

Centre for Applied Health Economics

Evidence Evaluation for the Diagnostic Accuracy of Iridology: Systematic Review, Appendices A-H

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Evidence Evaluation for the Diagnostic Accuracy of Iridology Systematic Review

Report Information

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Dates

This technical report and accompanying evidence evaluation report received approval from the National Health and Medical Research Council (NHMRC) Natural Therapies Working Committee (NTWC) on 04 May 2022.

The protocol for the evidence evaluation was approved by the NHMRC NTWC on 28 March 2022. (PROSPERO: CRD42022323024)

History

NHMRC has been engaged by the Department of Health and Aged Care (formally Department of Health; Department) to update the evidence underpinning the *2015 Review of the Australian Government Rebate on Natural Therapies for Private Health Insurance* (2015 Review) [1]. The natural therapies to be reviewed are Alexander technique, aromatherapy, Bowen therapy, Buteyko, Feldenkrais, homeopathy, iridology, kinesiology, naturopathy, Pilates, reflexology, Rolfing, shiatsu, tai chi, western herbal medicine and yoga. These therapies are among those excluded from the private health insurance rebate as of 1 April 2019.

To support NHMRC in their evidence review, the Centre for Applied Health Economics at Griffith University were engaged to conduct a systematic review of the evidence of the diagnostic accuracy of Iridology.

This technical report was developed by the Centre for Applied Health Economics at Griffith University in conjunction with NHMRC, NTWC, and NTREAP. It provides the appendices and supplementary data related to an evidence evaluation of the diagnostic accuracy of Iridology. The main body of evidence is presented in the evidence evaluation report. All associated materials have been developed in a robust and transparent manner in accordance with relevant best practice standards [2-5].

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Appendix A: Searching, selection criteria and screening

The methodologies for this systematic review were based on those reported in the Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy [6]. EndNote20 (<u>endnote.com</u>) and Covidence (<u>covidence.org</u>) were used for screening, managing citations, and data extraction. The final approved systematic review protocol was registered on the International Prospective Register of Systematic Reviews (PROSPERO), registration number: <u>CRD42022323024</u>.

A1. Search methods

This appendix documents the search strategy used to inform the systematic review of the accuracy of iridology as a diagnostic tool.

A1.1. Electronic searches

The following search strategy was developed for MEDLINE (based on a recent published scoping search for iridology [7]):

• iridology.mp OR iridodiagnos*.mp. OR (Iris/ AND Complementary Therapies/)

This search string was modified to suit the required syntax for other databases¹.

No date, language or geographic limitations were applied when conducting the search of English language databases. Non-English databases were not searched.

The following electronic databases were searched, from inception until May 2022:

- AMED
- CINAHL
- Cochrane Library
- Embase
- Emcare
- JBI Database of Systematic Reviews and Implementation Reports
- MEDLINE
- PsycINFO
- Systematic Review Data Repository (SRDR)
- Natural Medicines Comprehensive Database
- Scopus
- Web of Science
- PAHO Virtual Health Library.

¹ Based on a query from NTWC working group an alternate search string was also tested. This found 17 publications which were not found in the original search, and of those only one was relevant and was found in the search of Embase. The original search is therefore the one reported and described throughout.

A1.2. Other resources

Reference lists of all included studies were reviewed for potential eligible studies (ancestry search). In addition, studies citing the included studies were reviewed for inclusion (forwards citation search).

The Department of Health invited the public and key stakeholders to provide published research evidence. There was no evidence submitted in the Department's call for evidence for this review. Grey literature was considered out of scope.

A1.3. Publication date

There were no limitations on publication date, however, studies published after the systematic review literature search date were not included.

A1.4. Studies published in languages other than English

Searches were limited to human research. No date, language or geographic limitations were applied when conducting the search of English language databases. However, non-English databases were not searched. If non-English studies were found because of English language database searches, the process outlined in *"Studies published in languages other than English"* was followed. For practicality, potentially eligible studies did not undergo full-text translation or data extraction but were documented via a process outlined in the "Studies published in languages other than English"

A2. Search strategy

The search strings were modified to suit the required syntax for different databases (Table A1).

Database	Search terms
MEDLINE (OviD)	iridology.mp OR iridodiagnos*.mp. OR (Iris*/ AND Complementary Therap*/)
AMED	iridology OR iridodiagnos*
Campbell Systematic Reviews	iridology OR iridodiagnos*
CINAHL	iridology OR iridodiagnos* OR (Iris* Complementary Therap*/)
Cochrane Library	iridology
Embase	iridology OR iridodiagnos* OR (Iris*/ AND 'alternative medicine/exp)
Emcare (OviD)	(iridology or iridodiagnos*).mp. or (iris*.mp. and exp alternative medicine/)
JBI Database of Systematic Reviews and Implementation Reports (Ovid)	iridology OR iridodiagnos*
PsycINFO	iridology.mp OR iridodiagnos*.mp. OR (Iris*/ AND Complementary Therap*/)
Systematic Review Data Repository (SRDR)	iridology
Natural Medicines Comprehensive Database	iridology
Scopus	iridology OR iridodiagnos* OR (Iris*/ AND Complementary Therap*/)

Table A1. Search syntax used for the included databases.

Web of Science	((TS=(iridology)) OR TS=(iridodiagnos*)) OR TS=("Iris" AND "complementary")
PAHO Virtual Health Library	iridology OR iridodiagnosis

Endnote 20 has been integrated with the Retraction Watch database. Using this feature, Endnote 20 was used to identify if any of the included papers were on the Retraction Watch database; however, none were identified.

A3. Search Methods

Eleven studies were included in this review, after screening 1053 records retrieved by database and trial registry searches, and 1 record retrieved via other methods. 106 records were sought for retrieval and 87 were assessed at full text. Full reference details for each excluded study, the source of the study and the reason for exclusion are provided in Appendix C.

A4. Study selection criteria

This appendix documents the criteria used to identify studies eligible for inclusion in the systematic review of the accuracy of iridology as a diagnostic tool.

A4.1. Types of studies

This review includes evidence for the diagnostic accuracy of iridology from primary studies. Eligible study designs included any study which measures the diagnostic accuracy of iridology for a condition via comparison to a valid reference standard (diagnosis by a medical practitioner). Diagnostic case control studies were eligible for inclusion. Both prospective and retrospective studies were eligible for inclusion. Studies were limited to human studies and there were no restrictions on the recruitment of participants, though it was expected most would be in a clinical setting. As a study type, systematic reviews were excluded.

All studies were presented regardless of risk of bias (either in the main report or Appendix); however, only studies with a moderate to low risk of bias are included in the interpretation of the diagnostic accuracy.

