Correlation of Pre-Admission Math Aptitude Test with the Medical Dosimetry Program GPA

Shirley Ann Johnston, MS, RT(R)(T)CMD[1] and Carolyn Giordano, PhD[2]

[1]Department of Radiologic Sciences, Medical Dosimetry Program and [2]Office of Institutional Research

Who are Dosimetrists?

The Medical Dosimetrist is a member of the radiation oncology team who has knowledge of the overall characteristics and clinical relevance of radiation oncology treatment machines and equipment, is cognizant of procedures commonly used in brachytherapy and has the education and expertise necessary to generate radiation dose distributions and dose calculations in collaboration with the medical physicist and radiation oncologist.

Jefferson's Medical Dosimetry Program

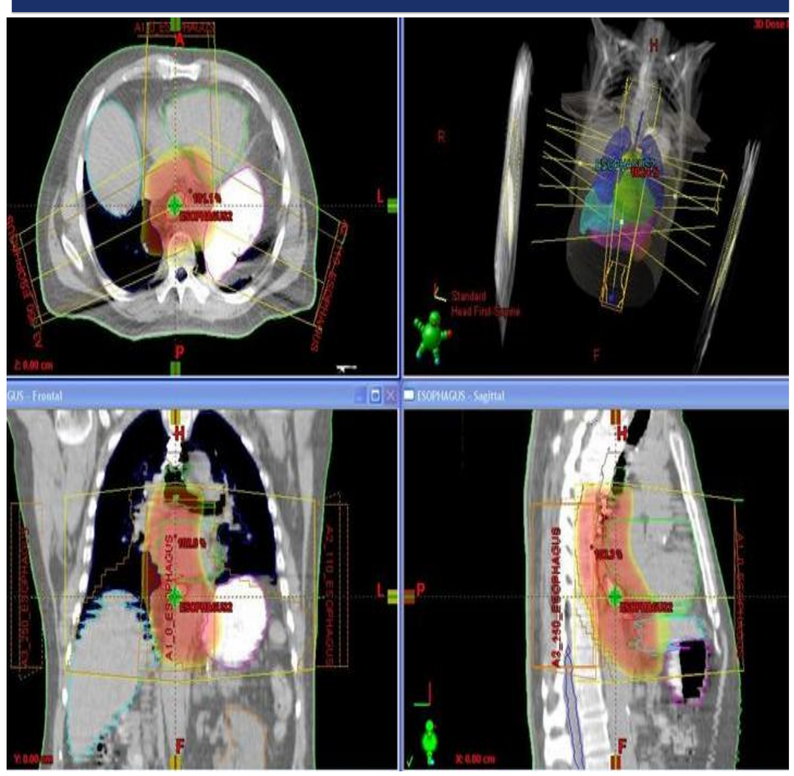
The Medical Dosimetry Program at TJU was founded in 2005 by Dr. Frances Gilman and Dr. Andrew Wu. It is currently one of twenty JRCERT-accredited dosimetry programs in the United States.

The Dosimetry professional needs a strong set of Math skills and the ability to conceptualize 3-dimensionally. This allows the planning process to incorporate a clear process of visualizing a tumor in juxtaposition to normal surrounding structures.

Many factors are considered as part of the admission process - a Bachelor's Degree with a GPA ≥ 3.0, OR a certification as a Radiation Therapist plus the 50 prerequisite credits as per the Department of Radiologic Sciences; a personal interview, obtain a passing score on an Math Aptitude Test.

Radiation treatment plan as calculated by the dosimetrist is shown below.

The radiation targets the tumor while sparing the surrounding normal structures as shown in this design for an esophageal cancer.



The Medical Dosimetry Program's Math Aptitude Test

The Math Aptitude administered to the viable candidates was developed by Andrew Wu, PhD, a medical physicist who was one of the founders of the program. This version of the test has been utilized since 2008.

