Supplementary Material B: Complete list of weighted scores for each KSA by phenotype

	Tertiles:		
	TOP		
	MIDDLE		
	BOTTOM		
	BOLD represents common KSAs across phenotypes		
CTSA Core Competency (KSA)	Weighted Score for Phenotype		
	PRECLINICAL	CLINICAL	COMMUNITY-ENGAGED
Use evidence as the basis of the critique and interpretation of results of published studies.	**100.0**	**82.6**	**83.3**
Formulate a well-defined clinical or translational research question to be studied in human or animal models.	100.0	93.5	75
Extract information from the scientific literature that yields scientific insight for research innovation.	96.7	89.1	76.3
Identify potential sources of bias and variations in published studies.	**96.4**	**85.9**	**84.7**
Interpret published literature in a causal framework.	96.4	67.4	73.5
Identify gaps in knowledge within a research problem.	**96.4**	**90.2**	**81.9**
Describe the role of peer review in funding and publication.	96.2	79.3	80.9
Define the data that formulate research hypotheses.	95.0	94.3	78.8
Prepare the background and significance sections of a research proposal.	**95.0**	**100**	**86.3**
Design a research study protocol.	**92.9**	**95.7**	**92.1**
Propose study designs for addressing a clinical or translational research question.	92.3	93.5	80.6
Communicate clinical and translational research findings to different groups of individuals, including colleagues, students, the lay public, and the media.	**91.7**	**89.1**	**89.7**
Outline criteria for determination of authorship.	**91.1**	**82.6**	**91.2**
Explain the purpose, policies and procedures to ensure ethical use, care, and animal safety in research.	91.1	53.3	52.9
Identify basic and preclinical studies that are potential testable clinical research hypotheses.	90.0	59.8	42.5
Assess the strengths and weaknesses of possible study designs for a given clinical or translational research question.	**88.5**	**91.3**	**82.9**
Collaborate with biostatisticians in the design, conduct, and analyses of clinical and translational research.	88.3	91.3	81.9

Design a research data analysis plan.	87.5	77.2	83.3
Explain conflict of interest management in research.	87.5	78.3	83.8
Describe the authority for and professional standards for the responsible conduct of research.	86.7	80.4	75
Explain the procedures for reporting and investigating misconduct in research.	86.7	72.8	72.1
Determine resources needed to implement a clinical or translational research plan.	83.9	82.6	81.9
Describe the concepts and implications of reliability and validity of study measurements.	83.9	81.5	79.2
Evaluate the reliability and validity of measures.	83.9	82.6	66.7
Explain the ways in which the principles of research ethics are integrated into the design, conduct, oversight and dissemination of research.	**81.7**	**82.6**	**83.8**
Assess threats to study validity (bias) including problems with sampling, recruitment, randomization, and comparability of study groups.	80.4	85.9	79.2
Maintain skills as mentor and mentee.	80.4	76.1	69.1
Foster innovation and creativity.	80.4	72.8	76.5
Integrate elements of translational research into given study designs that could provide the bases for future research, such as the collection of biological specimens nested studies and the development of community-based interventions.	78.7	75	75
Assess data sources and data quality to answer specific clinical or translational research questions.	78.6	78.3	72.2
Critique clinical and translational research questions using data-based literature searches.	**78.3**	**85.9**	**82.5**
Build an interdisciplinary/ intradisciplinary/ multidisciplinary team that matches the objectives of the research problem.	78.3	71.7	83.8
Manage conflict.	78.3	65.2	71.9
Conduct a comprehensive and systematic search of the literature using informatics techniques.	**76.8**	**62**	**73.6**
Compare the feasibility, efficiency, and ability to derive unbiased inferences from different clinical and translational research study designs.	76.8	82.6	73.6
Differentiate between the analytic problems that can be addressed with standard methods and those requiring input from biostatisticians and other scientific experts.	**76.8**	**73.9**	**68.1**
Work as a leader of a multidisciplinary research team.	76.8	67.4	66.2