Studies exploring machine learning for iridology were initially considered, but further investigation of the results suggested they were not representative of current clinical practice of iridology in Australia and were therefore excluded from the final report. Machine learning studies were only assessed if results were conducted on a "test" set. That is, when developing machine learning algorithms, a "training" set of images is used to help the algorithm learn pattern identification. Results which report on the diagnostic accuracy of this "training" set was excluded, and only studies which explicitly use a separate set of images for testing were included. Often, the process of a separate training and testing set was called "cross-validation", so, any studies including this as their methodology were initially included.

A4.2. Types of participants

A4.2.1. Participants

People of any age with any injury, disease, medical condition, or preclinical condition were eligible for inclusion.

A4.2.2. Target conditions

Iridology is used to diagnose many target conditions, including cancer and kidney disease (as identified via a scoping review conducted to inform the Research Protocol). Target conditions were not pre-specified to include the breadth of iridology practice. Searches were limited to any human clinical condition.

A4.3. Index test(s)

All studies which evaluate the practice of iridology as a diagnostic tool were eligible for inclusion, that is, any activity named as iridology which involves interpreting observations or images of an iris with reference to an iris chart to diagnose a pre-specified condition(s) and/or problem(s). Studies were included irrespective of whether diagnosis was completed by a certified iridologist. Any method of observing or capturing images of the iris, and interpreting iris images, were included.

Studies which included MLAs as part of the index test were initially considered where MLAs were specified as part of iridology's diagnostic process, or as a comparator. Studies must have used MLAs as a diagnostic tool for a pre-specified hypothesis about the relationships between a condition and a region/pattern of the iris; that is, data-driven studies "fishing" for correlations between diagnosis and iris patterns were not included.

Therefore, the following inclusion/exclusion criteria for considering MLA studies was used.

Studies were considered if:

- 1. MLAs were specified as part of the iridological diagnostic process.
- 2. MLAs were based on regions/sections of the iris which correspond to a standard iridology eye chart. Regions of interest in the iris must be pre-specified based on their corresponding organ and condition of interest.

Studies were not considered if:

- 1. The method of MLA was not pre-specified or was unclear.
- 2. MLAs were not used in the context of iridology practice.

After consideration of six MLA studies, it was decided that the studies were about developing MLAs and not relevant to diagnostic accuracy of iridology in current clinical practice in Australia and were therefore excluded from the main report. They are reported in Appendix C6 for completeness.

A4.4. Types of comparators

As this review examined the diagnostic accuracy of iridology for any clinical condition, it was not possible to specify which comparator tests would be considered. Studies that compared iridology to any other comparator (diagnostic test) were considered.

A4.5. Reference standards

Reference standards were required to confirm the presence or absence of a condition within a population. These vary depending by target condition but must include diagnosis by a medical practitioner, as this is the standard in practice for confirming the presence or absence of a condition. Diagnoses by iridologists or other non-medical practitioners were not considered as a reference standard. Studies in which the reference standard was not directly reported as diagnosis by a medical practitioner, or where this was unclear, were assessed for appropriateness on a case-by-case basis.

A4.6. Types of outcome measures

The outcome of interest in this review was diagnostic accuracy (including true positives, false positives, true negatives, false negatives, sensitivity, specificity, negative predictive value, positive predictive value, receiver operating curve or accuracy). Patient-reported measures of experience (e.g., satisfaction), safety, quality or economic outcomes were excluded. Prognostic accuracy outcomes were also excluded (those relating to the progression of disease). Studies were not assessed on outcome measures at the title-abstract review phase in the interest of comprehensive screening.

A5. Selection of studies (inclusion decisions)

This appendix documents how studies were identified, collected, and managed so as to conduct the systematic review of the accuracy of iridology as a diagnostic tool.

A5.1. Studies identified in the literature search

A5.1.1. Inclusion decisions – title/abstract screening

Citations (title/abstract/year/journal) retrieved by the literature searches were imported into Covidence or EndNote and duplicates removed. Two reviewers independently screened the titles and abstracts identified in the database searches, citation searches for eligibility against the inclusion criteria. No citations were provided by the Department. Any discrepancies were resolved via discussion with reference to the inclusion criteria with a third reviewer. Citations that were in a language other than English were tagged and managed as described in the below under "Studies published in languages other than English".

A5.1.2. Inclusion decisions – full text screening

The lead reviewer retrieved full-text copies of eligible articles, and two reviewers independently screened the studies for inclusion. Any disagreements were resolved by discussion, or with reference to a third reviewer. Ineligible studies were marked with a reason for exclusion and listed in Appendix C1. The selection processes were recorded in sufficient detail to complete a PRISMA flow diagram. Eligible studies that were not available in English were noted and managed as described in below under "Studies published in languages other than English" (Appendix C3).

A5.2. Evidence provided through the Department's public call for evidence

No citations were provided through the Department's public call for evidence or by other key stakeholders.

A5.3. Studies published in languages other than English

Studies published in languages other than English underwent title and abstract translation using Google translate. If online translation did not facilitate understanding of the title and abstract, then these studies were listed in a table as "Studies unable to be translated or interpreted at the title/abstract stage". Translated titles and abstracts were screened during the title/abstract screening stage and reported in the PRISMA flow diagram.

Studies not published in English but with translated versions available underwent standard screening. For studies not published in English but which were eligible for full-text review and were likely to meet the inclusion criteria, or if there was any uncertainty, the full-text report was not translated to determine the studies' compliance with eligibility criteria. They were recorded in a

"Studies Awaiting Classification" table in Appendix C3, and this information was reflected in the PRISMA flow diagram.

The potential risk of language bias and its implications for the evaluation were discussed in relevant sections "Overall completeness and applicability of evidence". Appropriate qualifying statements were made throughout the Report to acknowledge that only evidence published in English was reviewed. In relevant sections of the Evidence Evaluation Report, any potential limitations due to language bias that might influence the conclusions of the review were discussed.

A5.4. Collation of studies

Pre-determined data extraction forms were developed. The extraction form was piloted to test practicality and reliability. During piloting, two reviewers jointly extracted the data from two studies into the extraction forms to ensure consistent understanding and suitability of the forms. The remaining included studies were extracted by two authors independently. Where necessary, data extractions were compared by a third reviewer to identify discrepancies in extractions, and discrepancies were reconciled by discussion.

A6. Summary screening results

A6.1. Summary of studies identified through the literature search

We initially obtained a total of 1,054 records from electronic searching and forwards and backwards citation searching (i.e., searching included studies' references and citing articles). After removal of duplicates, two review authors screened 701 records independently. A total of 106 full texts were obtained for detailed assessment after title and abstract screening. A total of 87 studies were excluded after full-text articles were screened, with 15 studies unable to be translated or interpreted and identified as "awaiting classification". See PRISMA diagram (Figure 1) in the main report.

A6.2. Summary results for evidence provided through Department's public call for evidence

Nil.

Appendix B: Methods of data appraisal, extraction, analysis, and reporting for included studies

B1. Risk of bias assessment process

B1.1. Tools used to assess Risk of Bias

Risk of bias of included studies was assessed using QUADAS-2 tool for any studies measuring diagnostic accuracy [8], as advised by the Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy [6].

