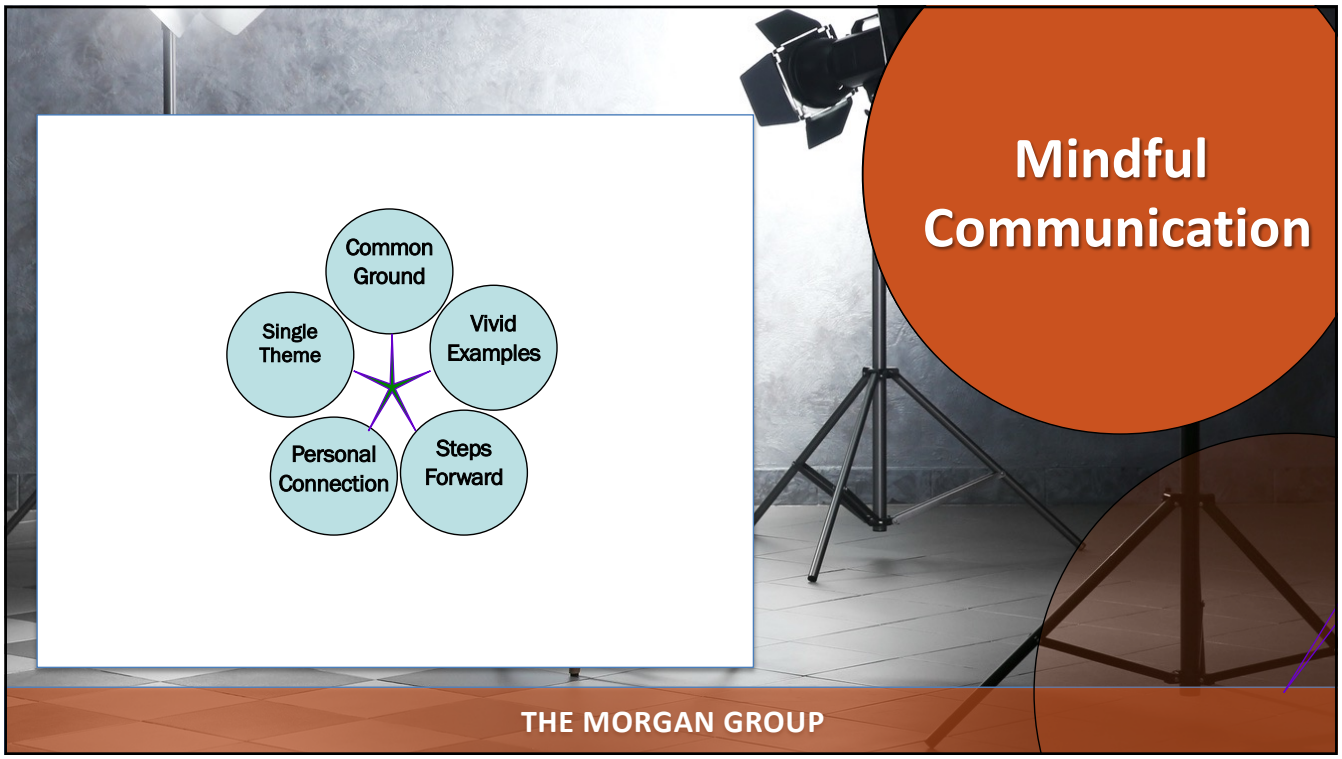
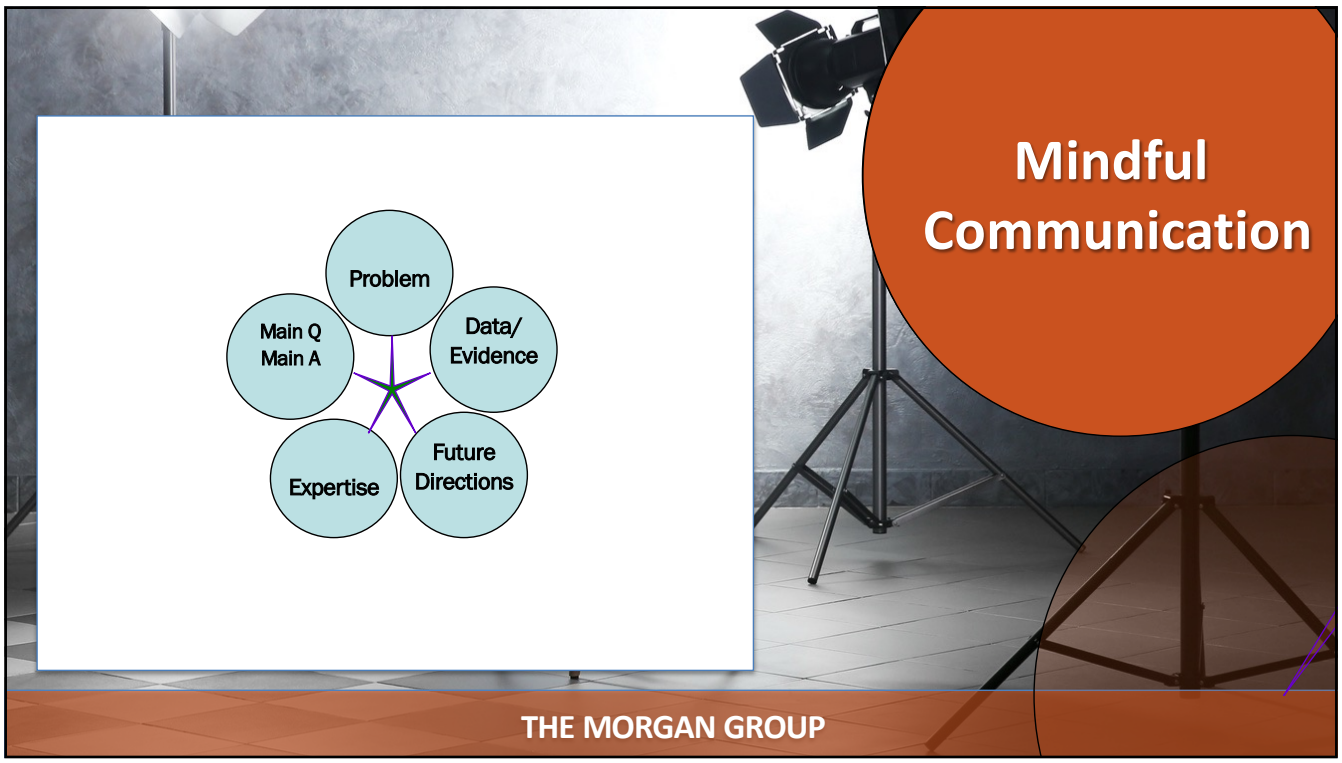

Speaking about Science:
Three Minute Talks
Scott Morgan
THE MORGAN GROUP

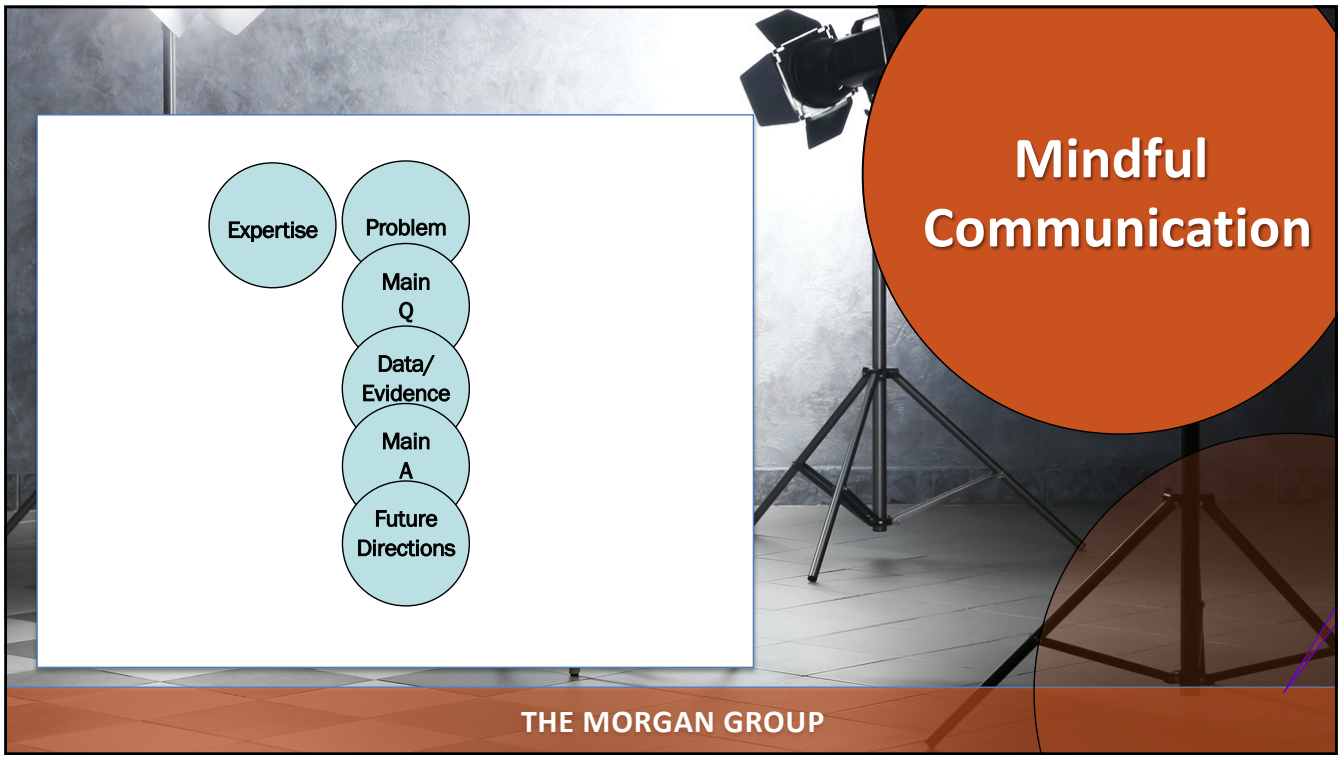
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Common Ground
Vivid Examples
Steps Forward
Personal Connection
Single Theme
Mindful Communication
THE MORGAN GROUP

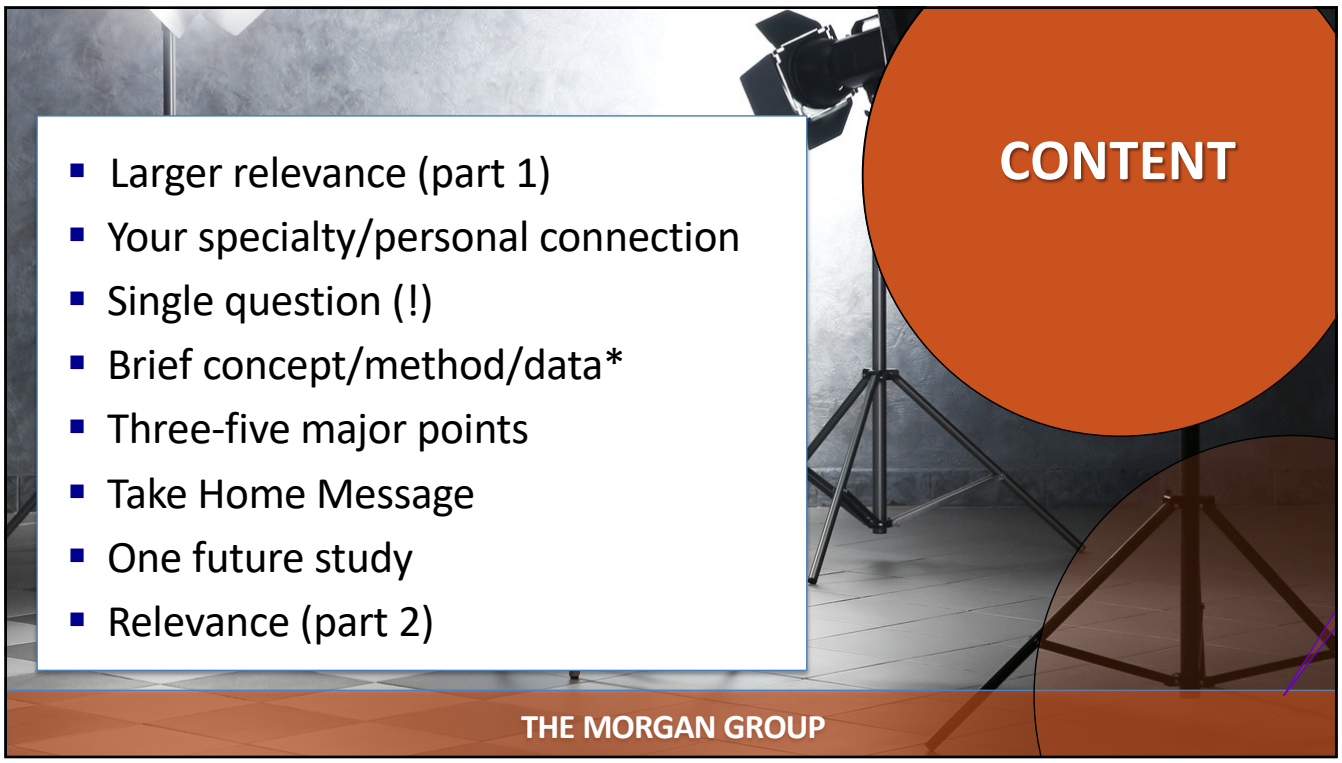
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Problem
Main Q
Main A
Data/
Evidence
Expertise
Future
Directions
Mindful
Communication
THE MORGAN GROUP

