucleotide to the code for ncAAs?



One research team took inspiration from certain bacteria who have naturally evolved four-nucleotide codons, studying what made those cells recognize a four-nucleotide codon. They successfully replicated the process, allowing them to code 12 different four-nucleotide codons and designing more than 100 new cyclic peptides (similar to small bioactive molecules in nature), each with up to three ncAAs.(2)

These results suggest that the four-nucleotide codon can be used to easily and effectively incorporate ncAAs into many different proteins.(2) In modern biotechnology, ncAAs can be incorporated into peptides, proteins, and enzymes to improve their function and performance in comparison to their natural counterparts.(3) This four-nucleotide codon innovation opens up many new avenues of research in synthetic protein creation and applications for medicine, manufacturing, and chemical sensing.(2)

1. <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/non-canonical-amino-acids>
2. <https://www.scripps.edu/news-and-events/press-room/2024/2024911-badran-rna-nucleotides.html>
3. <https://doi.org/10.1016/j.biotechadv.2018.07.008>