B1.2. Assessing Risk of Bias

Risk of bias was independently assessed by two reviewers and checked for disagreement. Disagreements were resolved by discussion, with reference to a third reviewer when it was necessary. Risk of bias assessments for each study were made on a scale (low, high, unclear).

Based on QUADAS-2 methodology, studies were scored for risk of bias and applicability based on the individual assessments for each checklist item.

B2. Data extraction process

B2.1. Data items

The following characteristics of included studies were extracted:

- Author, year, study design, clinical setting, and location;
- Journal;
- Number of participants, participant characteristics (including demographics, diagnosis, health status);
- Index test (including target condition, type of equipment used to capture iris image, equipment specifications, analysis technique, classifier (if using machine learning algorithm) and reference standard (when provided);
- Outcomes (true positives, false positives, true negatives, false negatives, inconclusive results, accuracy, sensitivity, specificity, negative predictive value, positive predictive value, receiver operating curve, diagnostic accuracy).

B2.2. Requests for data

For key information that was missing from reports of the included studies, the corresponding authors were contacted. Eight corresponding authors were contacted; however, no responses were received.

B2.3. Missing outcome data

For numerical outcome data that were missing from reports of the included studies, and they could not be obtained from the authors, where feasible, we have calculated them from other available statistics according to methods described in the Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy [6]. For missing data that have been calculated, these were noted in the Evaluation Report for transparency. For studies where missing data could not be reasonably calculated, results were included as narrative (non-quantitative) synthesis of results. Consequences of missing data were discussed and considered in the GRADE assessment.

B3. Data Analysis

B3.1. Measures of effect

Our primary analysis of interest is diagnostic accuracy of iridology, including report of true positives, false positives, true negatives, false negatives, sensitivity, specificity, negative predictive value, positive predictive value, receiver operating curve or accuracy. To explore this, we have applied the recommended Cochrane framework treating each condition separately. For each condition, we have extracted the relevant diagnostic accuracy outcomes (e.g., sensitivity/specificity).

Where these were not available and the data allowed, we planned to extract data to populate a standard 2x2 data table of binary test results against the reference standard. However, none of the studies provided enough detail to populate 2x2 tables and only one study allowed enough detail for an additional true positive to be calculated.

Where certain tests required a threshold level (e.g., HbA1c for type 2 diabetes) primary thresholds of interest were based on the thresholds proposed in the original paper describing the study or on agreed upon clinical threshold used in practice guidelines.

B3.2. Risk of reporting bias across studies

Risk of bias for individual studies were assessed using the appropriate tool as outlined in Section 3.4.4. Assessments for each study were made on a scale (low, moderate, high), and any studies with high risk of bias were excluded. Individual assessments were used to appraise the risk of bias across studies based on the study limitations, imprecision, inconsistency of results, indirectness of evidence, and the likelihood of publication bias.

B3.3. Data synthesis

B3.3.1. Addressing risk of bias

Only studies with a low or moderate risk of bias were included in the interpretation of the evidence. Studies at high risk of bias are noted in Appendix C5.

B3.3.2. Subgroup analyses and investigations of heterogeneity

Given the small number of studies found, it was not possible to perform subgroup analysis.

B3.3.3. Sensitivity analysis

Given the small number of studies found, the heterogeneity between studies and no meta-analysis conducted, no sensitivity analysis could be performed. No sensitivity analysis assessing the impact of study bias was conducted as studies with high risk of bias were excluded as per protocol.

B4. Evidence statements

B4.1. Summary of findings and certainty of evidence

Across each condition the certainty of evidence was assessed using the GRADE approach (26), in which the certainty of evidence was categorised as follows:

- High ($\oplus \oplus \oplus \oplus$): meaning the authors have a lot of confidence that the true effect is similar to the estimated effect.
- Moderate $(\oplus \oplus \oplus \ominus)$: meaning that the true effect is probably close to the estimated effect.
- Low (⊕⊕⊝⊝): meaning the true effect might be markedly different from the estimated effect.
- Very low (⊕⊖⊝⊝): meaning the true effect is probably markedly different from the estimated effect.

The GRADE process provided a framework for determining the certainty of evidence and is based on consideration of the following five factors:

- Risk of bias assessed using relevant tools for the study design (i.e., QUADAS-2). Given studies with high risk of bias were excluded from evidence interpretation, it was not expected that certainty of evidence would be impacted by risk of bias concerns. Risk of bias may be higher if: consecutive patients are not recruited as a single cohort and classified by disease state; the selection or referral process is not clearly described; evaluators are not blind to results of index test and reference standard.
- Inconsistency assessed by examining consistency in sensitivity, specificity, or likelihood ratios. Unexplained inconsistency may reduce quality of evidence.
- Imprecision This was assessed by examining confidence intervals for estimates of test accuracy or true and false positive and negative rates. Wide confidence intervals may reduce quality of evidence.
- Indirectness assessed by examining the relevance of population(s), setting(s), intervention or index test(s) of the studies to the intended population(s) setting(s), intervention or index test(s).
- Publication bias This was based on the extent to which the evidence is available. Publication bias would be suspected when the evidence is limited to a small number of small trials.

B4.2. Development of evidence statements

Findings are reported in a "Summary of Findings" tables in the Evidence Evaluation Report. This includes all reported results on diagnostic accuracy, grouped by condition of interest and/or index test. Results were summarised in tables across the report. The Summary of Findings tables provided a synthesis of the body of evidence, key numerical results, and a summary judgment about the certainty of the underlying evidence for each outcome. Plain language statements were used to describe findings, including the size of effects, and concerns relating to false positives and false negatives.

Appendix C: Citation details of studies assessed at full text but not included

C1. Citation details of studies from search results excluded (not eligible)

There were 66 citations screened at full text that were excluded for not meeting eligibility criteria. Of these, 56 were the wrong study type, 7 were the wrong study intervention, 2 reported wrong outcomes, 1 reported against an ineligible reference standard. Details of these excluded studies are listed by exclusion reason in the tables below.