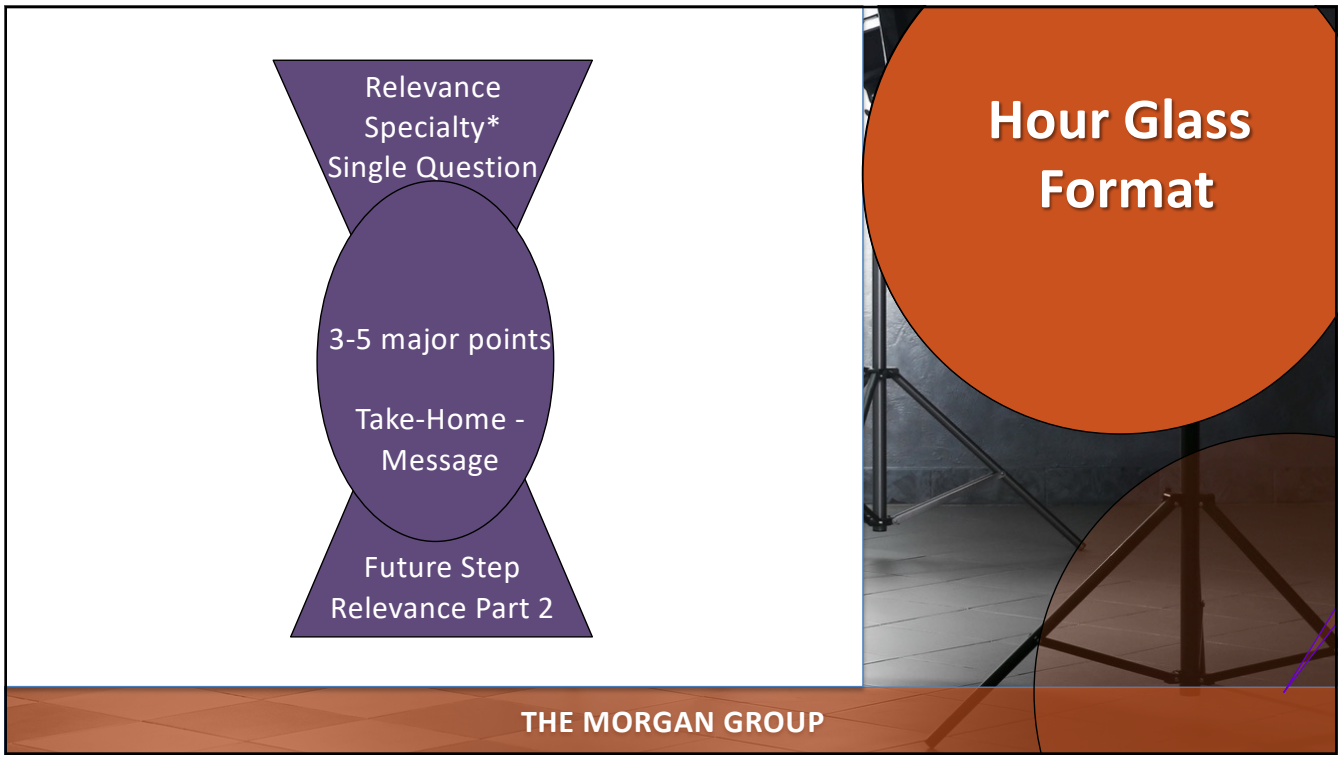
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Expertise
Problem
Main
Q
Data/
Evidence
Main
A
Future
Directions
Mindful
Communication
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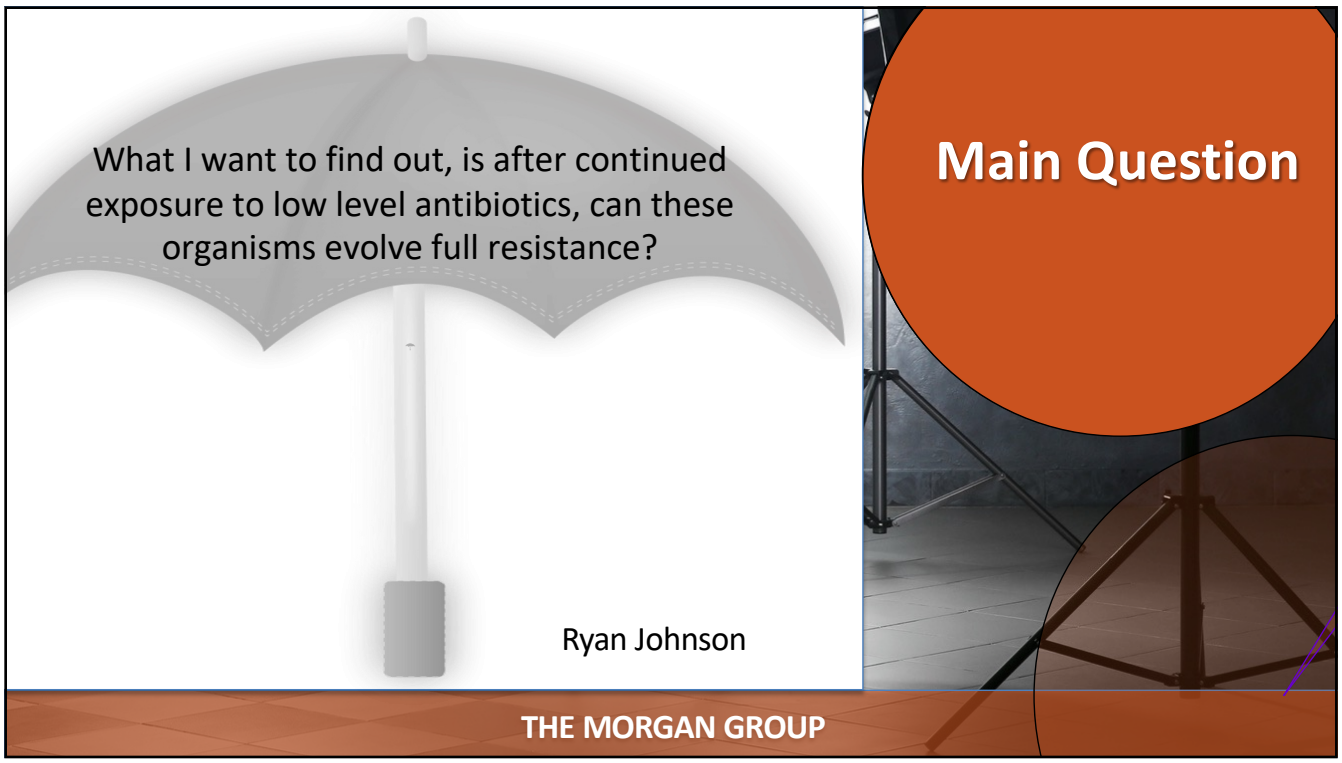
4


CONTENT
Larger relevance (part 1)
Your specialty/personal connection
Single question (!)
Brief concept/method/data*
Three-five major points
Take Home Message
One future study
Relevance (part 2)
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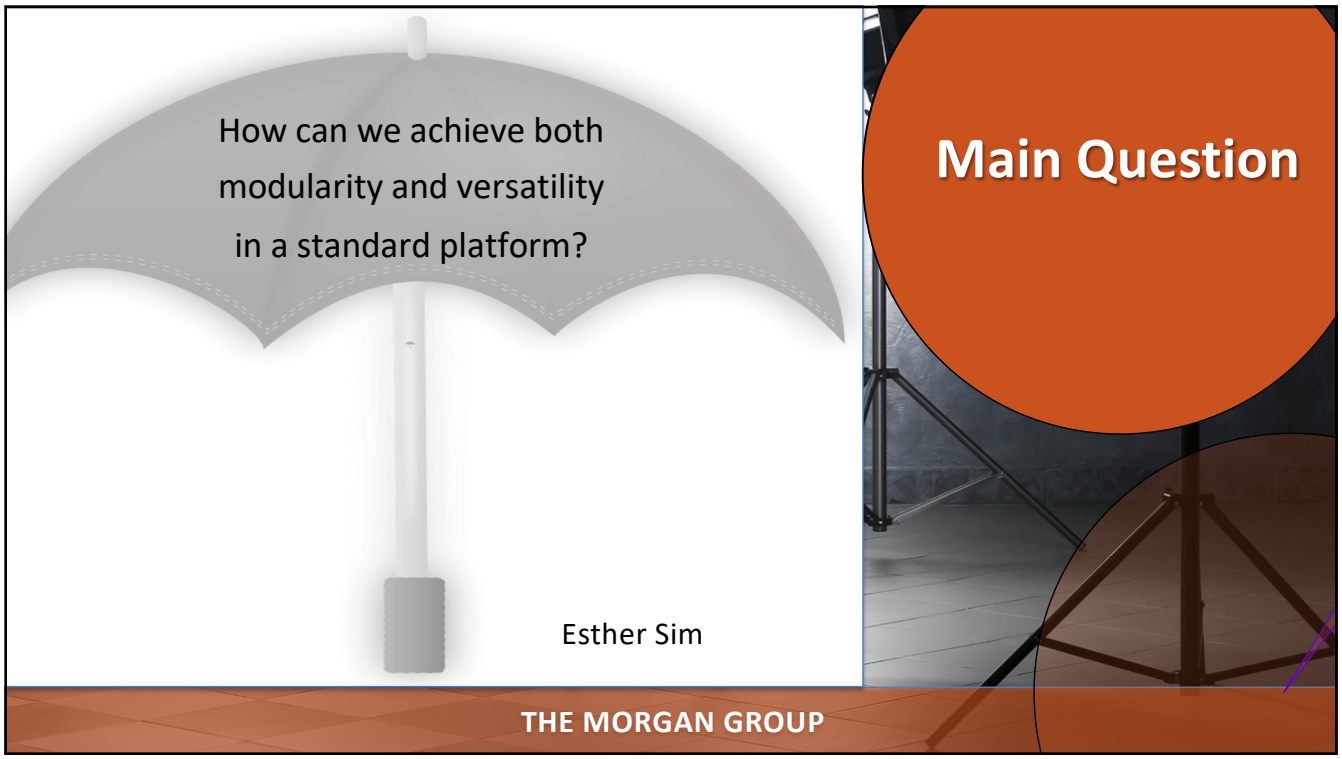
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Relevance
Specialty*
Single Question
3-5 major points
Take-Home -
Message
Future Step
Relevance Part 2
Hour Glass
Format
THE MORGAN GROUP

