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# The BOLD Science Conference 2022: Abstract Book Featuring the Work of Undergraduate Science College Students

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**Abstract**
The BOLD Science Conference is organized by the Science College and Science College Student Association at Concordia University and was held on May 6th and 7th. This year's theme was wildfires. The conference promotes the multidisciplinary nature of science and science communication/literacy. It highlights the exceptional research performed by the undergraduate students at the Science College, which were presented as virtual poster presentations through the Gathertown online platform. The Minor in Multidisciplinary Studies in Science (Science College) at Concordia is a program for undergraduates interested in pursuing a career in scientific research. The students are required to complete a minimum of two research projects outside of their Major, in the spirit of promoting the multidisciplinary nature of research.

**Keywords:** wildfires; multidisciplinary; statistics; mathematics; chemistry; biochemistry; physics

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**Conference Abstracts**
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## Poster Presentations in Mathematics and Statistics

### Accumulation of risk from demographic and socioeconomic characteristics on the proper detection and management of hypertension in women

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The objective of this study is to investigate how demographic risk factor combinations are associated with the diagnosis, treatment, and management of hypertension (HTN) in women. Data used were from women aged 20+ from the National Health and Nutrition Examination Survey (NHANES), a representative cross-sectional sample of Americans (2011–2018 cycles, n=9130). Current high blood pressure (HBP, measured: systolic ≥130 mmHg or diastolic ≥80 mmHg), and self-reported HTN diagnosis and HTN prescription medication use were collected. Among those with HBP, HTN statuses were categorized as: undiagnosed, untreated (previous diagnosis, no medication), or undermanaged (previous diagnosis and current medication use). A risk score was calculated (0–4), with one point for each of the following: poverty-to-income ratio ≤1.85, low education (< high school), no health insurance, and Black or Hispanic race/ethnicity. These risk factors were also analyzed separately. Multinomial logistic regression modeling the HTN statuses was used and adjusted for age, BMI, smoking status (current smoker vs not), frequency of healthcare visits (0, 1, 2+ in past year) and most common location of healthcare visits (clinic, health centre, doctor's office, or HMO; other place; none). Analyses incorporated the study design

and sampling weights. The likelihood of having undermanaged HTN was found to be 29% (95% CI: 1.05-1.58), 94% (CI: 1.57-2.39), and 139% (CI: 1.78-3.20) greater for women with risk scores of 1, 2, and 3 compared to 0, respectively, while a risk score of 4 was not significant. Risk score did not predict untreated HTN ($p>0.05$). The results demonstrate the inequities in managing hypertension in women.

## Poster Presentations in Chemistry and Biochemistry

### Functionalization of metal-organic frameworks for art conservation and restoration

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Our world heritage is in a constant state of decay, its conservation for future generations a questions of the skills and technologies at the disposal of conservators in museums and institutions around the globe. Surface chemistry, and especially, material nanoscience, are a prime scientific framework from which to interrogate, analyze, and devise new methods of countering the natural degradation of art works. While the field of conservation science has explored multiple options including gels, highly viscous polymeric dispersions, and nanostructured fluids, it has yet to make full use of the engineerability and functionalization of metal–organic frameworks (MOFs). MOFs are a functionally evolving class of crystalline periodic framework materials synthesized from inorganic nodes and organic linkers. The versatility, tunable structures with adjustable topology, pore size, functionalized linkers and metal sites, and internal surface properties make MOFs a prime candidate for use in art conservation. However, due to their small scale, use in industry has so far been limited.
This work explores possible options for integration of MOFs into larger porous networks for ease of handling, without loss of the characteristics that make MOFs useful for art conservation, namely their surface area and stability in aqueous mediums. To this end, acrylonitrile (PAN) polymer beads containing zirconium-based MOFs UiO-66, UiO-67, and MOF-808 were synthesized at various MOF loading amounts. These PAN-MOF beads were characterized using microscopic and scanning electron microscopy imaging, powder x-ray diffraction, and nitrogen adsorption-desorption isotherms. UiO-66 PAN-MOF beads demonstrated exemplary stability and maintenance of MOF surface area and porosity. UiO-67 and MOF-808 beads uncovered the possibility of polymer incorporation into MOF pores caused by either low polymer concentration or sonication. Overall, promising results demonstrated the possibility of MOF encapsulation for further functionalization for art conservation, and outlined necessary methodological considerations for further research.

## Poster Presentations in Physics

### Comparing the unfolding properties of α-conotoxins using molecular dynamics

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Conotoxins have been a subject of interest ever since their medical properties were discovered in the late 1960s. Today, they still have great potential as alternative analgesics. It is estimated that there are millions of bioactive conotoxins, while roughly 10 000 have been researched. Thus, it is of utmost importance to explore the unknown conotoxins. In this article, we explore the conformational space of RgIA, MII and AUIB α-conotoxins in three isomer forms, both with and without disulfide bond connection. This is done by analyzing 400 ns molecular dynamics simulations, by examining RMSD histograms and free energy landscapes. The data found leads us to believe that the disulfide bonds are the main factor towards their secondary structure. This conformational analysis is a key first step towards clinical usage of these conotoxins.

### Conflicts of Interest

The author(s) declare that they have no conflict of interests.

### Authors' Contributions

YJK: served as planning committee for the conference, reviewed the abstract submissions and ensured they adhered to correct formatting standards, drafted the conference abstract booklet, gave final approval of the version to be published

**Acknowledgements**
The author of this booklet would like to acknowledge the contribution of Sarah Ménard, Élyse Moisan, Carolynn Boulanger and Zoey Davis, the co-executives of the Science College Student Association (SCSA) that organized the BOLD Science Conference. We also thank Dr. Emma Despland (Concordia University) and Vikas Nehra for their support and role in organizing the conference.

**Funding**
The SCSA would like to thank the Concordia Council on Student Life (CCSL) for funding the BOLD Science Conference. The staff, faculty and students of the committee are dedicated to improving the quality of student life at Concordia and supporting student-led initiatives, such as ours.

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**Article Information**
Managing Editor: Jeremy Y. Ng
Article Dates: Received Jul 18 22; Published Aug 04 22

**Citation**
Please cite this article as follows:
Kim YJ. The BOLD Science Conference 2022: Abstract book featuring the work of undergraduate science college students. URNCST Journal. 2022 Aug 04: 6(8). https://urncst.com/index.php/urncst/article/view/398
DOI Link: https://doi.org/10.26685/urncst.398