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Notes
Iridology has no value	Ernst, E.; Munstedt, K.	 Aim: To investigate the value of iridology as a diagnostic tool in detecting some common cancers. Design: Prospective case-controlled study. Setting: Outpatient clinic, Germany. Participants: A total of 110 subjects, of whom 68 had histologically proven cancers of the breast, ovary, uterus, prostate or colorectum. The other 42 individuals were free of cancer. Intervention: All subjects were examined by an experienced practitioner of iridology who was unaware of their gender or medical details. He was allowed to suggest up to five diagnoses for each subject. Main outcome measures: Accuracy of detecting malignancy. Main results: Iridology identified the correct diagnosis in only three cases (sensitivity 0.04). Conclusion: Iridology was of no value in diagnosing the cancers investigated in this study. 	2005	Focus on Alternative and Complementary Therapies	10	4	314- 315	This is a summary of another study
Heart Abnormalities Detection Through Iris Based on Mobile	Kusuma, F. D.; Kusumaningtyas, E. M.; Barakbah, A. R.; Hermawan, A. A.	Heart disease is the main cause of the death. Some modern examination methods in hospitals need a lot of money for this disease. So there is Iridology, one of the popular alternative ways to have a preliminary detection for the condition of organs. Many studies before that combine this method with the computation system. This research proposes a new model for detecting the heart abnormalities through iris based on mobile with several phases of the process, such as capturing based on target, pre-processing, auto crop based on a histogram analysis, heart area extraction feature and classification using thresholding algorithm. This detection is conducted on images taken by the camera of a mobile device and the testing process is carried out on a mobile device. The technique used to capture the iris has affect to the cropping method and the classification process. This experiment is assisted by the iridology expert in Surabaya Mugi Barokah Clinic. The system performance produces 86.66% precision. Some mistakes happen due to the unsuccessful cropping results. The unsuccessful result will impact the segmentation process and the result of segmentation in the heart area.	2018	20th International Electronics Symposium on Knowledge Creation and Intelligent Computing (IES- KCIC)			152- 157	

Table C1. Characteristics of excluded studies – exclusion reason: wrong study type (n=56).

Application of Liver Disease Detection Using Iridology with Back- Propagation Neural Network	Herlambang, Rganp; Isnanto, R. R.; Ajulian, Z. A.	Iridology is the study of iris structure as a reflection of the organ condition and system in the human's body. In this study, the organ which is detected is liver. To determine the condition of the liver through iris, texture analysis and classification process are needed to distinguish iris of eye that contains the condition of normal and abnormal liver. The purpose of this study is to detect the condition of the liver through iris using back-propagation neural network with the Gray Level Co-occurrence Matrix (GLCM) for feature extraction. Application to detect liver conditions was made using Matlab version 8.1.0.604 (R2013a). Inputs for this study which is used is the eye image with both normal and abnormal conditions of the liver, based on Bernard Jensen's iridology chart. The image is then carried out with iris localization process, ROI-making organ of the liver, and GLCM feature extraction. Results of feature extraction is used as input data (training data and test data) for the back -propagation neural network method, then used to diagnose liver organ conditions. On the obtained test results, a number of hidden layer units showed a growing number of units in the hidden layer that makes Mean Square Error (MSE) value will decrease. It makes network performance is getting better. Based on the test results, 35 test data with four variations of the number of units in the hidden layer, namely, the variation of the number of hidden layer units [40 (layer 1), 20 (layer 2)], [50 (layer 1), 20 (layer 2)], [70 (layer 1), 30 (layer 2)], and [80 (layer 1), 30 (layer 2)]. Sequentially, the data show the success rate percentage of 77.14 %, 80 %, 88.57 %, and 91.42 %. Thus in this test, the best success percentage is 91.42 %	2015	International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE)		123- 127	
Early Detection of Diabetes by Iris Image Analysis	Yashodhara, P. H. A. H. K.; Ranasinghe, D. D. M.; Smys, S.; Balas, V. E.; Kamel, K. A.; Lafata, P.	Diabetes has become a global problem due to changing lifestyles, daily eating habits, level of stress encountered by people, etc. According to statistics of the World Health Organization (WHO) in 2016, 8.5% of the adult population of the world is suffering from diabetes. Therefore, early detection of diabetes has become a global challenge. The iris of the human eye depicts a picture of the health condition of the bearer. Iridology is a method conceived decades ago that focuses on the study of iris patterns such as texture, structure and color for diagnosis of various diseases. By analyzing the images of human iris, a medical imaging method was explored with computer vision for the pancreas, kidney and the spleen of the human body where the local datasets were collected using a Digital Single Lens Reflex (DSLR) camera. Diabetes detection system with a low cost was created focusing on the localization, segmentation, normalization and the system predicts the severity of diabetes with 85% accuracy. \hat{A} © 2021, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.	2021		173 LNNS	615- 632	
Application For Heart Abnormalities Detection Through Iris	Entin, M. K.; Barakbah, A. R.; Syarifa, A. S.; Hermawan, A. A.;	Iridology is the science that allows a health practitioner or non expert to learn the signs in the iris of the eye that is capable of indicating the presence of abnormalities in the body, including basic genetics, toxin deposition, dam circulation, and other weaknesses. Research on computerized iridology had been done before. This paper present a computerized iridology system for detecting heart conditions which is designed through several stages such as pre-processing, auto cropping, segmentation, feature extraction and classification using Thresholding Algorithm. Put a sample of the patient's iris shows the condition of normal and abnormal heart. Our proposed heart abnormalities detection system performs in Mugi Barokah Clinic Surabaya. We made	2016	18th IEEE International Electronics Symposium (IES)		315- 322	

		an experimental study of our proposed system by using 40 data of normal and abnormal patients to determine the effectiveness of our application system. Our heart abnormalities detection system gives contribution for the patient with 86,4% accuration.						
Stomach Disorder Detection Through the Iris Image Using Backpropagation Neural Network	Dewi, A. K.; Novianty, A.; Purboyo, T. W.	Stomach is a digestive organ which is the most vulnerable to diseases which are caused by the increased stomach acid production due to wrong diet. Many people sometimes ignore, even worse underestimate this, but if it's been ignored too long, it will lead to death. Thus it's necessary for routine check to determine whether there is disturbance in the stomach organ or not. One simple way to check is through the iris or called iridology. Iridology in science is based on an analysis of the composition of the iris. In particular slice has specific advantages, which can record all state organs, body construction, also psychological condition. In this final project will be made a system which can detect the presence or absence of disturbances in someone's stomach. This software works by taking an image by camera. After that, system will do the feature extraction by using Principal Component Analysis (PCA) and classify it with method Backpropagation Neural Network. From result of testing that has been done, the conclusion is the system is very good at doing classification process with one hidden layer and produce a level of accuracy up to 87,5% from 40 iris image data.	2016	1st International Conference on Informatics and Computing (ICIC)			192- 197	
Iris features-based heart disease diagnosis by computer vision	Nguchu, B. A.; Li, L.; Jiang, X.; Falco, C. M.	The study takes advantage of several new breakthroughs in computer vision technology to develop a new mid-irisbiomedical platform that processes iris image for early detection of heart-disease. Guaranteeing early detection of heart disease provides a possibility of having non-surgical treatment as suggested by biomedical researchers and associated institutions. However, our observation discovered that, a clinical practicable solution which could be both sensible and specific for early detection is still lacking. Due to this, the rate of majority vulnerable to death is highly increasing. The delayed diagnostic procedures, inefficiency, and complications of available methods are the other reasons for this catastrophe. Therefore, this research proposes the novel IFB (Iris Features Based) method for diagnostic tool. The method analyzes abnormal inherent weakness in tissues, change in color and patterns, of a specific region of iris that responds to impulses of heart organ as per Bernard Jensen-iris Chart. The changes in iris infer the presence of degenerative abnormalities in heart organ. These changes are precisely detected and analyzed by IFB method that includes, tensorbased-gradient(TBG), multi orientations gabor filters(GF), textural oriented features(TOF), and speed-up robust features(SURF). Kernel and Multi class oriented support vector machines classifiers are used for classifying normal and pathological iris features. Experimental results demonstrated that the proposed method, not only has better diagnostic performance, but also provides an insight for early detection of other diseases.	2017		10420			
Classification of iris image of patient chronic renal Failur	Wibawa, A. D.; Sitorus, M. A. R.; Purnomo, M. H.	Iridology is an alternative method in studying the condition of human internal organ through the image of iris. Iris chart has been introduced by scientists (Bernard Jensen) long time ago. In this paper we classified the iris image of patients CRF (Chronic Renal	2016	Journal of Theoretical and Applied	91	2	390- 396	