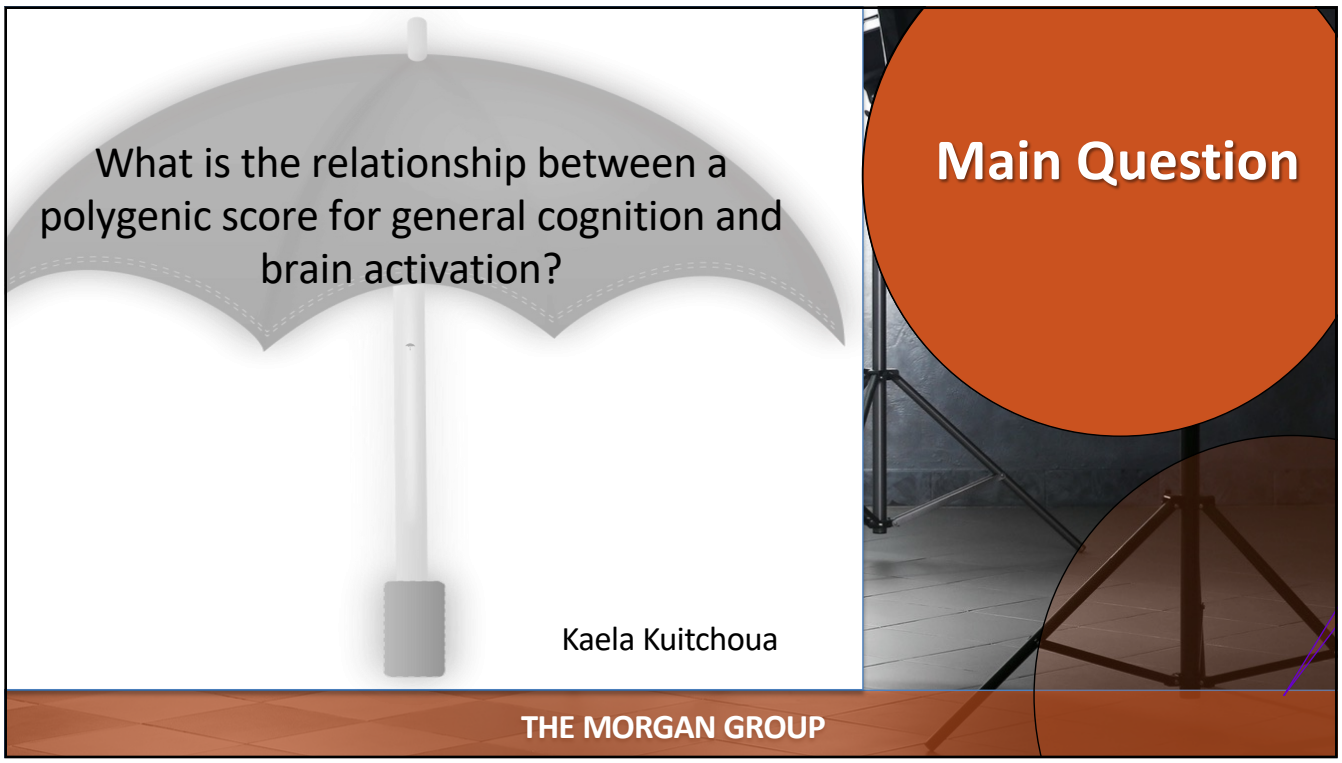
6


What I want to find out, is after continued exposure to low level antibiotics, can these organisms evolve full resistance?
Ryan Johnson
Main Question
THE MORGAN GROUP

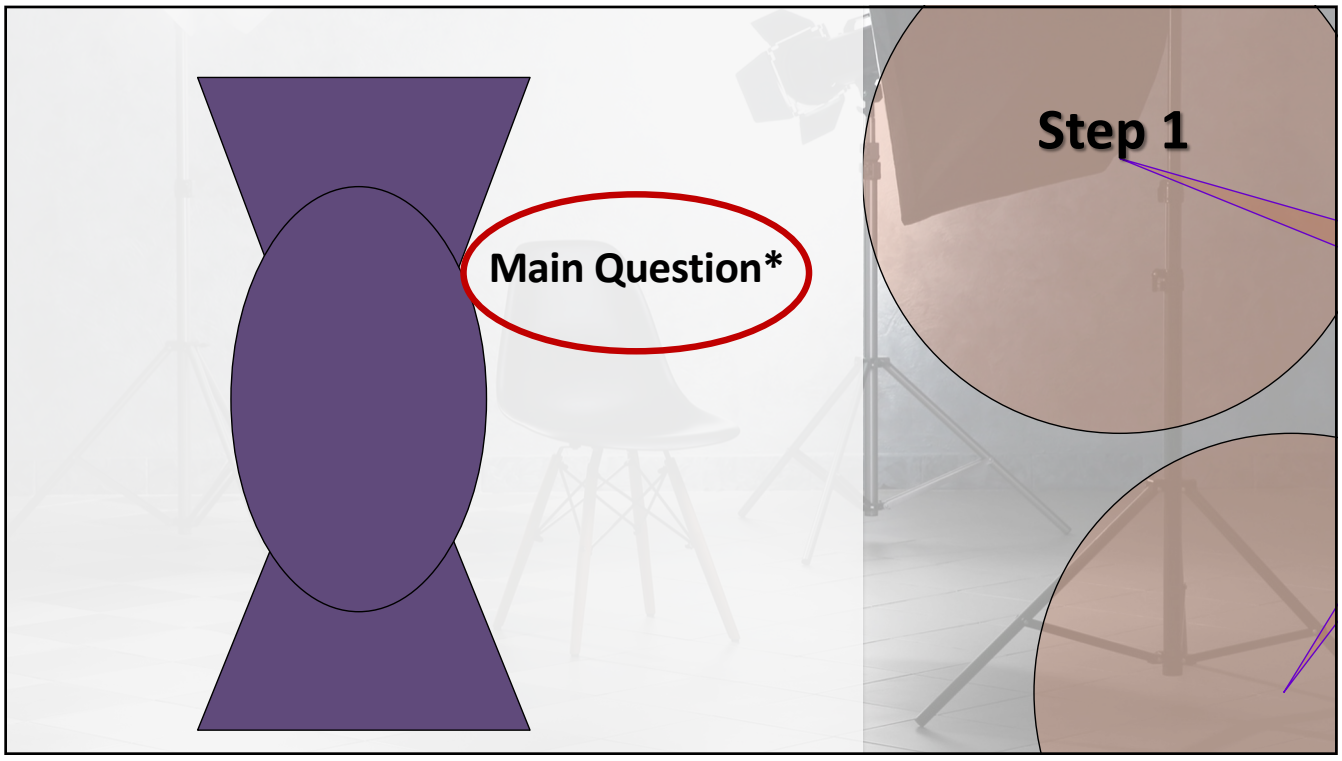
7


How can we achieve both modularity and versatility in a standard platform?
Esther Sim
Main Question
THE MORGAN GROUP

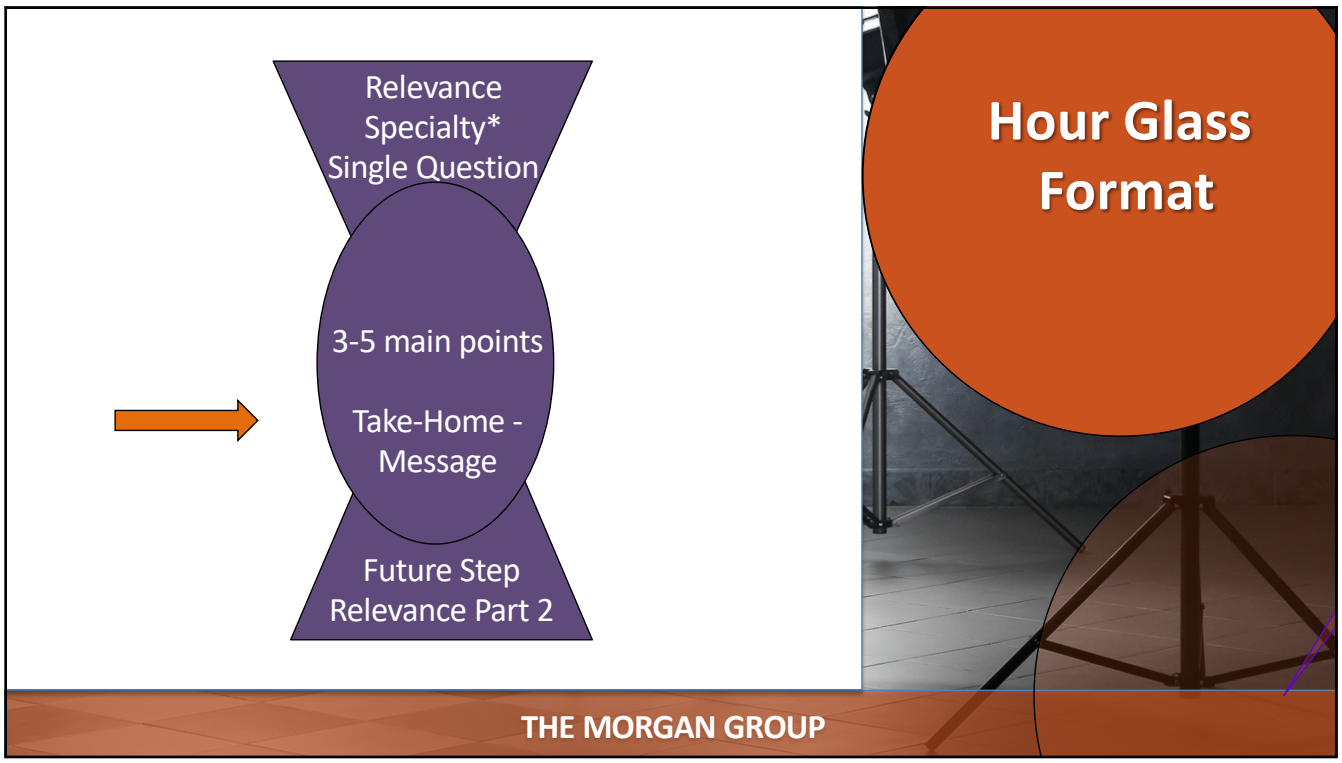
8


What is the relationship between a polygenic score for general cognition and brain activation?
Kaela Kuitchoua
Main Question
THE MORGAN GROUP

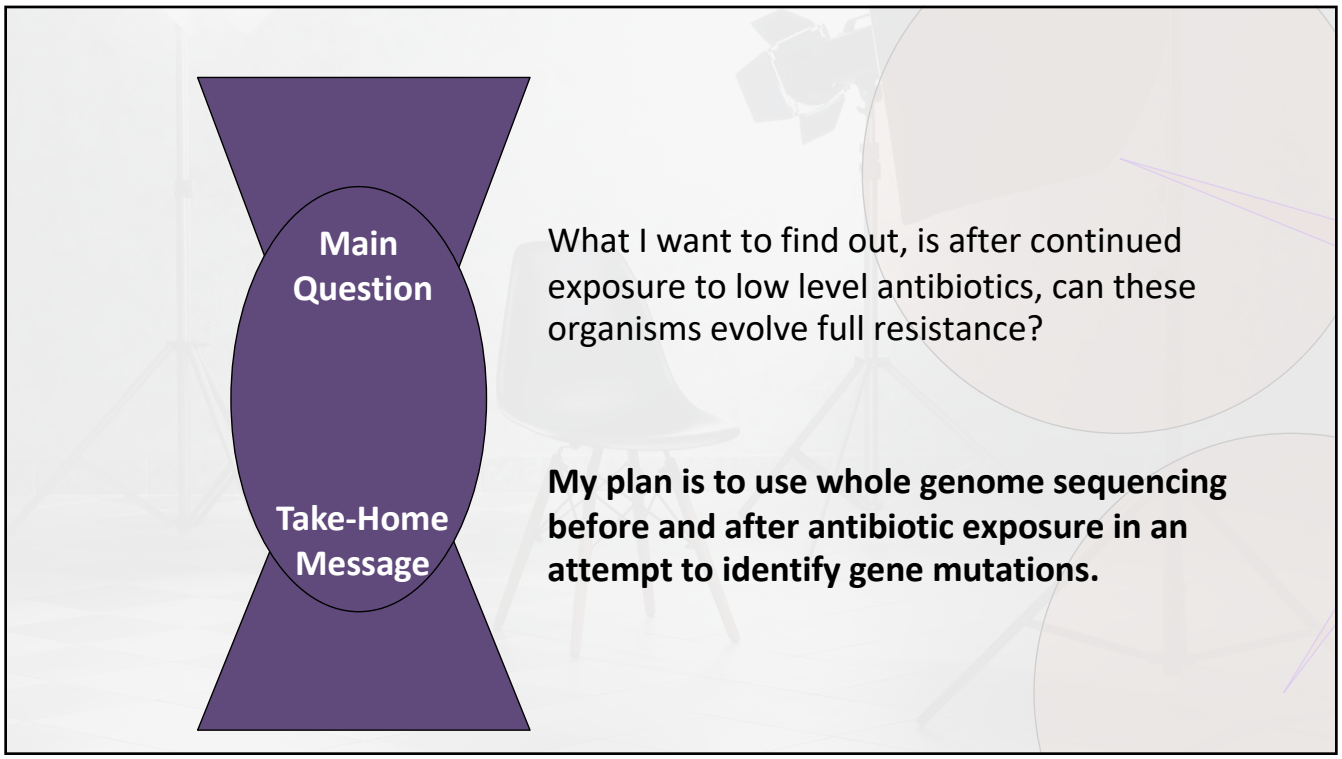
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Main Question*
Step 1

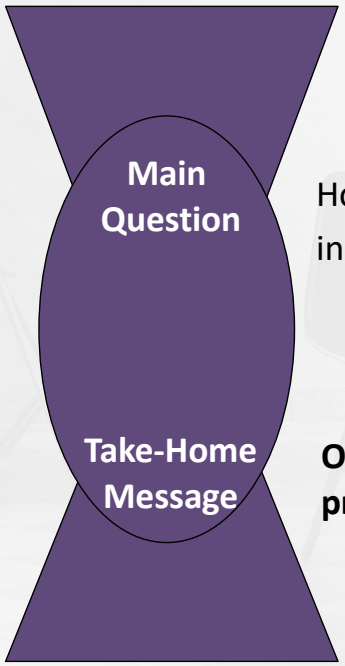
10


Relevance
Specialty*
Single Question
3-5 main points
Take-Home -
Message
Future Step
Relevance Part 2
Hour Glass
Format
THE MORGAN GROUP

11


Main
Question
Take-Home
Message
What I want to find out, is after continued exposure to low level antibiotics, can these organisms evolve full resistance?
My plan is to use whole genome sequencing before and after antibiotic exposure in an attempt to identify gene mutations.

