



# UNIVERSITÀ DEGLI STUDI DI MILANO

**CONCORSO PUBBLICO, PER TITOLI ED ESAMI, A N. 4 POSTI DI CATEGORIA D - AREA TECNICA, TECNICO-SCIENTIFICA ED ELABORAZIONE DATI, CON RAPPORTO DI LAVORO SUBORDINATO A TEMPO INDETERMINATO PRESSO L'UNIVERSITÀ DEGLI STUDI DI MILANO - DIPARTIMENTO DI SCIENZE FARMACOLOGICHE E BIOMOLECOLARI - CODICE 22290**

La Commissione giudicatrice della selezione, nominata con Determina Direttoriale n. del , composta da:

Prof.ssa Raffaella Molteni	Presidente
Prof.ssa Stefania Lauzi	Componente
Dott. Giuliano Grignaschi	Componente
Dott. Giampaolo Bosi	Segretario

comunica i quesiti relativi alla prova orale:

Gruppo di quesiti n. 1

- Descrivere i metodi di identificazione degli animali
- Descrivere le procedure di congelamento/scongelo di aliquote di linee di colture cellulari
- Conoscenza lingua inglese: tratto da: Connors, J., Cusimano, G., Mege, N., Woloszczuk, K., Konopka, E., Bell, M., Joyner, D., Marcy, J., Tardif, V., Kutzler, M. A., Muir, R., & Haddad, E. K. (2023). Using the power of innate immunoprofiling to understand vaccine design, infection, and immunity. *Human vaccines & immunotherapeutics*, 19(3), 2267295. <https://doi.org/10.1080/21645515.2023.2267295>
  - Systems immunology utilizes multiple technical strategies to generate large amounts of data that, when integrated, can predict immunological responses and allow researchers to understand the complex interactions between the immune system's cellular network and infectious organisms. Although there have been many advances in diagnostic testing for managing infectious diseases such as HIV, dengue and tuberculosis to facilitate early detection and more immediate care, personalized treatment options and treatment options for vulnerable populations such as the elderly are still needed. To this end, identification of novel biomarkers of immunity and of perturbations in immune responses remains critical.

Gruppo di quesiti n. 2

- Descrivere il principio delle 3R
- Descrivere come risolvere il distacco di cellule in coltura con un fenotipo aderente
- Conoscenza lingua inglese: tratto da: Connors, J., Cusimano, G., Mege, N., Woloszczuk, K., Konopka, E., Bell, M., Joyner, D., Marcy, J., Tardif, V., Kutzler, M. A., Muir, R., & Haddad, E. K. (2023). Using the power of innate immunoprofiling to understand vaccine design, infection, and immunity. *Human vaccines & immunotherapeutics*, 19(3), 2267295. <https://doi.org/10.1080/21645515.2023.2267295>
  - With the immune system being made up of hundreds of cluster of differentiation (CD) antigens, cytokines, chemokines, specialized cell populations and thousands of genes, systems tools are required not only to study each component separately but also to combine these data. Combining these data allows researchers to understand the connections and associations that define the homeostatic activities of a healthy immune system and predict the response to changes in the environment, including exposure to harmful antigen and during vaccination against



a large number of diseases. Systems immunology studies have been used to facilitate new hypotheses generation and inform mechanistic studies during the development of novel therapeutics and vaccines since the high-throughput methods used provide accurate and unbiased information in a timely fashion from large data sets.

## Gruppo di quesiti n. 3

- Descrivere vantaggi e svantaggi delle differenti modalità di stabulazione roditori
- Descrivere come procedere per aumentare/migliorare una scarsa crescita di una coltura cellulare
- Conoscenza lingua inglese: tratto da: Connors, J., Cusimano, G., Mege, N., Woloszczuk, K., Konopka, E., Bell, M., Joyner, D., Marcy, J., Tardif, V., Kutzler, M. A., Muir, R., & Haddad, E. K. (2023). Using the power of innate immunoprofiling to understand vaccine design, infection, and immunity. *Human vaccines & immunotherapeutics*, 19(3), 2267295. <https://doi.org/10.1080/21645515.2023.2267295>
  - These large data sets are generated from multi-omics technologies including genomics, proteomics, metabolomics, microbiome profiling, and computational approaches. Together, these results form an integrated analysis of immune function at the molecular and cellular levels to establish predictive models of the networks and dynamic interactions between components of the immune system in health and disease. This will allow researchers to fully comprehend the value of new discoveries, particularly in the quest to manage infections and develop new vaccination strategies, and to define the worth of resulting data, its benefits, and risks, as well as its clinical usefulness, which is the key advantage of using the systems immunology approach.

## Gruppo di quesiti n. 4

- Descrivere i principi di bioesclusione e biocontenimento applicati ai modelli animali
- Descrivere come procedere in caso di contaminazione crociata di colture cellulari
- Conoscenza lingua inglese: tratto da: Connors, J., Cusimano, G., Mege, N., Woloszczuk, K., Konopka, E., Bell, M., Joyner, D., Marcy, J., Tardif, V., Kutzler, M. A., Muir, R., & Haddad, E. K. (2023). Using the power of innate immunoprofiling to understand vaccine design, infection, and immunity. *Human vaccines & immunotherapeutics*, 19(3), 2267295. <https://doi.org/10.1080/21645515.2023.2267295>
  - Innate immune cells serve as a functional immune response to immediate pathogen threats, induced by an array of cytokine, receptor, and pattern recognition pathways. Such an activation allows for the stalling of infection as an immediate response, while a more specific and mounted immune response via adaptive immunity is generated. A key player in these roles is neutrophils, which are constantly circulating and are often the first to the source of invasion or inflammation. Neutrophils (PMN) function via cytokine production, phagocytosis, degranulation, and neutrophil extracellular traps formation (NETosis). Activation occurs shortly after engagement of specific pattern recognition receptors (PRRs) or with complement complexes that can induce phagocytosis.

## Gruppo di quesiti n. 5

- Descrivere la formazione prevista dalla normativa per il personale addetto alle diverse funzioni nell'ambito dell'utilizzo dei modelli animali.
- Descrivere la rilevanza del siero nel medium di coltura e i casi in cui può essere necessario a fini sperimentali la deprivazione di siero



- Conoscenza lingua inglese: tratto da: Connors, J., Cusimano, G., Mege, N., Woloszczuk, K., Konopka, E., Bell, M., Joyner, D., Marcy, J., Tardif, V., Kutzler, M. A., Muir, R., & Haddad, E. K. (2023). Using the power of innate immunoprofiling to understand vaccine design, infection, and immunity. *Human vaccines & immunotherapeutics*, 19(3), 2267295. <https://doi.org/10.1080/21645515.2023.2267295>
  - Macrophages or developing monocytes form an additional component to the activation of innate immunity functioning via phagocytosis and additional cytokine and chemokine signaling during later stages after the onset of infection. Monocytes serve as the free roaming cell, which can differentiate into either pro-inflammatory (M1), anti-inflammatory (M2), or alternatively activated macrophages. Monocytes may not differentiate at all and remain active as phagocytic forms utilizing TLR4 and CD14 for gram negative bacterial identification and subsequent phagocytosis. Once activated, M1 macrophages will recruit more monocytes while inducing more MHC-II expression and maximizing their reactive oxygen species (ROS) and nitric oxide content to allow them to kill invasive pathogens more efficiently.

Milano, 23 novembre 2023

La Commissione

Prof.ssa Raffaella Molteni Presidente

Prof.ssa Stefania Lauzi Componente

Dott. Giuliano Grignaschi Componente

Dott. Giampaolo Bosi Segretario