(CRF) using watershed algorithm and support vector machine (SVM)		Failure) on stage 5 (End Stage of Renal Disease). Sixty one hemodialysis patients and 21 healthy volunteer with normal or nearest normal kidneys participated in this research. Iris image of CRF patients were taken using specific iris camera. Watershed transform technique was used to extract the features of iris image of hemodialysis patients. The ROI (region of interest) of iris image of renal organ is at 5.35-5.95 (2520 $\hat{a} \in 2680$) for right eye and at 6.05-6.6 (2720 - 2880) for left eye assuming that the circle of iris is divided into 120 points (3600). The medical records of participants were used to validate the result of this study. The result showed that 87.5% of patients hemodialysis has shown broken tissue on their right iris and 89.3% has shown broken tissue on their left iris. In conclusion, the condition of renal organ of CRF patients mostly showed broken tissue in their iris image. SVM was used to recognize the iris image whether it contains broken tissue that showing kidney disease or not, and the accuracy showed that for learning and testing dataset, best mean of precission is 87.5% and best mean recall is 91.7% given by the percentage split 90 (where the data training was 90% and data testing was 10%).		Information Technology				
Iris recognition using genetic programming to detect pancreas condition related with diabetes mellitus	Purnomo, M. H.; Nugroho, S. M. S.; Wibawa, A. D.	Iridology is an alternative method in evaluating the condition of our internal organ by looking at the image of iris. Evaluating the iris is done by detecting the presence of some broken tissues in iris. In this paper, input image of the iris will be taken by using a video camera in real time. The presence of broken tissues in iris in a certain area will represent the condition of certain organ according to the chart of iris. The organ that will be observed, in this research, is Pancreas. Pancreas's position in iris is at 07.15 - 07.45 when a circle of iris is divided by 120 points. Some image processing methodes will be used to enhance the quality of image of iris so that the broken tissues in area of pancreas can be detected clearly. Finally, the result of this detecting method will be compared with the Insulin normality test.	2006				233- 236	
How iridology and orthodox medicine work together	Davidson, F.		1985	J Alternat Med	3	11	17-8	
Texture feature extraction and classification for iris diagnosis	Ma, L.; Li, N.	Appling computer aided techniques in iris image processing, and combining occidental iridology with the traditional Chinese medicine is a challenging research area in digital image processing and artificial intelligence. This paper proposes an iridology model that consists the iris image pre-processing, texture feature analysis and disease classification. To the pre-processing, a 2-step iris localization approach is proposed; a 2-D Gabor filter based texture analysis and a texture fractal dimension estimation method are proposed for pathological feature extraction; and at last support vector machines are constructed to recognize 2 typical diseases such as the alimentary canal disease and the nerve system disease. Experimental results show that the proposed iridology diagnosis model is quite effective and promising for medical diagnosis and health surveillance for both hospital and public use. © Springer-Verlag Berlin Heidelberg 2007.	2008		4901 LNCS		168- 175	

Organ Disorder Identification Through Iris Using Multilayer Perceptron Algorithm	Tamam, M. T.; Hardani, D. N. K.; Hayat, L.	Human organ condition can be seen through the iris as learned in iridology. Iridology is the study of network structure contains in the iris pattern. By the sign of color, texture, and location of pigment in the iris, the state of someone health can be analyzed. Consider to person's health, identifying disease as well as potential development is very good topic to research. It also can be used as a highly effective complement to gain physical health and quality of life. It has become an important thing to do research in the identification of organs disorder through the iris pattern. The method used in the identification process is a combination of Independent Component Analysis (ICA) with FastICA and MultiLayer Perceptron algorithm. By mixing three different images, it can be obtained three different outputs with different kurtosis value. From those three outputs, one image with has the highest kurtosis value is considered synonymous with the original image. There are seven statistical characteristic extraction results are used as input in the classification process by the method of MultiLayer Perceptron algorithm which are the average, standard deviation, skewness, kurtosis, energy, entropy, and smoothness. The results of the of classification by MultiLayer Perceptron algorithm produces an accuracy rate of 78.9%, a sensitivity of 86.67% and a specificity of 65.38% for organ disorder identification. As for the normal condition, identification produces 78.9% in accuracy rate, 65.38% in sensitivity and 86.67% in specificity.	2016	1st International Conference on Engineering and Applied Science (InCEAS)			198- 202	
Look into my eyes. Iridology exposed	Stark, D. J.		1981	Medical Journal of Australia	2	13- Dec	676-9	
Iridologic Methods in the Diagnosis of Complication of Sexually- Transmitted Infection in Male Patients	Afonin, A. V.; Vasilyev, M. M.; Velkhover, Y. S.; Afonina, R. V.; Klyuvayev, V. V.; Kharitonov, A. L.	The authors suggest the iridodiagnostic method for the screening of patients with complications of sexually-transmitted infections. The iridologic signs of chronic prostatitis are trabecular cleavage in the 4 h 20 min - 5 h segment of the ciliary zone adjacent to the autonomous ring outside the right iris and in the 7 h 35 min - 7 h 40 min segment of the ciliary zone adjacent to the autonomous ring outside the right iris and in the 7 h 35 min - 7 h 40 min segment of the ciliary zone adjacent to the autonomous ring outside the left iris, as well as inaccurate trabecular linearity and presence of lacunes with white pigment deposits on the edges. Iridal diagnostic method was used in examinations of 100 healthy controls, 300 patients with confirmed chronic prostatitis, and 500 men examined to assess the diagnostic value of this method. In 276 of the 300 (in 92 %) examined patients the characteristic iridologic picture coincided with the diagnostic method was confirmed by clinical laboratory methods, ultrasonic scanning included, in 364 (72.8 %). These results recommend the iridodiagnostic method for screening of venereologic patients.	1991	Vestnik Dermatologii I Venerologii		8	51-54	
Potential of Heart Disease Detection Based on Iridology	Yohannes, C.; Nurtanio, I.; Halim, K. C.	Every year the number of deaths caused by heart disease continues to increase. This is mostly caused by misdiagnosis or misinterpretation of the heart disease symptoms. Therefore, people need to be aware of this disease by maintaining a healthy lifestyle and conducting regular checks on the potential for heart disease. This early examination can be done using the iridology method, namely by analyzing the iris of the eye. This paper presents the implementation of computer vision and machine learning of iridology to detect the potential for heart disease. This system uses Canny edge detection and Principal Component Analysis (PCA) to extract features in the iris region	2020		875			