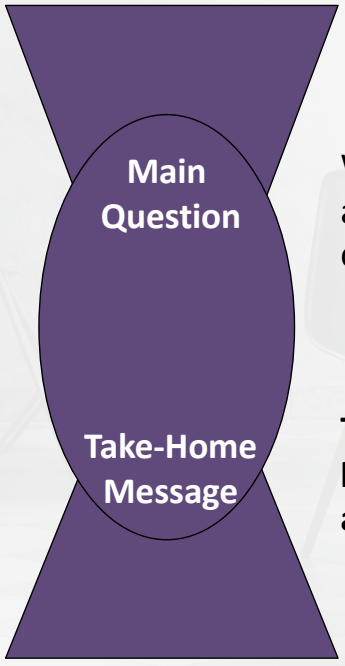
12



How can we achieve both modularity and versatility in a standard platform?

Our 3D model both validates the platform and the process for drug screening.

13



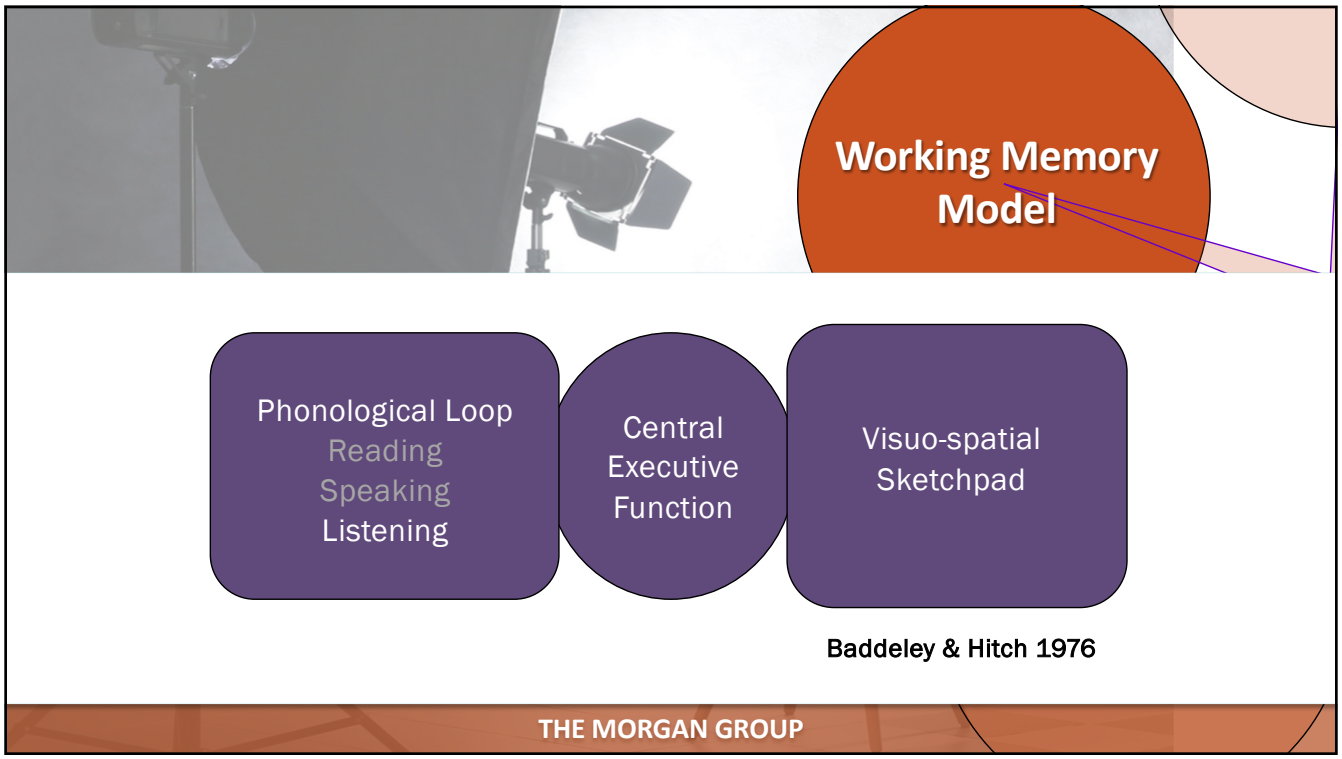
What is the relationship between brain activation and a polygenic score for general cognition in schizophrenia?

There is a moderate positive relationship between a polygenic score and brain activation of 8%.

14


Step 2
Take-Home-Message

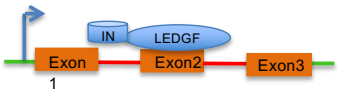
15


Working Memory Model
Phonological Loop
Reading
Speaking
Listening
Central Executive Function
Visuo-spatial Sketchpad
Baddeley & Hitch 1976
THE MORGAN GROUP

16

LEDGF interacts with mRNA splicing factors and targets HIV-1 integration to highly spliced genes

Current model for HIV integration

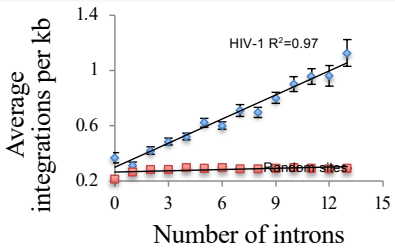


HIV-1 integrase interacts the host chromatin factor LEDGF, and thus targets actively transcribed genes.

Q1: However, we don't know how LEDGF recognizes chromatin?

Q2: Does HIV-1 prefer any specific set of genes like cancer genes?

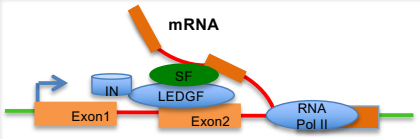
Q3: Are HIV-1 based vectors safe for gene therapy?



Genes with more intron (splicing) are highly targeted by HIV-1

Comparison of 10,000 human genes (RNAseq analysis)	Number of genes with change in splicing
WT HEK293 vs. HEK293 with the full LEDGF deletion	4,305
WT HEK293 vs.HEK293 with just the deletion of integrase binding domain (IBD) of LEDGF	5,139

LEDGF (or IBD) affects splicing of 5000 genes and interacts with 67 splicing factors.

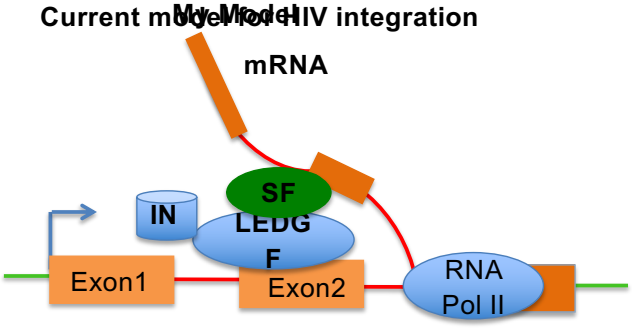


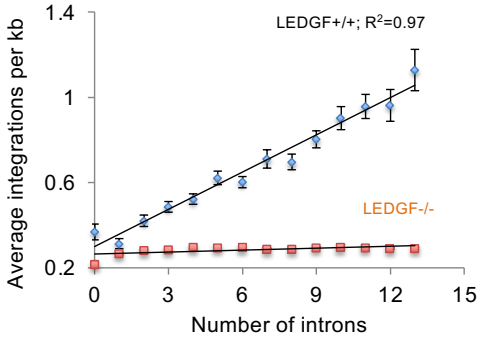
Top 1000 targeted genes have 5 time enrichment for cancer genes and these cancer genes have average introns >15.

So it needs careful evaluation before using in gene therapy.