Describe the basic principles and practical importance of random variation, systematic error, sampling error, measurement error, hypothesis testing, type I and type II errors, and confidence limits.	**75.0**	**69.6**	**69.4**
Manage a clinical and/or translational research study.	75.0	81.5	79.4
Advocate for multiple points of view.	75.0	58.7	85.3
Manage a multidisciplinary team across its fiscal, personnel, regulatory compliance and problem solving requirements.	75.0	70.7	57.4
Describe the role that biostatistics serves in biomedical and public health research.	**73.3**	**71.7**	**75**
Evaluate computer output containing the results of statistical procedures and graphics.	73.3	54.3	56.9
Assess threats to internal validity in any planned or completed clinical or translational study, including selection bias, misclassification, and confounding.	73.2	87	81.9
Validate others as a mentor.	73.2	54.3	58.8
Identify measures to be applied to a clinical or translational research project.	73.2	93.5	88.9
Generate simple descriptive and inferential statistics that fit the study design chosen and answer research question.	**71.7**	**71.7**	**68.1**
Demonstrate group decision-making techniques.	71.7	57.6	72.1
Summarize evidence from the literature on a clinical problem.	71.4	84.8	87.5
Incorporate regulatory precepts into the design of any clinical or translational study.	**71.4**	**76.1**	**66.7**
Manage an interdisciplinary team of scientists.	70.0	62.5	66.2
Describe the mechanism of a clinical problem reviewed in a manuscript.	69.6	75	58.3
Compute sample size, power, and precision for comparisons of two independent samples with respect to continuous and binary outcomes.	68.3	64.1	52.8
Identify a target population for a clinical or translational research project.	67.9	93.5	94.7
Provide clinical and translational science instruction to beginning scientists.	67.9	40.9	34.4
Derive translational questions from clinical research data.	66.7	83.7	73.8
Retrieve medical knowledge through literature searches using advanced electronic techniques.	**63.3**	**60.9**	**66.7**
Clarify language differences across disciplines.	61.7	55.4	75
Collaborate with bioinformatics specialists in the design, development, and implementation of research projects.	60.0	62	54.2

Describe the fundamental principles of the protection of human subjects, the main authoritative bodies, key codes, and scope of enforcement.	60.0	81.5	86.8
Implement quality assurance and control procedures for different study designs and analysis.	**58.9**	**68.5**	**66.7**
Describe the principles of research documentation, validation and audit.	58.3	69.6	82.4
Implement quality assurance systems with control procedures for data intake, management, and monitoring for different study designs.	57.1	70.7	65.3
Incorporate adult learning principles and mentoring strategies into interactions with beginning scientists and scholars in order to engage them in clinical and translational research.	57.1	37	35.9
Describe the essential elements of voluntary informed consent.	57.0	91.3	94.1
Translate the implications of clinical and translational research findings for clinical practice, advocacy, and governmental groups.	**56.7**	**72.8**	**79.4**
Prepare an application to an IRB.	55.4	93.5	91.7
Develop strategies for overcoming the unique curricular challenges associated with merging scholars from diverse backgrounds.	53.6	35.9	42.2
Identify research observations that could be the bases of large clinical trials.	53.3	73.9	60
Scrutinize the assumptions behind different statistical methods and their corresponding limitations.	53.3	52.2	50
Develop protocols utilizing management of information using computer technology.	53.3	41.3	40.8
Explain the utility and mechanism of commercialization for clinical and translational research findings, the patent process, and technology transfer.	53.3	41.3	33.8
Apply principles of adult learning and competency-based instruction to educational activities.	51.8	31.5	39.1
Defend the significance of data and safety monitoring plans.	51.7	71.6	62.5
Prepare an application for IRB approval.	51.7	90.2	91.2
Critique a proposal for risks to human subjects and protections of vulnerable populations.	51.7	80.4	91.2
Discuss the role of bioinformatics in the study design and analyses of high dimensional data in areas, such as genotypic and phenotypic genomics.	43.3	37	27.8

Describe the Food and Drug Administration requirements for drug biologic products	43.3	54.5	32.4
Describe the uses of meta-analytic methods.	41.7	50	45.8
Critique studies for evidence of health disparities, such as disproportional health effects on select populations (e.g., gender, age, ethnicity, race).	41.1	66.3	84.4
Translate clinical and translational research findings into national health strategies or guidelines for use by the general public.	38.3	45.7	60.3
Describe trends and best practices in informatics for the organization of biomedical and health information.	36.7	38	33.3
Describe the effects of technology on medical research, education, and patient care.	36.7	39.1	47.4
Differentiate between cultural competency and cultural sensitivity principles.	35.7	44.6	91.2
Describe cultural and social variation in standards of research integrity.	35.7	50	85.3
Describe the essential functions of the electronic health record (EHR) and the barriers to its use.	35.0	47.8	38.9
Write summaries of scientific information for use in the development of clinical health care policy.	35.0	51.1	64.7
Recognize the demographic, geographic, and ethnographic features within communities and populations when designing a clinical study.	33.9	66.3	88.2
Describe the relevance of cultural and population diversity in clinical research design.	33.9	64.1	94.1
Explain the uses, importance, and limitations of early stopping rules in clinical trials.	31.7	76.1	52.8
Explain the role that health information technology standards have on the interoperability of clinical systems, including health IT messaging.	30.0	35.2	33.3
Access patient information using quality checks via electronic health record systems.	30.0	43.5	33.8
Appraise the role of community engagement as a strategy for identifying community health issues, translating health research to communities and reducing health disparities.	21.4	38	94.1
Examine the characteristics that bind people together as a community, including social ties, common perspectives or interests, and geography.	19.6	29.3	94.1
Analyze the ethical complexities of conducting community-engaged research.	19.6	31.5	97.1

Summarize the principles and practices of the spectrum of community-engaged research.	17.9	35.2	96.9
Specify how cultural and linguistic competence and health literacy have an impact on the conduct of community engaged research.	17.9	34.8	94.1