Penggunaan Spektrofotometeri Autofluoresensi dalam Klasifikasi Preparat Blok Parafin Jaringan Lambung Mencit Normal, Inflamasi dan Prekanker = Use of Autofluorescence Spectrophotometry in Classification of Paraffin Block Preparations of Normal, Inflammatory and Precancerous Mice Gastric Tissue

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Abstrak

Latar belakang: Kanker lambung bertanggung jawab atas lebih dari 1.000.000 kasus kanker baru pada tahun 2020 dan diperkirakan 769.000 kematian atau sama dengan satu dari setiap 13 kematian secara global. Deteksi dini menjadi kunci penurunan angka kematian dan perbaikan prognosis, dengan baku emas berupa avaluasi histopatologi dari hasil biopsi endoskopi. Tetapi subjektivitas pemeriksan tersebut berpotensi menimbulkan kesalahan diagnosis terutama akibat kesalahan interpretasi ahli patologi. Untuk itu, diperlukan metode diagnostik kuantitatif yang dapat menilai secara objektif lesi prekanker atau inflamasi pada dinding lambung. Metode autofluoresensi sebelumnya sudah digunakan dalam upaya diagnostik kanker lambung. Namun, saat ini belum ada studi terkait penggunaan spektrofotometri autofluoresensi sebagai metode diagnostik kuantitatif dan objektif untuk kanker lambung. Tujuan: Studi ini dilakukan untuk mengetahui kemampuan spektrofotometri autofluoresensi dalam mengidentifikasi jaringan lambung normal, inflamasi dan prekanker berdasarkan intensitas fluoresensi jaringan.Metode: Studi ini menggunakan sediaan blok parafin jaringan lambung mencit (Mus musculus) normal, inflamasi dan prekanker. Intensitas fluoresensi jaringan diukur pada 640 panjang gelombang menggunakan spektrofotometer autofluoresensi sederhana dengan sumber cahaya ultraviolet. Analisis data dilakukan dengan SPSS untuk uji normalitas, homogenitas dan hipotesis. Dilanjutkan dengan pengelompokkan data secara kualitatif dengan Principal Component Analysis (PCA) dan secara kuantitatif dengan machine learning dengan 3-fold cross validation. Hasil analisis dengan PCA dinilai dengan scatter plot. Hasil pengolahan data secara kuantitatif dinilai dengan Area under the Curve (AUC),Classification Accuracy (CA), precision, recall, F1-score, sensitivitas dan spesifisitas. Hasil: Ditemukan dua panjang gelombang dengan intensitas fluoresensi bermakna untuk tiga kelompok jaringan dan 554 panjang gelombang yang bermakna untuk dua kelompok jaringan. Dalam pengelompokkan tiga variabel, ditemukan nilai AUC 0,900, CA 0,833, Skor F1 0,831, Precision 0,802, dan Recall 0,800. Dalam pengelompokkan dua variabel, ditemukan sensitivitas dan spesifisitas 100% untuk membedakan jaringan prekanker dengan normal. Sensitivitas 100% dan spesifisitas 80% untuk jaringan prekanker dengan inflamasi. Serta sensitivitas 80% dan spesifisitas 90% untuk jaringan inflamasi dengan normal. Kesimpulan: Spektrofotometeri autofluoresensi dapat membedakan jaringan lambung normal, inflamasi dan prekanker mencit Mus musculus dengan sensitivitas dan spesifisitas yang baik.
.....Introduction: Gastric cancer was responsible for more than 1,000,000 new cancer cases in 2020 and an estimated 769,000 deaths or equal to one in every 13 deaths globally. Early detection is the key to reducing mortality and improving prognosis, with histopathological evaluation of endoscopic biopsy results as gold standard. However, the subjectivity of the examination has the potential to cause misdiagnosis, mainly due to the pathologist's misinterpretation. For this reason, quantitative diagnostic methods are needed that can objectively assess precancerous or inflammatory lesions in the gastric wall. The autofluorescence method

has previously been used in the diagnostic effort of gastric cancer. However, there are currently no studies related to the use of autofluorescence spectrophotometry as a quantitative and objective diagnostic method for gastric cancer Objective: This study was conducted to determine the ability of autofluorescence spectrophotometry to identify normal, inflammatory and precancerous gastric tissue based on the intensity of tissue fluorescence.Method: This study used a paraffin block preparation of normal, inflammatory and precancerous mice (Mus musculus) gastric tissue. The intensity of tissue autofluorescence was measured at 640 wavelengths using simple autofluorescence spectrophotometer with ultraviolet light source. Data analysis was performed using SPSS to test for normality, homogeneity and hypotheses. Followed by grouping the data qualitatively with Principal Component Analysis (PCA) and quantitatively with machine learning with 3-fold cross validation. The results of the PCA analysis were assessed using a scatter plot. The results of quantitative data processing were assessed by Area under the Curve (AUC), Classification Accuracy (CA), precision, recall, F1-score, sensitivity and specificity. Result: Two wavelengths with significant fluorescence intensity were found for three tissue groups and 554 significant wavelengths for two tissue groups. In grouping the three variables, the AUC value was 0.900, CA 0.833, F1 score 0.831, Precision 0.802, and Recall 0.800. In grouping the two variables, 100% sensitivity and specificity were found to differentiate between precancerous and normal tissues. 100% sensitivity and 80% specificity for precancerous tissue with inflammation. As well as 80% sensitivity and 90% specificity for normal inflammatory tissue. Conclusion: Autofluorescence spectrophotometry can differentiate normal, inflammatory and precancerous gastric tissue in mice Mus musculus with good sensitivity and specificity.