in neurons, loss of small-cell perivascular spongiosis and plaque formation were quite pronounced. The most obvious changes were in the upper layers of the cortex where focal atrophy was more prominent than laminar. A large number of corpora amylacea can be significant not only in the foci of necrosis but also in areas of chronic ischemia.

CONCLUSION

Cerebral microangiopathy is a morphological sign of diabetic encephalopathy.

PP-D-03

MORPHOLOGICAL CHANGES OF THE BRAIN IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AND COVID-19

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OBJECTIVES

To investigate the brain tissue of patients with type 2 diabetes mellitus who died from COVID-19.

METHODOLOGY

This study included 31 patients with type 2 diabetes mellitus who had a positive test for SARS-CoV-2 detected by qRT-PCR and eventually expired in 2021 in Lviv regional and city hospitals from complications of COVID-19. We studied macroscopic and microscopic changes in the brain with the use of common histological and immunohistochemistry staining for activated astrocytes (GFAP, Thermo Scientific), activated microglia (CD68, Clone Ab-4, Thermo Scientific), T lymphocytes (CD3, Clone SP7, Thermo Scientific) in the cortex, basal ganglia, brainstem and cerebellum.

RESULTS

In all the cases, arteriolosclerosis with perivascular rarefaction was present. Ischemic lesions in the brain with focal encephalolysis were documented in 15 (48, 39%) out of 31 patients with type 2 diabetes mellitus. Hemorrhagic infarctions were rare. The main cyto/angio-architectural manifestations of brain damage were diffuse alteration of the basement membranes and vascular endothelium, capillary fibrosis and hyalinosis, pericyte proliferation, congophilic angiopathy accompanied by a sharp disruption of transcapillary transport. The astrogliosis with positive GFAP was seen in all cases but showed variable degrees. The perivascular activation of microglia and the microglial nodules with CD68 positive cells were in the studied regions of the brain, but less in the cerebellum. Perivascular infiltration by CD3 was most pronounced in the brainstem.

CONCLUSION

The morphological changes associated with COVID-19 and type 2 diabetes mellitus include pathology of the microvasculature, ischemic infarction with encephalolysis, astrogliosis, microgliosis and perivascular infiltration by CD3 in different regions of the brain.

PP-D-04

ASSOCIATION OF CIRCULATING HYPOXIA-INDUCIBLE FACTOR 1 ALPHA WITH TYPE 2 DIABETES IN INDIVIDUALS WITH SEVERE OBESITY

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OBJECTIVES

Obesity and type 2 diabetes (T2D) are often attributed to hypoxia. Adaptive responses to hypoxia are regulated by hypoxia-inducible factor 1 α (HIF1α). The role of hyperglycemia in mediating HIF1α expression and activity remains unclear. This cross-sectional study aimed to evaluate the relationship between plasma HIF1α and T2D in individuals with severe obesity.

METHODOLOGY

The study involved adults with severe obesity recruited at the Khoo Teck Puat Hospital (N=252, age: 45±8 years, 38% men, body mass index: 41.1 ± 6.5 kg/m^2). The level of HIF1α in plasma was measured by immunoassay. Spearman's correlation and modified Poisson regression analysis were used to evaluate the association of HIF1α with glycated haemoglobin (HbA1c) and T2D, respectively.

RESULTS
Out of 252 subjects, 52 %(n = 131) of the subjects had T2D. A positive correlation was observed between HIF-1α and HbA1c (rho = 0.295, P<0.001). Individuals with T2D had markedly higher median HIF1α levels compared with their non-T2D counterparts [207.1 (IQR:180.4–246.1) vs 155.1 (IQR:132.0–189.6) pg/ml; P<0.001)]. The association between natural log-transformed circulating HIF1α and T2D (outcome) remained significant even after adjusting for age, gender, body mass index and HbA1c (risk ratio: 2.63, 95% CI: 1.85–3.74, P<0.001).

CONCLUSION
To our knowledge, this is the first study to demonstrate an association between circulating HIF1α and T2D in people with severe obesity. Our data suggest that hyperglycemia may result in the accumulation of HIF1α protein, which may contribute to the development of T2D-associated complications. Hence, inhibition of HIF1α expression may exert beneficial effects on T2D and its complications.

PP-D-05

THE EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES (ACE) ON THE DEVELOPMENT OF DIABETES MELLITUS (DM) AND PRIMARY HYPOTHYROIDISM IN ADULTS

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OBJECTIVES
Globally, diabetes mellitus (DM) and hypothyroidism are the leading endocrine disorders. The etiology of DM and hypothyroidism is complex and the influence of toxic stress on their development is yet to be explored. Few studies report high scores of adverse childhood experiences (ACE) in DM patients. Our study aims to investigate the effect of ACE on DM, insulin resistance (IR) and primary hypothyroidism in a local population and to understand its effects on the risk of developing these diseases in adulthood.

METHODOLOGY
A cross-sectional web-based study was conducted. We investigated 123 adults over 21 years old who were clinically diagnosed with DM, IR and primary hypothyroidism in Georgia using an ACE (scores ranging from 0-4+) survey and the CDC guidelines for risk factors for ACE.

RESULTS
Analysis showed that 42 participants had only one of the three endocrine disorders: 27 with DM, 7 with IR and 8 with hypothyroidism. On the other hand, 81 patients had 2 out of 3 disorders: 27 had DM and hypothyroidism while54 had hypothyroidism with IR. ACE score of 4+ was associated with increased odds of DM (OR = 2.51, 95% CI 5.32, 1.18) and hypothyroidism (OR = 1.34, 95% CI 3.04, 0.59). The ACE was not associated with IR (OR = 0.65, 95%CI 1.34, 0.31). However, in patients with both IR and hypothyroidism, a high ACE score was observed (OR = 1.78, Cl 95% 6.28, 0.51). Participants with concomitant DM and hypothyroidism had the strongest association with ACE (OR = 3.26, 95% Cl 9.29, 1.14).

CONCLUSION
Results of the study suggest that a high ACE score increases the risk for DM, hypothyroidism and IR with hypothyroidism. This opens new avenues to develop preventive and management strategies for these diseases.

PP-D-06

MEDITERRANEAN DIET FOR DIABETES MELLITUS TYPE 2 PREVENTION, A LESSON FROM 751,161 SUBJECT: A SYSTEMATIC REVIEW AND META-ANALYSIS

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OBJECTIVES
An unhealthy diet including excessive caloric intake and physical inactivity are strongly associated with future risk for type 2 diabetes (T2D). A meta-analysis by Esposito et al. showed that adoption of a healthy diet will decrease the risk of diabetes by 20%. An example of diet modification is the Mediterranean diet. Hence, we would like to determine the effect of the Mediterranean diet on the prevention of T2D.