17

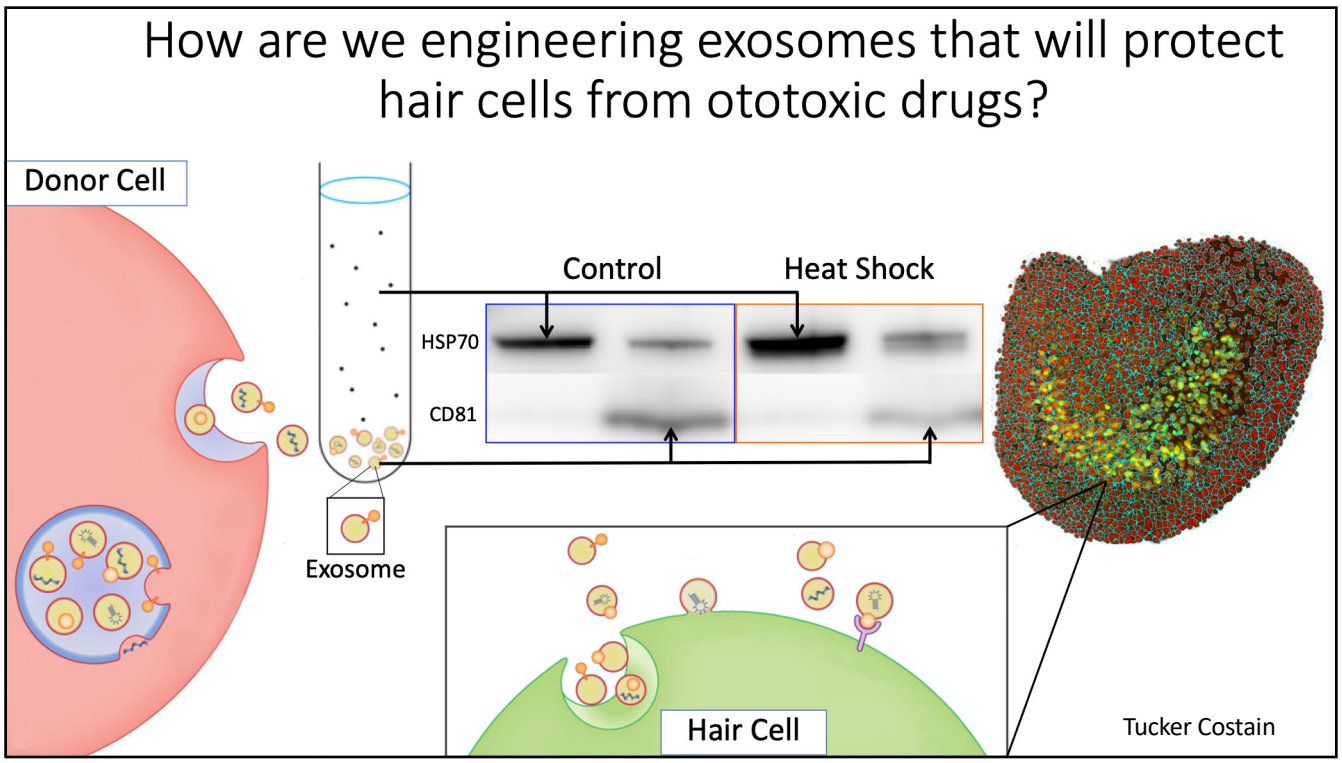
Current model for HIV integration



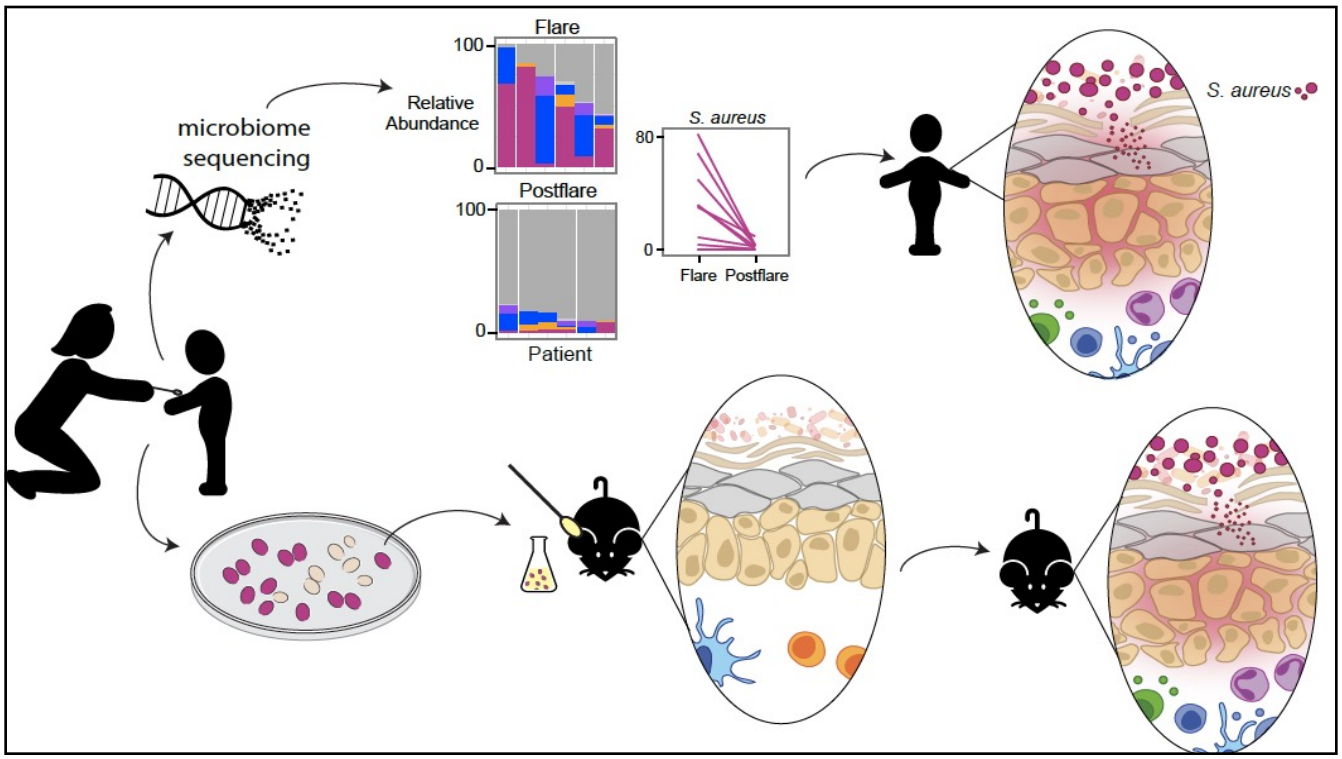


5,139

18

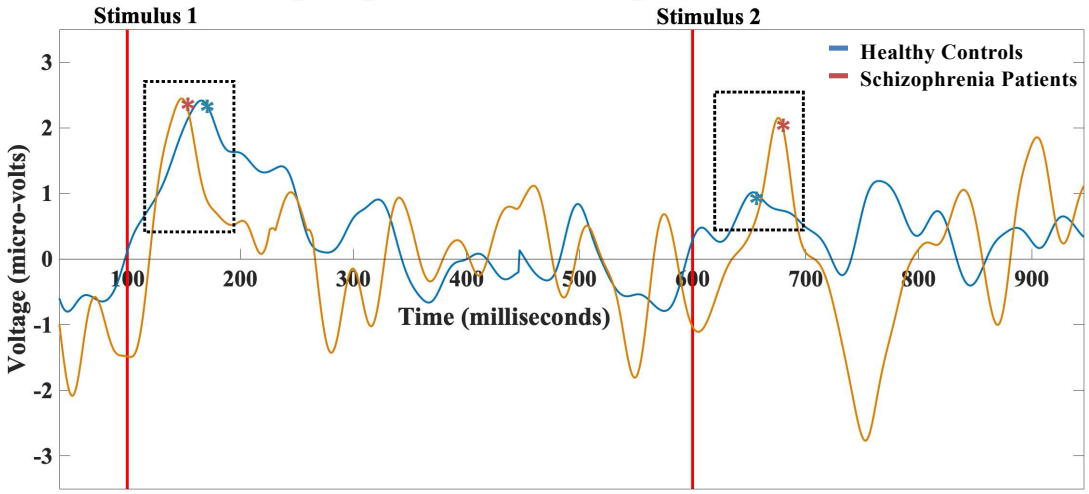

How are we engineering exosomes that will protect hair cells from ototoxic drugs?
Donor Cell
Control
Heat Shock
HSP70
CD81
Exosome
Hair Cell
Tucker Costain

19


microbiome sequencing
Flare
Postflare
Relative Abundance
100
0
Patient
S. aureus
80
0
Flare Postflare
S. aureus

20

Neuroimaging to Meaningful Mind Theories



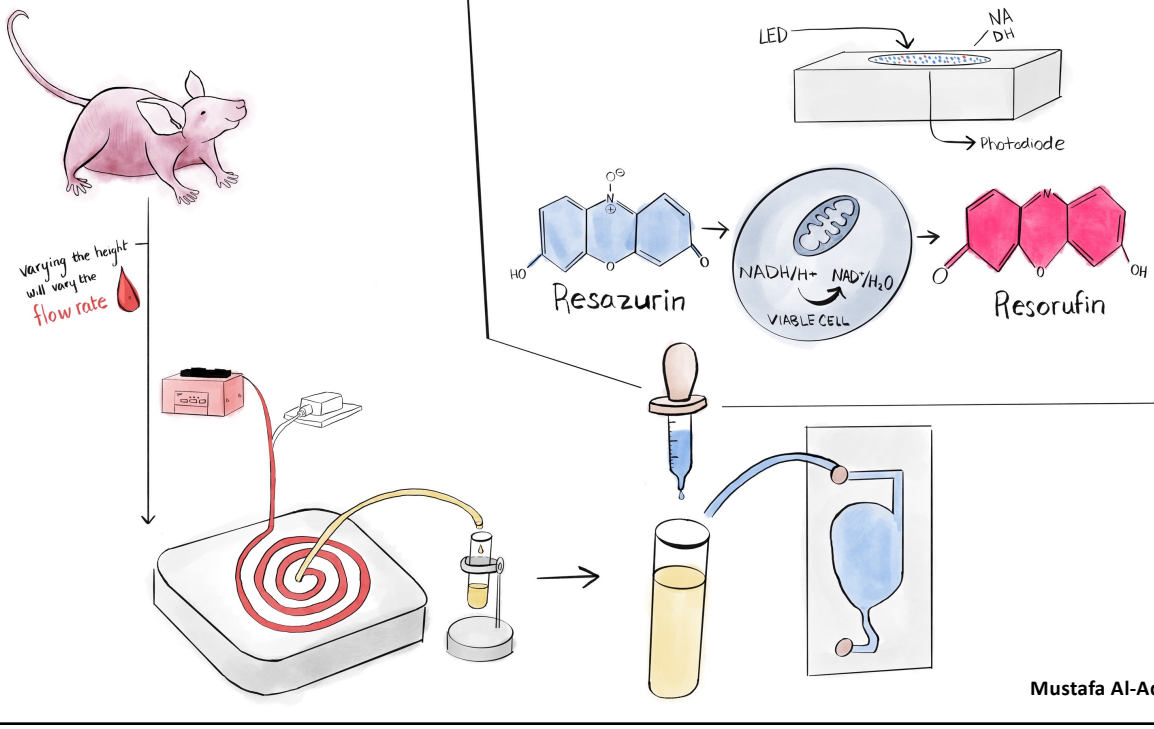


$$Y = KJ + E$$

data | gain matrix | dipole amplitudes | noise

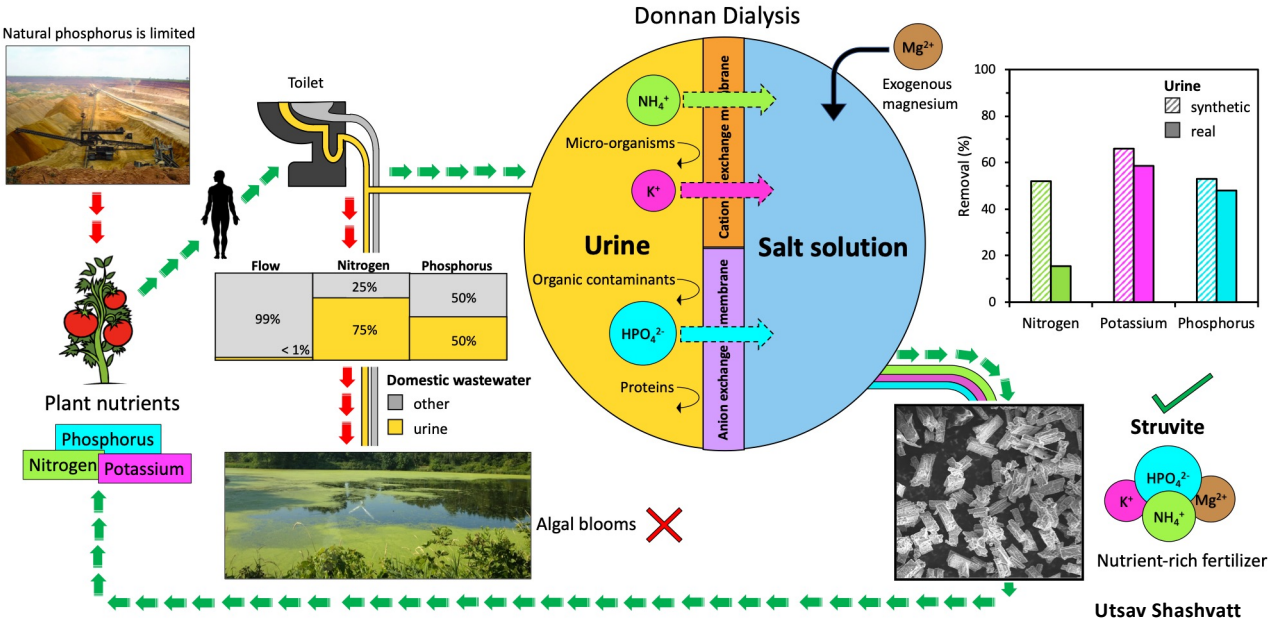


21



22

Urine-credible! Sustainable closed-loop fertilizer production



23

"WE DON'T HAVE A CHOICE!":

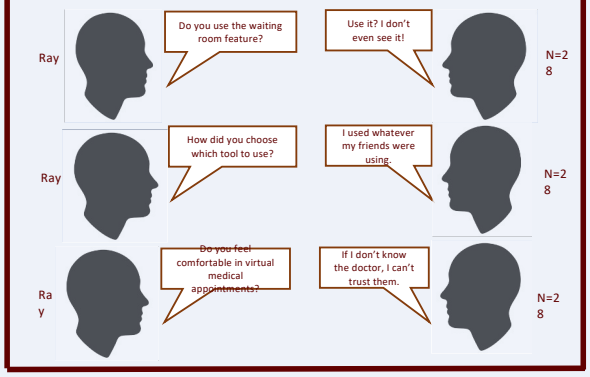
PRIVACY CONCERNS AMONG OLDER ADULTS

Hirak Ray | PhD Candidate | Human-Centered Com puting

webex by cisco zoom

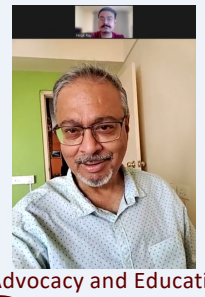
Which factors affect older adults' privacy concerns when adopting new technology?

FINDINGS



Ray, H., Kuber, R. & Aviv, A. J. Investigating Older Adults' Adoption and Usage of Online Conferencing Tools During COVID-19 in 19th Web for All Conference (W4A 2022).

STEPS FORWARD



Advocacy and Education

"It is cumulative in its relationship. Especially for family. I'm glad we have it."