		of the eye, and Backpropagation Algorithm of Artificial Neural Networks to create the predictive model. There are 110 data used in this system, consisting of 55 eye images from subjects suffering from heart disease and 55 images of normal subjects. The data is divided into 88 data for training and 22 data for testing. The proposed system produced accuracy up to 95.45% for the test data using the sigma 0.3 for canny edge detection, 50 principal components, 50 hidden neurons, and 0.01 for the error limits. © 2020 Published under licence by IOP Publishing Ltd.						
Designing Diabetes Mellitus Detection System Based on Iridology with Convolutional Neural Network Modeling	Velia, D.; Saputro, A. H.	Diabetes mellitus is one of the uncontagious diseases with the highest mortality rate in the world. It happens because of the increased risk of complications caused by the disease. One of the preventative ways is to do early detection, one of which is by using the iridology method. The method detects damage to the body's organs through the signs that appear on the iris. The paper has introduced a Diabetes Mellitus Detection System to classify diabetes using a Convolutional Neural Network (CNN). The proposed method removed the pupil segmentation step that is important in the traditional machine learning classification system. The squared pupil image size 720×360 pixel was trained using Adam's algorithm with a learning rate of 0.001 to develop the CNN model. The pupil image was collected using Iriscope Iris Analyzer Iridology 9822U camera. The dataset consists of 35 healthy and 14 diabetes subjects that repeat three times of each person. The proposed approach has an accuracy of 96.43% that better performance compared to traditional machine learning. © 2020 IEEE.	2020					
The relationship between diabetes, obesity and iris markings in African-Americans in Montgomery County, Alabama	Valentine, Peggy; Xu, Jiangmin; Jones, Tatiana; Haile, Herman Laila; Goore, Myrtle; Smolnik, Jane; Egnin, Marceline	Diabetes mellitus is a common health problem in the United States, and African- Americans are disproportionately affected, especially among those who are overweight and obese. Health professionals are aware that obesity and a family history of diabetes increase one's risk for acquiring the disease. Therefore, the field of genetics offers insight into future risks based on the polygenic nature of inheritance and environmental components. Iridology analysis could be used as a diagnostic tool to predict and evaluate the possibility of developing type 2 diabetes for those obese individuals based on their iris markings with associated genetic inheritance. Our study examined 43 African-American residents in Montgomery, Alabama, where the prevalence rates of diabetes and obesity are among the highest in the nation. Comparisons of iris markings were made between individuals in different groups. The findings revealed that extremely obese group had more iris markings in the pituitary and pancreatic regions than the obese and normal weight groups. Further, the diabetic obese group had more iris markings in the pancreatic region than the non-diabetic obese and normal groups. The findings not only highlight the importance of iridology analysis in diabetes research but also may suggest the possibility of adding iris markers as a genetic identifier to public health strategies aimed at detecting and preventing diabetes. (PsycInfo Database Record (c) 2021 APA, all rights reserved)	2012	Building community capacity: Minority and immigrant populations			91- 104	
Association between iris constitution and apolipoprotein E	Um, J.; Hwang, C.; Hwang, W.; Kang, S.; Do, K.; Cho, J.; Kim, S.;	OBJECTIVE: Iridology is a complementary and alternative medicine (CAM) that involves the diagnosis of medical conditions by noting irregularities of the pigmentation in the iris. Iris constitution has a strong familial aggregation and heredity is implicated. Apolipoprotein E (apoE) gene polymorphism is one of the most well-studied genetic	2004	Journal of Alternative & Complementary Medicine	10	6	1101- 1105	

gene polymorphism in hypertensives	Shin, T.; Kim, Y.; Kim, H.; Hong, S.	markers for vascular diseases, including hypertension. In this study, we investigated the relationship between iris constitution and apoE polymorphism in hypertensives. DESIGN AND SUBJECTS: We classified 87 hypertensives and 79 controls according to iris constitution and determined the apoE genotype of each individual. RESULTS: A significantly higher percentage of individuals with neurogenic constitutions was found in the hypertensive group when compared with the control group (chi(2) = 40.244, p < 0.001). In addition, a neurogenic constitution increased the relative risk for hypertension for subjects with an apo epsilon2 or an epsilon4 allele (chi(2) = 4.086, p = 0.049, odds ratio = 2.633, confidence interval = 1.004-6.905). CONCLUSIONS: Our results imply that a neurogenic iris constitution enhances the relative risk for hypertension in subjects with the apo epsilon2 or epsilon4 allele. Furthermore, we attempted to evaluate the efficacy of iris constitutional medicine and to find an association with hypertension.				
Iridology-based dyspepsia early detection using linear discriminant analysis and Cascade Correlation Neural Network	Sulistiyo, M. D.; Dayawati, R. N.; Pahirawan, P. A. M.	Dyspepsia is a condition of indigestion and became one of the diseases with a large number of patients in Indonesia. Early detection of Dyspepsia is done to assist in the prevention of the disease. Iridology is a method of early detection in human organs disorders by analyzing the iris patterns. However, the application of Iridology technique often finds difficulties because it requires a high level of precision in the iris image observation. The low quality of the image also leads to the high possibility of human error. Therefore, research in this paper is aimed to build Iridology-based image processing system to detect early Dyspepsia. Stages of feature extraction and classification is important and determines how the performance of the established system. The method of Linear Discriminant Analysis (LDA) is used in the feature extraction stage to reduce the image feature dimension and obtain the features vector of the image that is being observed. Meanwhile, Cascade Correlation Neural Network (CC-NN) is a classification model that is used to determine whether an observed image shows the symptoms of Dyspepsia or not. Based on previous studies, it was shown that the CC-NN with its learning mechanism capable of producing high accuracy in classification problems. With the combination of these two methods, the system can generate fairly high accuracy in detecting Dyspepsia using Iridology-based techniques. The highest accuracy rate that can be achieved by the system is 95.45% for both in training and testing set. © 2014 IEEE.	2014		139- 144	
FCM based Iris image analysis for tissue imbalance stage identification	Sivasankar, K.; Sujaritha, M.; Pasupathi, P.; Muthukumar, S.; Sathiyamoorthy, S.; Elizabeth Caroline, B.; Gnana Jayanthi, J.	The iris of human eye is globally identified as the better solution for biometric systems with its unique feature and complex pattern. In other side the iris has the significance to reflect the changes in human body with the varying health condition. This study of the iris for medical purposes is called iridology. A primary theory of Iridology is that the iris is constructed in layers that represent the four stages of tissue activity, namely acute changes, sub-acute changes, chronic changes and degenerative changes. Iridology is a novel, cost-effective and non-invasive approach of medical analysis because there are no touching, no damage to human body. The Iridologists have to measure color of iris, its density, open and closed lesion, iris signs and the corresponding location of body organ in iris image as stated in iridology chart. This paper is proposing a real time approach to analyze human iris specifically for Pulmonary Diseases due to problems in lung organ, using Image Processing techniques such as Circular Hough Transform,	2014		210- 215	

