Center for Reproductive Science

Dr. Blanche Capel Delivers the 2024 Danielle Maatouk Memorial Lecture

Julia Sprenger and Anika Schipma, MS-RSM Students, May 1, 2024

On Friday, April 5th, CRS hosted the **2024 Danielle Maatouk Memorial Lectureship.** This lecture commemorates the life of Dr. Danielle Maatouk, an exceptional scientist who studied how changes in the epigenome regulate gene expression and cell fate determination during fetal development. Dr. Maatouk contributed immensely to the field of reproductive science and medicine prior to her passing on November 13, 2016, after a two-and-a-half-year battle with aggressive colon cancer.

In Dr. Maatouk's honor, CRS invited **Blanche Capel, PhD,** a James B. Duke Professor of Cell Biology at Duke University and Dr. Maatouk's postdoctoral mentor, to give a research talk. Dr. Capel earned her PhD in Genetics in the laboratory of Dr. Beatrice Mintz at the Fox Chase Cancer Center, Philadelphia, PA. She then completed her postdoctoral research in the laboratory of Dr. Robin Lovell-Badge at the National Institute of Medical Research in London. She joined the Department of Cell Biology at Duke University Medical Center as an Assistant Professor and eventually became a full Professor. The Capel lab studies sex determination, which is the process by which the gonad differentiates into a testis or ovary, and germ cells become oogonia or spermatogonia.

We were honored to host Dr. Capel's lecture titled "From Danielle Maatouk's Pioneering Work to a Better Understanding of the Epigenetic Regulation of Cell Fate Decisions." In her lecture, Dr. Capel covered advancements in knowledge regarding sex determination with insights from genetic and epigenetic studies. Dr. Capel's research has made significant progress in deciphering the mechanisms underlying sex determination in biological development. A few key findings from her research focused on gene expression dynamics and epigenetic regulation in sex determination pathways. Dr. Capel investigated the expression patterns of crucial genes like *Fox9* and *Sox9*, which are pivotal in male and female pathways, mapping gene expression changes over specific time frames to understand sex-specific gene regulation.

Dr. Capel highlighted Dr. Maatouk's findings regarding the role of *Cbx2* in repressing the female pathway and facilitating the establishment of the male pathway. These findings led Dr. Capel to investigate the epigenetic mechanisms of sex determination, particularly histone methylation. It was found that histone methylation serves as a critical regulator of gene expression during sex determination, with KDM6B identified as a conserved regulator responding to environmental cues and influencing the male pathway by modulating genes like DevG one. Further investigations revealed the involvement of *Utx* and *Uty* genes in sex determination, indicating complex interactions with KDM6B.

These findings underscore the intricate network of genes and epigenetic factors governing the balance between male and female pathways. Dr. Capel's recent advancements in understanding sex determination pathways offer valuable insights into the complex mechanisms governing this biological process, promising advancements in developmental biology knowledge across diverse species. These discoveries hold promise for addressing scientific questions and advancing our knowledge of developmental biology

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