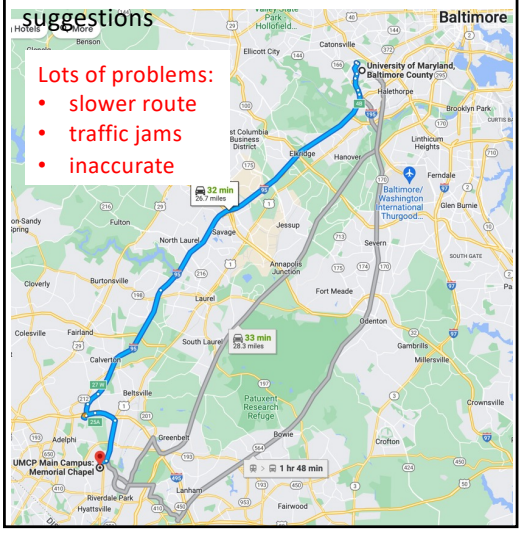
"An interactive training [session] with someone who knew what they were talking about so we could ask questions, like "How do I grab the screen? "

24

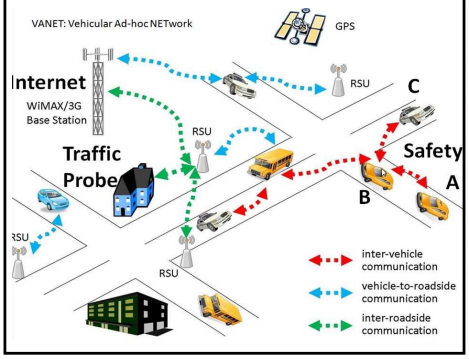
META - Traffic Management based on Estimated Time of Arrival

1 Input: start point, destination, start time

Output: rough ETA, same route suggestions

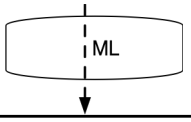


2 Internet of Things (IoT)
Internet of Vehicles (IoV)



3 **Complete Traffic Information: Real-time, Accurate**

1. Road-net
2. Vehicle: location, speed direction, route
3. Traffic volume
4. Traffic lights info

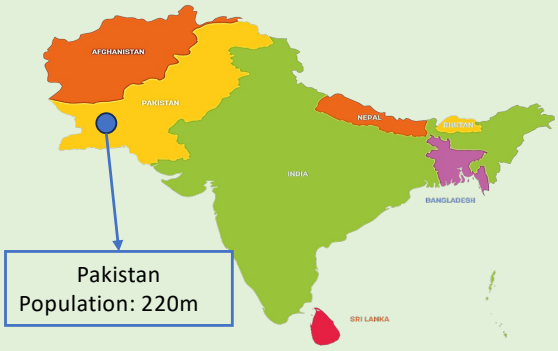


4 **Accurate M-ETA of every Vehicle**

- Traffic flow volume prediction
- Dynamically schedules and adjusts for traffic lights
- Route suggestions + traffic diversion
- Serves emergency vehicles

Dayuan Tan

25



20m Patients

90%

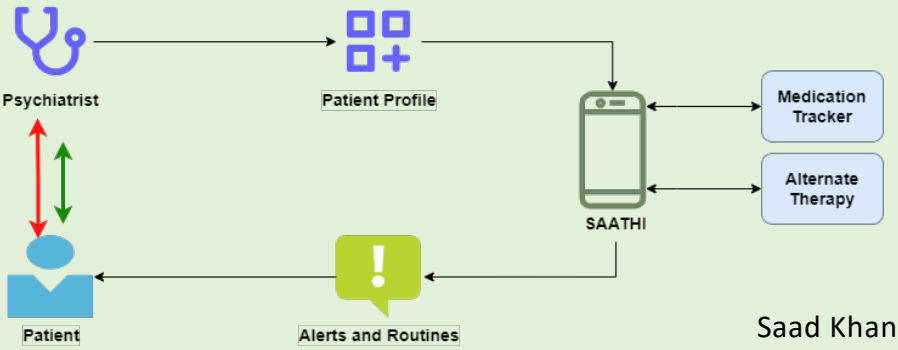
Untreated

500 Psychiatrists

14

Average Visits Per Day

- Increase Number of Visits Per Day.
- Reduce the percentage of untreated population **using the same number of psychiatrists.**

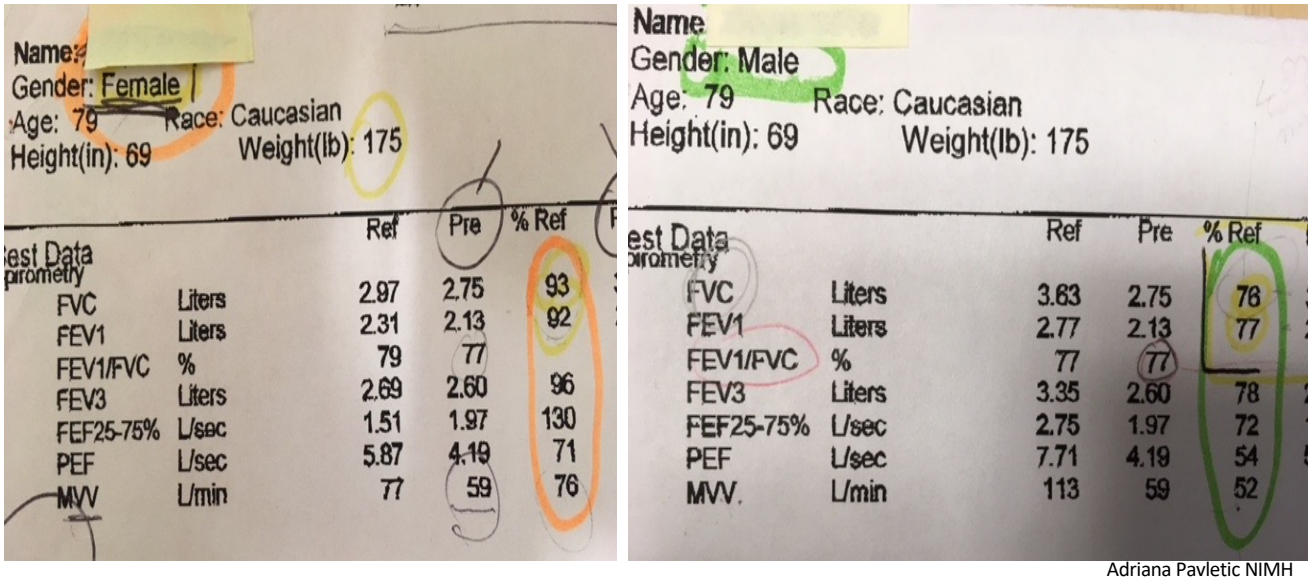


Saad Khan

Map: Google Images

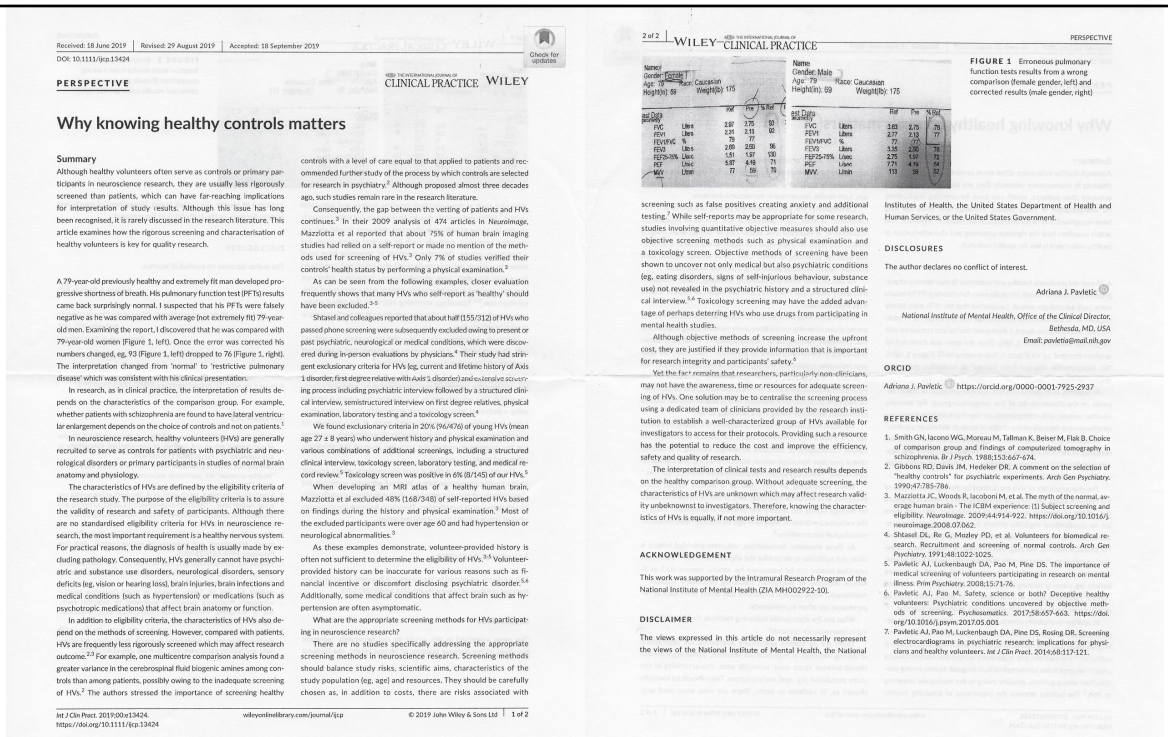
26

Why Knowing Healthy Controls Matters for Research



Adriana Pavletic NIMH

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PERSPECTIVE

THE INTERNATIONAL JOURNAL OF CLINICAL PRACTICE WILEY

Why knowing healthy controls matters

Summary

Although healthy volunteers often serve as controls or primary participants in neuroscience research, they are usually less rigorously screened than patients, which can have far-reaching implications for interpretation of study results. Although this issue has long been recognised, it is rarely discussed in the research literature. This article examines how the rigorous screening and characterisation of healthy volunteers is key for quality research.

A 79-year-old previously healthy and extremely fit man developed progressive shortness of breath. His pulmonary function test (PFTs) results came back surprisingly normal. I suspected that his PFTs were falsely negative as he was compared with average (not extremely fit) 79-year-old men. Examining the report, I discovered that he was compared with 79-year-old women (Figure 1, left). Once the error was corrected his numbers changed, eg, 93 (Figure 1, left) dropped to 76 (Figure 1, right). The interpretation changed from 'normal' to 'restrictive pulmonary disease' which was consistent with his clinical presentation.

In research, as in clinical practice, the interpretation of results depends on the characteristics of the comparison group. For example, whether patients with schizophrenia are found to have lateral ventricular enlargement depends on the choice of controls and not on patients.[1]

In neuroscience research, healthy volunteers (HVs) are generally recruited to serve as controls for patients with psychiatric and neurological disorders or primary participants in studies of normal brain anatomy and physiology.

The characteristics of HVs are defined by the eligibility criteria of the research study. The purpose of the eligibility criteria is to assure the validity of research and safety of participants. Although there are no standardised eligibility criteria for HVs in neuroscience research, the most important requirement is a healthy nervous system. For practical reasons, the diagnosis of health is usually made by excluding pathology. Consequently, HVs generally cannot have psychiatric and substance use disorders, neurological disorders, sensory deficits (eg, vision or hearing loss), brain injuries, brain infections and medical conditions (such as hypertension) or medications (such as psychotropic medications) that affect brain anatomy or function.

In addition to eligibility criteria, the characteristics of HVs also depend on the methods of screening. However, compared with patients, HVs are frequently less rigorously screened which may affect research outcome.[2,3] For example, one multicentre comparison analysis found a greater variance in the cerebrospinal fluid biogenic amines among controls than among patients, possibly owing to the inadequate screening of HVs.[2] The authors stressed the importance of screening healthy controls with a level of care equal to that applied to patients and recommended further study of the process by which controls are selected for research in psychiatry.[2] Although proposed almost three decades ago, such studies remain rare in the research literature.

Consequently, the gap between the vetting of patients and HVs continues.[3] In their 2009 analysis of 474 articles in *NeuroImage*, Mazziotta et al reported that about 75% of human brain imaging studies had relied on a self-report or made no mention of the methods used for screening of HVs.[3] Only 7% of studies verified their controls' health status by performing a physical examination.[3]

As can be seen from the following examples, closer evaluation frequently shows that many HVs who self-report as 'healthy' should have been excluded.[2-5]

Shtasel and colleagues reported that about half (155/312) of HVs who passed phone screening were subsequently excluded owing to present or past psychiatric, neurological or medical conditions, which were discovered during in-person evaluations by physicians.[4] Their study had stringent exclusionary criteria for HVs [eg, current and lifetime history of Axis 1 disorder, first degree relative with Axis 1 disorder] and extensive screening process including psychiatric interview followed by a structured clinical interview, semistructured interview on first degree relatives, physical examination, laboratory testing and a toxicology screen.[4]

We found exclusionary criteria in 20% (96/476) of young HVs (mean age 27 ± 8 years) who underwent history and physical examination and various combinations of additional screenings, including a structured clinical interview, toxicology screen, laboratory testing, and medical record review.[5] Toxicology screen was positive in 6% (8/145) of our HVs.[5]

When developing an MRI atlas of a healthy human brain, Mazziotta et al excluded 48% (168/348) of self-reported HVs based on findings during the history and physical examination.[3] Most of the excluded participants were over age 60 and had hypertension or neurological abnormalities.[3]

As these examples demonstrate, volunteer-provided history is often not sufficient to determine the eligibility of HVs.[3-5] Volunteer-provided history can be inaccurate for various reasons such as financial incentive or discomfort disclosing psychiatric disorder.[3,4] Additionally, some medical conditions that affect brain such as hypertension are often asymptomatic.

What are the appropriate screening methods for HVs participating in neuroscience research?

There are no studies specifically addressing the appropriate screening methods in neuroscience research. Screening methods should balance study risks, scientific aims, characteristics of the study population (eg, age) and resources. They should be carefully chosen as, in addition to costs, there are risks associated with

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FIGURE 1 Erroneous pulmonary function tests results from a wrong comparison (female gender, left) and corrected results (male gender, right)

screening such as false positives creating anxiety and additional testing.[1] While self-reports may be appropriate for some research, studies involving quantitative objective measures should also use objective screening methods such as physical examination and a toxicology screen. Objective methods of screening have been shown to uncover not only medical but also psychiatric conditions (eg, eating disorders, signs of self-injurious behaviour, substance use) not revealed in the psychiatric history and a structured clinical interview.[3,4] Toxicology screening may have the added advantage of perhaps deterring HVs who use drugs from participating in mental health studies.