		Fuzzy C-Means clustering and Gray level analysis. The efficiency of the proposed system is analyzed for its correctness with iridologist report. © 2012 IEEE.						
The prevalence of iridologic signs in individuals with diabetes mellitus	Salles, L. F.; da Silva, M. J. P.; Araújo, E. A. C.	OBJECTIVE: To verify the prevalence of iridologic signs, such as the pancreas sign and the Cross of Andreas, in individuals with Diabetes mellitus and the association of these signs with three risk factors for the disease: obesity, sedentarism and heredity. METHODS: Collection occurred from April to June, 2006, involving 97 individuals over 30 years of age with Diabetes mellitus, cared for at Centro de Saúde Escola 'Geraldo de Paula Souza', São Paulo. RESULTS: After having their irises analyzed, the adjusted prevalence of the pancreas sign and the Cross of Andreas was observed, with 98% and 89%, respectively. There were significant associations (p < 0.001) between obesity, sedentarism and family history for diabetes with both signs studied. CONCLUSION: Evidence shows data of interest for the preventive area and the necessity for new studies.	2008	Acta Paulista de Enfermagem	21	3	474- 480	
Colon detection using Principal Component Analysis (PCA) and Support Vector Machine (SVM)	Rizanti, N. A.; Arini,; Setianingrum, A. H.	Large intestine or colon has an important role in human digestion system including assimilation process, especially vitamin, mineral, and water, forming feces from leftovers food that has not function to body. Human life style including the type of food that consumed is affect to colon condition. Iridology as science used to knowing organs condition by iris can be alternative to early examination colon condition. The examination can be used in computerization with applying Principal Component Analysis (PCA) as feature extraction method and Support Vector Machine (SVM) as classification method in data input iris image. © 2016 IEEE.	2016					
Detection of heart abnormalities and high-level cholesterol through iris	Reshma, P. A.; Divya, K. V.; Subair, T. B.	Iridology is medicine technique to claim the colours, characteristics and pattern of the iris. Iridology is used to determine the existence of basic genetics, irregularities in the body, dam circulation, toxin deposition and other weakness. This paper discusses the determination of high-level cholesterol in blood and heart conditions through several stages. In this study, we examine the heart condition and cholesterol through preprocessing, segmentation, feature extraction and classification from the captured iris image. Due to the high level of cholesterol in blood, sodium ring is to be formed around the iris. © Springer Nature Switzerland AG 2019.	2019	Lecture Notes in Computational Vision and Biomechanics	30		339- 346	
Deep learning based chronic kidney disease detection through iris	Rehman, H. A. U.; Lin, C. Y.; Su, S. F.	Kidney is an important organ in human body as it maintains the nutrients and fluid balance in our body. It is extremely beneficial if its dysfunctionality is diagnosed at an early stage. Iridology provides a pathway to examine the kidney disease through iris images. Therefore, in this work we proposed the Iris-based Kidney Disease Identification System (IKDIS). The IKDIS would aid in identifying abnormalities through iris images an input which would be followed by application of deep neural network model for assessment. This type of diagnostic system without involving any instruments for assessment of human body organs is much popular these days. The data of 49 patients gives promising results of IKDIS, achieving overall accuracy of 86.9% during the experiment. © 2021 Institute of Physics Publishing. All rights reserved.	2021		2020			
Using iris recognition algorithm,	Ramlee, R. A.; Ranjit, S.	The objective of this paper is to use existing iris recognition methods as an alternative method to detect the presence of cholesterol in blood vessel. This research adopts John Daugman's and Libor Masek's iris recognition methods and alternative medicine,	2009				714- 717	

detecting cholesterol presence		iridology. Based on the iris recognition methods and iridology chart, a MATLAB program has been created to detect the present of cholesterol in human body. \hat{A} © 2009 IEEE.				
Detection of cholesterol levels by analyzing iris patterns using backpropagation neural network	Rachman, L. B.; Basari,	Detecting cholesterol levels with iridology can be an alternative method for checking human's health. Iridology analyzes diseases and weaknesses of the body based on the shape and structure of the iris. This study uses image processing to analyze patterns in the outer portion of the iris bordering the sclera. Colored iris images are converted to grayscale to facilitate image processing. The results of color conversion still contain noise so that the Median Filter is used to eliminate noise in the image. The iris image which is still in the form of polar is transformed into a rectangular shape. This is used to facilitate the taking of the area to be analyzed. Next, the iris image is filtered using a Gaussian Filter to get smooth results. This is used to remove lines on the iris image after being converted into a rectangular shape. From the filtered image, the statistical value is calculated using the Gray Level Co-Occurance Matrix (GLCM). This is a comparison method which will produce several statistical characteristics, namely Energy, Correlation, Contrast, and Homogeneity. The four statistical characteristics will be used as input data for training using the Backpropagation Neural Network method that will produce output in the form of normal cholesterol or high cholesterol. The results of experiments on thirty images obtained an accuracy of 96.67%. © 2020 Institute of Physics Publishing. All rights reserved.	2020	852		
Design of Convolutional Neural Network Modeling for Low- Density Lipoprotein (LDL) Levels Measurement Based on Iridology	Putri, S. H.; Saputro, A. H.	Cholesterol is a waxy substance that contains fat required to produce hormones and other substances in the body. The excessive cholesterol in the blood vessel can be mixed with other substances and called Low-Density Lipoprotein (LDL). LDL can clog the blood vessel and caused heart disease and stroke. Measuring LDL levels is generally done by taking blood samples (invasive) with the lipid profile test method. This research focused on developing a non-invasive detection system for LDL levels status prediction based on eye image using Convolutional Neural Network (CNN) as a classification model. One indicator of excess LDL levels is a greyish-white ring that surrounds the iris called the corneal arcus. The image processing used the Circular Hough Transform (CHT) algorithm for the localization process and Rubber-Sheet Normalization to normalize the iris region. This LDL level status prediction system used CNN as a classification model with 5-fold cross-validation results in an accuracy of 97.14%. © 2020 IEEE.	2020			
Prediction Instrument of Diabetes Mellitus based on Iridology Image and Artificial Neural Network: Initial Findings	Putri, R.; Saputro, A. H.	One of the diabetes mellitus detection methods is to measure the blood glucose by drawing a small amount of blood. Other than that, some non-invasive methods also have been developed, one of the alternative methods is iridology. The mapping of organs that corresponded in iris image can be used to detect damaged tissues of an organ, particularly in the pancreas where insulin hormone is made. This paper focuses on developing a non-invasive diabetes mellitus prediction system through an iris image using image acquisition instrument and image processing algorithm. The processing starts with image enhancement using FFT filter and grayscaling, iris localization using Circular Hough Transform (CHT), and normalization using rubber sheet normalization.	2019			

