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OBJECTIVES/GOALS: We endeavor to investigated the hypothesis that muscle protein synthesis (MPS) is stimulated more after consumption of a 4-ounce beef patty as compared to 4- and 8-ounces of a soy protein based meat alternative (SPBMA) and if a greater stimulation is related to differences in the responses of plasma essential amino acid (EAA) concentrations. METHODS/STUDY POPULATION: Participants were aged 18 to 40 years of age with a BMI between 20 and 32 kg/m2. Written informed consent was obtained from all participants, and approved by UAMS IRB. Participants were assigned to one of three intervention groups via a single-blinded permuted block randomization, stratified for sex: 4 oz beef patty; 4 oz SPBMA; 2 x 4 oz (8oz) SPBMA. The impossible burgerTM was selected as it is primarily soy protein, a high-quality plant protein, and specifically designed to mimic a beef burger. Stable isotope were infused to assess protein metabolism. Appropriate muscle and blood samples were obtained. Enrichment and plasma EAA concentrations were measured with mass spectrometry. ANOVA's on the change from basal to postprandial were used to identify group difference, significance was accepted at $p < 0.05$. RESULTS/ANTICIPATED RESULTS: The MPS increase from basal to postprandial indicated a significant main effect of group ($p = 0.026$), with the beef group (0.020 ± 0.016%/hour) being significantly greater than the 4oz SPBMA (0.003 ± 0.010%/hour; $p = 0.021$) but not the 8oz PBMA group (0.013 ± 0.016%/hour; $p = 0.454$). Similar results were observed for whole-body protein synthesis, where the beef group ($p = 0.042$) and 8oz SPBMA ($p = 0.033$) were significantly greater than the 4oz SPBMA ($p = 0.021$). Whole-body protein balance was significantly greater in the 8oz SPBMA as compared to 4oz of beef and SPBMA. Lastly, we observed a significantly relationship ($p = 0.046$; $r = 0.411$) between the maximal plasma EAA concentration and change in MPS, indicating the greater rate of MPS following 4oz of beef is mediated by an higher increase in plasma EAA concentrations. DISCUSSION/SIGNIFICANCE: In conclusion, 4oz of beef stimulates muscle protein FSR more than 4oz of a SPBMA. A common SPBMA can stimulate increase in protein metabolism, however, greater amounts are required as compared to beef protein. Further, the change in the muscle protein FSR response was significantly correlated with the maximal EAA concentration.

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Transcriptomic analysis of Influenza A infected lung organoids reveals Warburg-like phenotype*

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OBJECTIVES/GOALS: The CDC estimates that Influenza infections account for an average of 420,000 hospitalizations and 34,700 deaths in the U.S. each year. This project explores the underlying mechanisms of the infectious process of Influenza A in human lung organoids by examining the differential transcriptomic expression compared to uninfected controls. METHODS/STUDY POPULATION: Lung organoids were cultured from differentiated human bronchial epithelial cells from lung transplant donors on an air-liquid interface until they were confirmed to contain both mucous producing and ciliated cells. Lung organoids are ideal models in translational science due to their structural and functional characteristics which closely mimic those of in vivo human epithelial tissue. Half the organoids were exposed to Influenza A pH1N1 for 72h; the other half served as uninfected controls. RNA was isolated from both groups and sequenced using the Oxford Nanopore MinION which generates full length reads. Reads were aligned to the human reference genome (GRCh38.p14) using Minimap2. RESULTS/ANTICIPATED RESULTS: The MinION sequenced an average of 3.24m reads per sample and a total of 13,128 genes were relevantly expressed (defined as greater than 1 read per million in at least half the samples). ANOVA with a 5% false discovery rate (Benjamini and Hochberg correction) revealed 5,417 differentially expressed genes between infected and control groups. Within this subset, we identified downregulation of mucociliary clearance, mitochondrial and ÃŸ-oxidation, peroxisome, and glutathione replenishment genes. We further identified upregulation in inflammatory markers, lactate dehydrogenase enzymes, and several s100 proteins. The downregulation of mitochondrial and β-oxidation markers and the upregulation of lactate dehydrogenase enzymes revealed a Warburg-like phenotype which has not previously been reported. DISCUSSION/SIGNIFICANCE: This study reveals a novel Warburg-like phenotype in Influenza A infection alongside downregulated mucociliary clearance and upregulated inflammatory processes. These findings improve our understanding of Influenza A infection and point to potential therapeutic targets to advance precision medicine approaches to treatment.

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Treatment experience and symptom burden in multiple myeloma: interim results of a longitudinal electronic patient-reported outcomes study

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OBJECTIVES/GOALS: Patients with multiple myeloma (MM) experience significant disease- and treatment-related symptom burden, especially with higher lines of therapy (LOT). We used a remote symptom monitoring app to characterize overall symptom profile, symptom bother, and quality of life (QOL) among patients with MM across LOT and longitudinally. METHODS/STUDY POPULATION: We used Carevive PROmpt, a symptom monitoring app for cancer patients. From 11/10/22 to 9/27/23, we enrolled 84 adult patients with MM of any stage and anywhere in the treatment continuum from Duke Health MM clinics. Participants received weekly symptom surveys while on active treatment. Per prior studies, we defined heavily pretreated patients as those on current LOT ≥4. Our sample had a mean (SD) age of 63.7 (10.8) years and was 56.0% male; 73.8% had a prior bone marrow transplant, 40.5% were on LOT ≥4 (53.6% on LOT <4, 6.0% missing), 58.3% were on triplet therapy or higher. For 14 symptoms, we described the prevalence of moderate to very severe (MOD-VS) symptoms based on LOT overall and over time. We also described responses to "How bothersome are treatment side effects?" and "Overall QOL over the past week" based on LOT. RESULTS/ANTICIPATED RESULTS: Surveys continued for a mean (SD) of 14.9 (9.6) weeks (range: 44). The top 5 MOD-VS symptoms ever experienced were fatigue

https://doi.org/10.1017/cts.2024.379