Although objective methods of screening increase the upfront cost, they are justified if they provide information that is important for research integrity and participants' safety.[5]

Yet the fact remains that researchers, particularly non-clinicians, may not have the awareness, time or resources for adequate screening of HVs. One solution may be to centralise the screening process using a dedicated team of clinicians provided by the research institution to establish a well-characterized group of HVs available for investigators to access for their protocols. Providing such a resource has the potential to reduce the cost and improve the efficiency, safety and quality of research.

The interpretation of clinical tests and research results depends on the healthy comparison group. Without adequate screening, the characteristics of HVs are unknown which may affect research validity unbeknownst to investigators. Therefore, knowing the characteristics of HVs is equally, if not more important.

ACKNOWLEDGEMENT

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DISCLAIMER

The views expressed in this article do not necessarily represent the views of the National Institute of Mental Health, the National Institutes of Health, the United States Department of Health and Human Services, or the United States Government.

DISCLOSURES

The author declares no conflict of interest.

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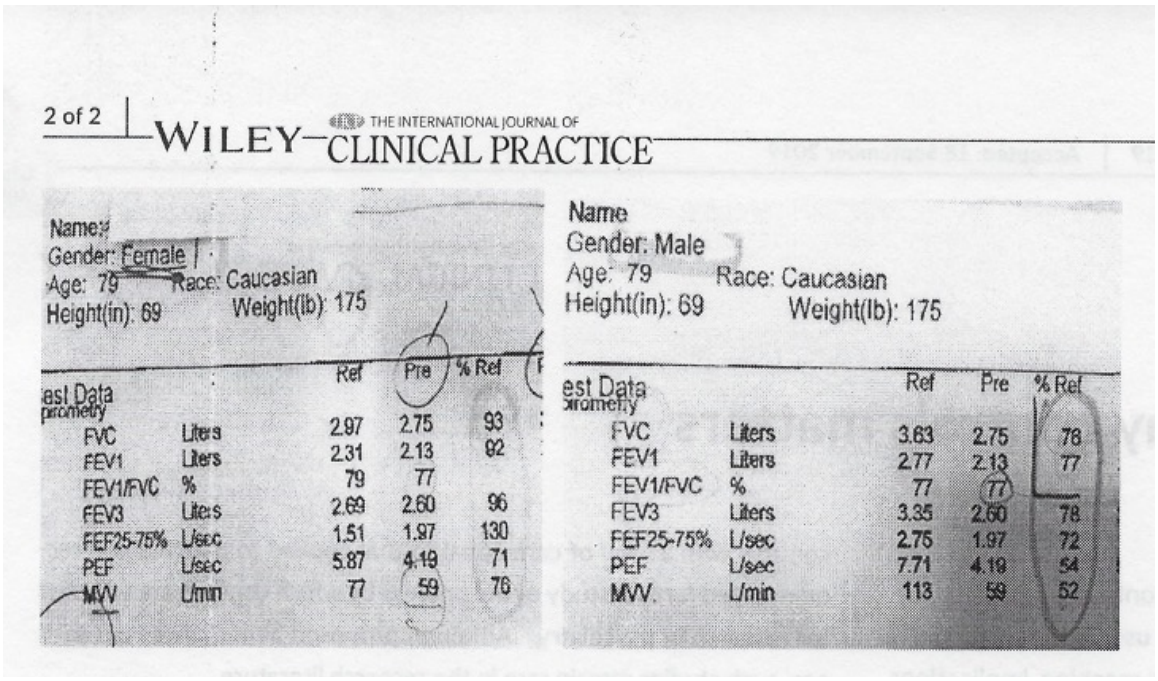
ORCID

Adriana J. Pavletic https://orcid.org/0000-0001-7925-2937

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4. Shtasel DL, Re G, Modley PD, et al. Volunteers for biomedical research. Recruitment and screening of normal controls. *Arch Gen Psychiatry.* 1991;48:1022-1025.
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2 of 2 WILEY—THE INTERNATIONAL JOURNAL OF CLINICAL PRACTICE

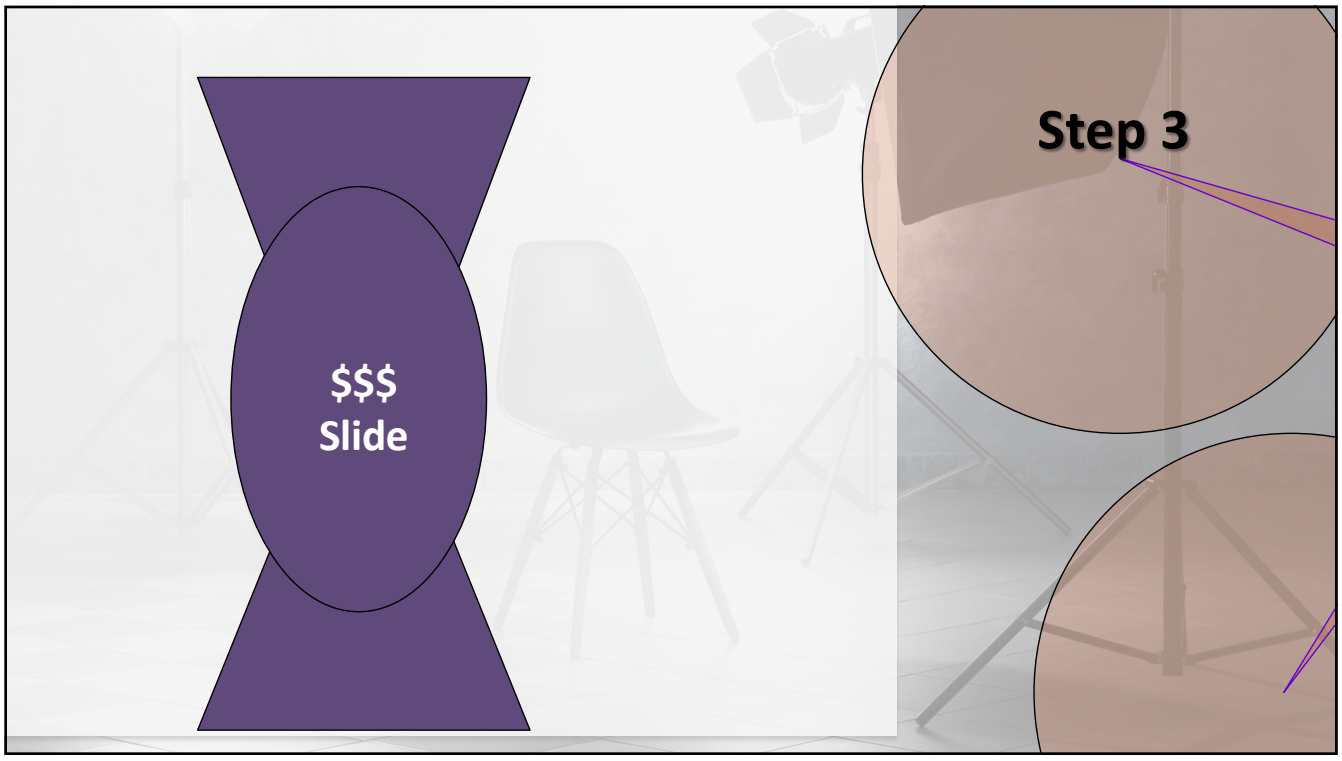
Name:
Gender: Female
Age: 79 Race: Caucasian
Height(in): 69 Weight(lb): 175

est Data		Ref	Pre	% Ref
FVC	Liters	2.97	2.75	93
FEV1	Liters	2.31	2.13	92
FEV1/FVC	%	79	77	
FEV3	Liters	2.69	2.60	96
FEF25-75%	L/sec	1.51	1.97	130
PEF	L/sec	5.87	4.19	71
MVV	L/min	77	59	76

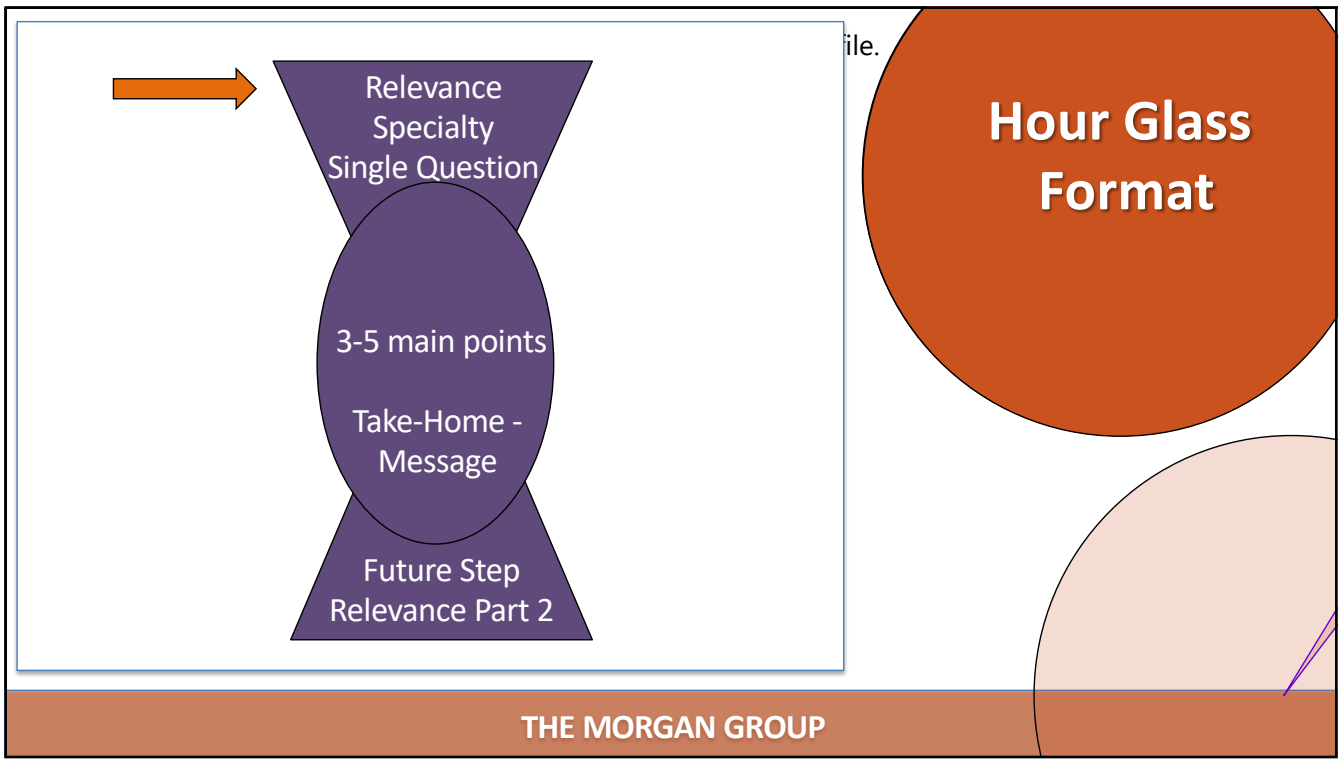
Name
Gender: Male
Age: 79 Race: Caucasian
Height(in): 69 Weight(lb): 175

est Data		Ref	Pre	% Ref
FVC	Liters	3.63	2.75	76
FEV1	Liters	2.77	2.13	77
FEV1/FVC	%	77	77	
FEV3	Liters	3.35	2.60	78
FEF25-75%	L/sec	2.75	1.97	72
PEF	L/sec	7.71	4.19	54
MVV	L/min	113	59	52