Each section contains 5 problems, all equally weighted.

The test is given in via paper and pencil, for one-hour, without a calculator and consists of 40 problems covering:

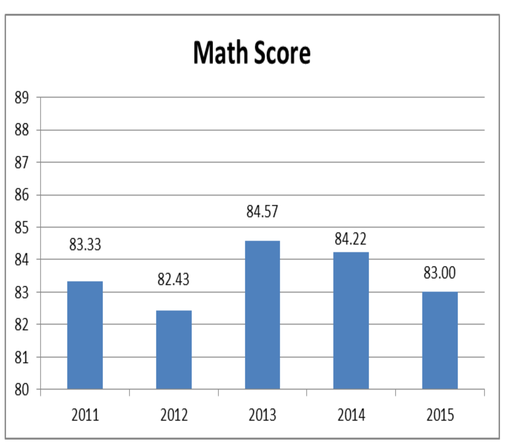
- SI Prefixes
- Exponents
- Logaritm
- Geometry
- Scientific Notation
- Linear Algebra
- Fractions, decimals and percentages
- Trigonometry

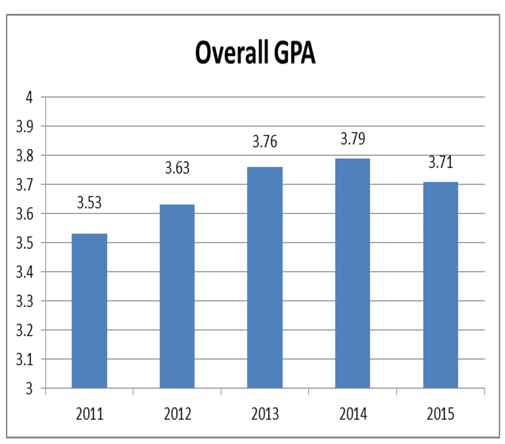
JRCERT-accredited Dosimetry Programs

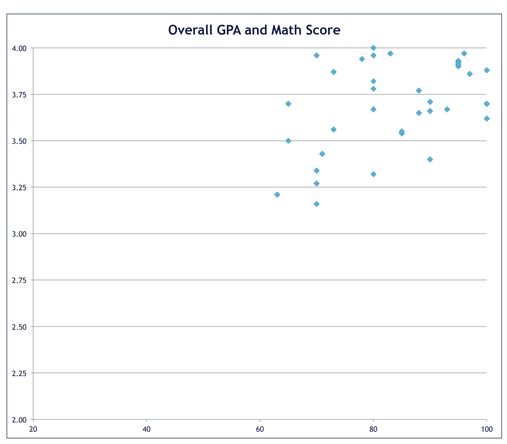
The Program Directors of the 18 JRCERT-accredited programs in the United States were surveyed to access whether any type of Math Test was utilized as a factor in the admission process. Of the 10 responses:

- 4 administered in-house developed Math test similar to TJU
- 1 had used it previously but discontinued it a few years ago
- 2 require the GRE and uses the Math portion as an admission factor
- 1 considers the grades from 2 required Calculus college courses
- 2 did not utilize any Math courses or tests

Results







	Math Score (n=37)
Overall GPA	r=.466**, p=.004
Medical Dosimetry Physics I	r=.264, p=.114
Medical Dosimetry Physics II	r=.365**, p=.026
Brachytherapy	r=.493**, p=.002

Summary: A Pearson correlation was computed and found that all variables but Medical Dosimetry Physics I were significantly correlated with the score on the Math Aptitude Test.

Discussion

The correlations performed show that the Math Aptitude test is an indicator of overall success in the program, and certain courses that have a heavy math concentration, especially in the second semester. The authors feel that while the sample size is small, the results validate the use of the aptitude test in admissions criteria.

These results highlight the role of strong mathematics skills required in Dosimetry.

For more information on this program at TJU contact: Shirley.Johnston@jefferson.edu