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Cerebrovascular disease is a leading cause of mortality and disability and an immense global burden. It is partly related to aging in a metabolic syndrome-promoting environment. Prevention strategies are insufficient: they rely on intermittent screening in predominantly high-risk individuals, while most cases occur in the intermediate risk population. Screening algorithms like the Framingham Risk Score predict events in the next decade using traditional risk factors (age, diabetes, hypertension, obesity, hyperlipidemia, atrial fibrillation and smoking). No current tool can predict a near/impending stroke in the next few weeks/months. This could provide a time window for urgent preventive measures (anticoagulation, hypertension control or lipid lowering). Algorithms analyzing daily computer usage, examining motor, language and executive functions, correlate with standard cognitive tests. Covert cerebrovascular disease is linked to subtle cognitive and motor deficits and increased risk for stroke. We examined whether this could be harnessed to predict an imminent stroke. We developed an algorithm based on internet search queries to identify people at increased risk for a near stroke event. The algorithm was entirely blind to traditional cardiovascular risk factors or risks for cognitive decline. We analyzed queries submitted to the Bing search engine by 285 people for which a stroke event was identified and 1195 controls, with regards to attributes previously shown to reflect cognitive function. Controls included random people 60 years and above or similar aged individuals who queried for one of eight control conditions: myocardial infarction, atrial fibrillation, hypertension, migraine, B12 deficiency, depression, hypothyroidism and surgery. We used a random forest model with 1000 trees to distinguish the patient cohort from each of the control cohorts. Ten-fold cross-validation at the user level was used to reduce the likelihood of overfitting. All processing was conducted using Matlab 2019. **Results:** Our model performed well against all controls with area under the curve of the receiver operating curve (AUC) of 0.985 or higher and a true positive rate (at 1% false positive rate) above 80% for separating patients from each of the controls. The predictive power rose as the stroke date approached and if data was acquired beginning 120 days prior to the event. Good prediction accuracy was also obtained for a prospective cohort of users collected one year later. We propose that impending stroke can be identified through alterations in internet usage patterns that reflect cognitive function, with high predictive power (AUC exceeding 0.985 for a near event in comparison to an AUC of ~0.71 in the Framingham Stroke Risk Score for a 10 year event). This could potentially be applied inexpensively, continuously and on a large scale to willing individuals with the aim of reducing stroke events.

Cardiovascular Endocrinology
CARDIOVASCULAR ENDOCRINOLOGY

The Relationship Between the Aldosterone-to-Renin Ratio and Blood Pressure in Young Adults: A Longitudinal Study

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Background: Hypertension tracks throughout childhood into adulthood. Aldosterone excess, or primary aldosteronism, has been reported as the most common secondary cause of hypertension in adults. Elevated aldosterone in the setting of low renin predicts incident hypertension in normotensive adults. However, the relationship between aldosterone and blood pressure in adolescents and young adults is unclear. **Objectives:** To evaluate the relationship between aldosterone, renin and the aldosterone:renin ratio (ARR) and blood pressure (BP) at age 17y as well as BP at age 27y in a community-based population. **Methods:** This is a prospective birth cohort study. Young adult offspring (Gen2) of women enrolled during pregnancy into the Raine Study, with 1239 at age 17y and 1006 at age 27y, were evaluated. Females taking hormonal contraception and participants without BP data were excluded from the current analysis. A generalised linear model was used to examine the relationship between BP and aldosterone, renin and ARR over time. The median aldosterone, renin and ARR was compared between sexes using quantile regression. **Results:** At 17y, females had similar aldosterone (349 vs 346 pmol/L, p=0.833) but significantly lower renin (20.6 vs 25.7 mU/L, p<0.001) and thus a higher ARR (18.3 vs 13.5, p<0.001) compared to males. However, they had lower systolic BP (109 vs 118 mmHg, p< 0.001) versus males. A significant correlation between ARR and systolic BP was detected in 17y males when adjusted for alcohol consumption, physical activity, urinary sodium and body mass index. This was true when the ARR was expressed as a continuous variable (β-coefficient 0.1, p=0.009) or categorical variable (highest quartile, β-coefficient 3.15, p=0.003). A similar correlation was not observed in females at 17y. However, the ARR at 17y was significantly associated with both systolic (β-coefficient 0.15, p=0.009) and diastolic BP (β-coefficient 0.14, p=0.003) at 27y in females, but not males. **Conclusion:** A relationship between ARR and BP are observed at both 17 and 27 years but with distinct age-related sex differences. Further evaluation of the relationship between ARR and surrogate markers of cardiovascular disease such as vascular reactivity will improve our understanding of aldosterone as a cardiovascular risk factor young people.