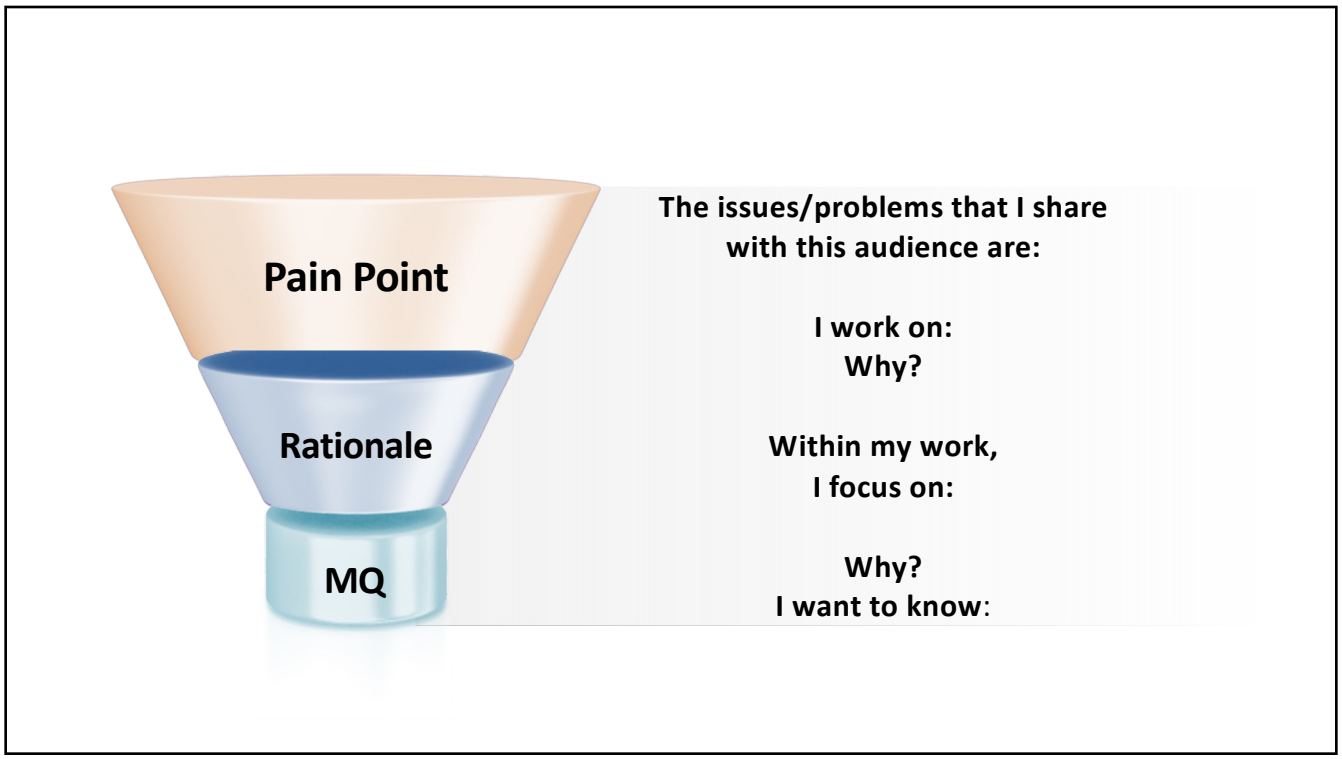
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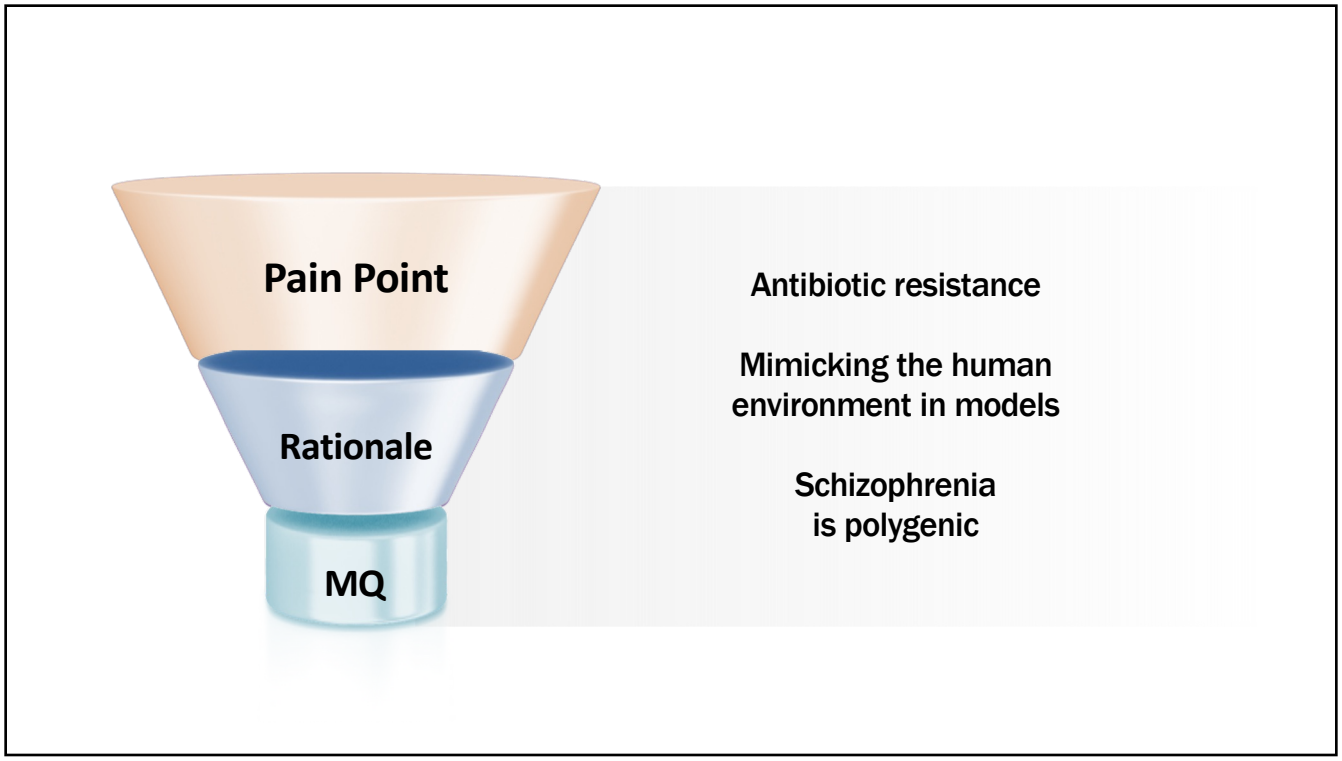
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Relevance
Specialty
Single Question
3-5 main points
Take-Home -
Message
Future Step
Relevance Part 2
Hour Glass
Format
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Pain Point
Rationale
MQ
The issues/problems that I share with this audience are:
I work on:
Why?
Within my work,
I focus on:
Why?
I want to know:

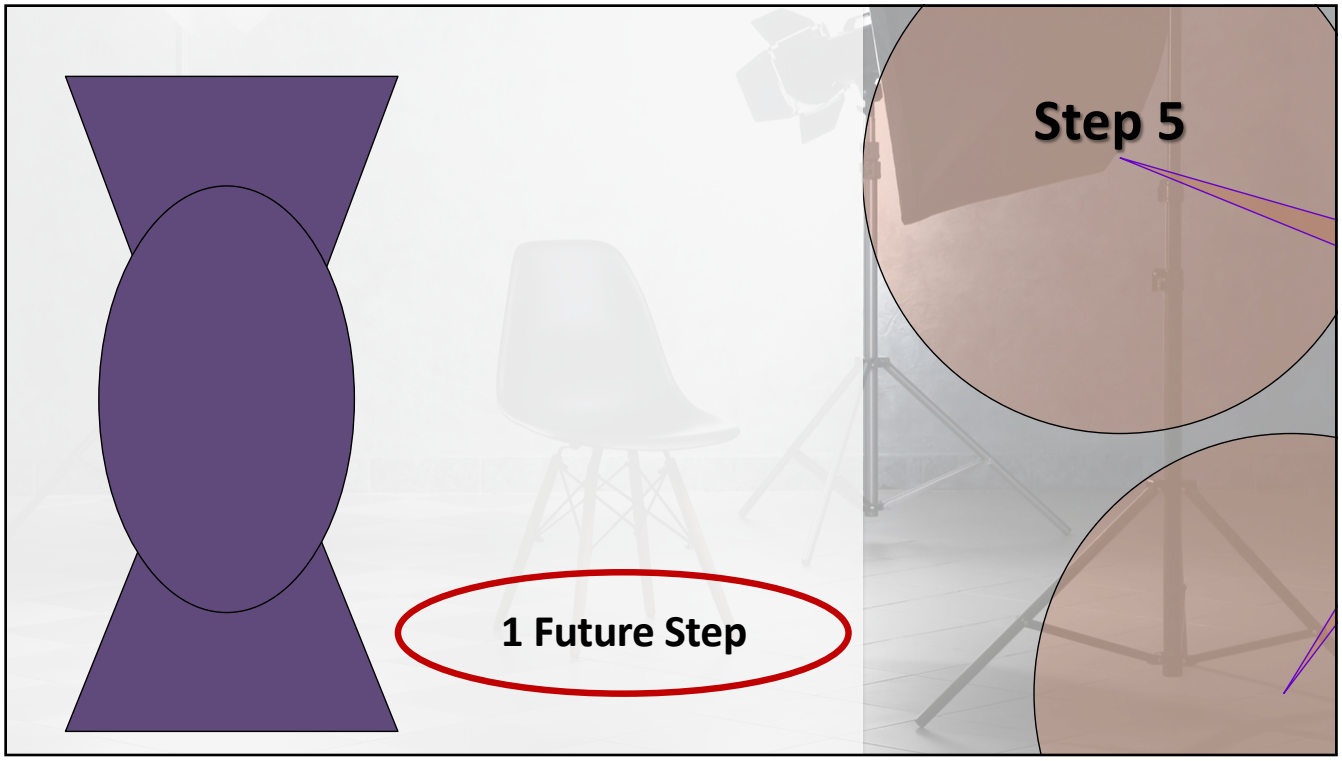
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Pain Point
Rationale
MQ
Antibiotic resistance
Mimicking the human environment in models
Schizophrenia is polygenic

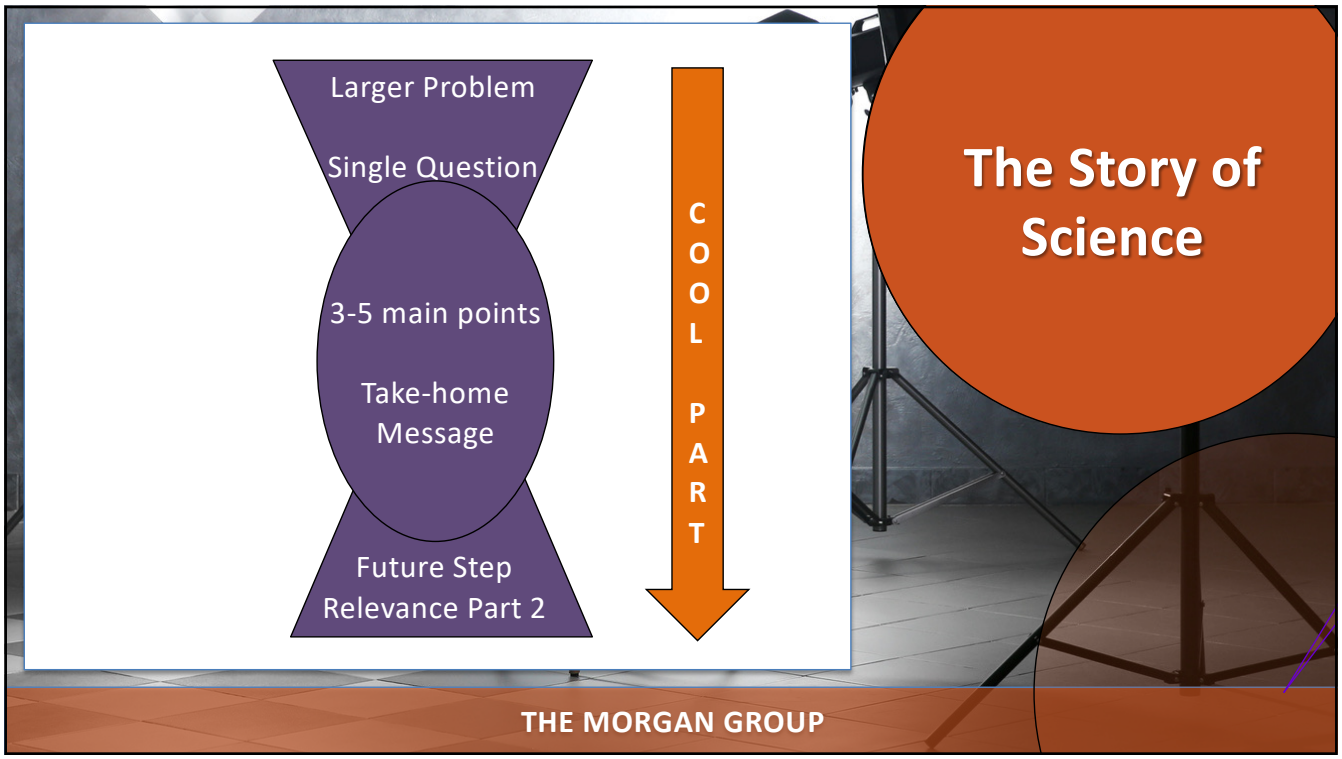
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Common Ground
Step 4

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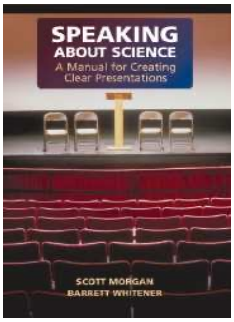

Step 5
1 Future Step

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Larger Problem
Single Question
3-5 main points
Take-home Message
Future Step Relevance Part 2
COOL PART
The Story of Science
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- The book
- scott@morgangp.com
- *3rdi* - mindfulness app
- www.sciencesketches.org
- Private Sessions



science SKETCHES

Future Directions

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