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			Segmentation on the pancreas in iris image then resulted as followed, one ROI of the right eye image and two ROIs of the left-eye image. The image acquisition is done with a maximum of three images taken from 15 healthy subjects and 11 diabetes subjects. Feature extraction method that has been used is the Gabor filter, using the texture feature of the segmented iris image. The confusion matrix is used as an evaluation method to obtain the accuracy parameter of the system. Classification model of Artificial Neural Network (ANN) is implemented to classify between diabetes and healthy subjects with results of accuracy number 91.54% and 89.05% for training and testing data respectively. The result shows that this system can be proposed as a tool to help in medical uses for the prediction of diabetes. © 2019 IEEE.					
	Implementation of neural network classification for diabetes mellitus prediction system through iridology image	Putri, R.; Saputro, A. H.	One alternative and a non-invasive method named iridology, has been developed to find more effective way of detecting diabetes mellitus. Iridology is the method of mapping the human organs, and it has corresponded in iris' zone. It can be used to detect damaged tissues, particularly in the pancreas where it holds the primary role of producing insulin. This study focuses on developing a non-invasive diabetes mellitus prediction system through an iris image using an image processing algorithm and neural network model. The processing starts with image enhancement using FFT filter and grayscaling, iris localization using Circular Hough Transform (CHT), and normalization using rubber sheet normalization. Segmentation on pancreas in iris image then resulted as followed, one ROI of right-eye image and two ROIs of left-eye image. The image database is collected with maximum of three images taken from 15 healthy subjects and 11 diabetes subjects, resulted in 201 data images. Feature extraction method that has been used is the Gabor filter, using the texture feature of the segmented iris image. The evaluation method we use for the system is the confusion matrix to obtain its accuracy and other parameters. Classification model of Feed-Forward Neural Network (FNN) is implemented to classify between diabetes and healthy subjects with the best results of accuracy number 95.74% and 92.57% for training and testing data respectively. The result shows that this system can be proposed as a complementary tool for therapeutic methods for diabetes prediction. © 2019 IEEE.	2019				
	Iris Acquisition and Detection for Computer-Assisted Iridiology	Perner, P	The iris of a human is not only relevant for biometry; it is also relevant for the prediction and diagnosis of human health. One understands by iris diagnosis (Iridology) the investigation and analysis of the colored part of the eye, the iris, to discover factors which play an important role for the prevention and treatment of illnesses. Up-to-date the iris diagnosis is done manually and is concerned with the know problems, objectivities and reproducibility. An automatic system would pave the way for much wider use of the iris diagnosis for the diagnosis of ill-nesses and for the purpose of individual health protection. In this paper we describe the state-of-the-art of the Iridology. Different ways of image acquisition and image preprocessing are explained. We describe the image analysis method for the detection of the iris. This method is based on our novel case-based object recognition and case mining method.	2014	22nd IEEE Signal Processing and Communications Applications Conference (SIU)		2291- 2295	

Heart disorder detection based on computerized iridology using support vector machine	Permatasari, L. I.; Novianty, A.; Purboyo, T. W.	Human iris can be used for detecting organ disorders based on iridology science. Nowadays, iridology diagnosis can be done automatically by computer using artificial intelligence approach. This research focused on cardiac diagnosis based on left iris map on clockwise direction around 2:00 to 3:00. The Principal Component Analysis (PCA) is used for feature extraction while the Support Vector Machine (SVM) for classification. Experimental results showed that the highest accuracy of classification is 80% for the classification.	2017		157- 161	
Preliminary study on iris recognition system: Tissues of body organs in iridology	Othman, Z.; Satria Prabuwono, A.	Iris recognition gives many advantages to those who practice iridology in order to detect symptom in patient's iris. In iridology, there are many factors in it iris analysis have to be considered due to complex iris's structure. Practitioners have to measure color of iris, its density, sign on iris image and the location of body organ in iris image as stated in iridology chart. Currently, iris diagnosis systems have certain weaknesses. This paper proposed an approach to discover those problems. An accurate iris image will be obtained by using new segmentation technique in iris recognition which called water flow method. This research expected to fulfill all the iridology practitioners need in order to diagnose patient health. © 2010 IEEE.	2010		115- 119	
Discovering Informative Regions in Iris Images to Predict Diabetes	Moradi, P.; Nazer, N.; Ahmadi, A. K.; Mohammadzade, H.; Jafari, H. K.	Alternative medicine can be used to achieve the healing effects of the experimental medicine, it also can predict diseases and prevent them, but validity of them is unproven. Iridology is an alternative medicine that claims to predict tissue weaknesses in the body by looking at the iris. The main object of this paper is to validate the using of iridology to predict diabetes, to do so iris images of 106 diabetic patients and 124 healthy controls were obtained and evaluated. The designed method is completely automatic and independent of iridologists. Also a novel algorithm is developed to improve the efficiency by finding the best region of iris automatically. The results showed the accuracy of 91.8% in the best setting, which shows the effectiveness of the proposed method.	2018			Appears to be same results from Hussein et al., 2013 – though no authors are the same.
Application for heart abnormalities detection through Iris	Martiana, K. E.; Barakbah, A. R.; Akmilis, S. S.; Hermawan, A. A.; Briantoro, H.; Zainudin, A.; Permatasari, D. I	Iridology is the science that allows a health practitioner or non expert to learn the signs in the iris of the eye that is capable of indicating the presence of abnormalities in the body, including basic genetics, toxin deposition, dam circulation, and other weaknesses. Research on computerized iridology had been done before. This paper present a computerized iridology system for detecting heart conditions which is designed through several stages such as pre-processing, auto cropping, segmentation, feature extraction and classification using Thresholding Algorithm. Put a sample of the patient's iris shows the condition of normal and abnormal heart. Our proposed heart abnormalities detection system performs in Mugi Barokah Clinic Surabaya. We made an experimental study of our proposed system by using 40 data of normal and abnormal patients to determine the effectiveness of our application system. Our heart abnormalities detection system gives contribution for the patient with 86,4% accuration.	2017		315- 322	
Design of an iris- based medical diagnosis system	Lodin, A.; Demea, S.	The goal of this study is to present a system which use correlation between medical pathology and different sectors from the surface of the iris. A computerized iris texture and color analysis reveals texture regions which offer useful information. Locations of	2009			

		those regions upon a segmented iridology charts point out an interrelation between map sectors and the projection of the internal body system. The final automatically				
		generated diagnosis needs user approval, thus making the system semiautomatic.				
Health examination based on iris images	Lai, C. L.; Chiu, C. L.	This study combined iridology with image processing technique to conducts iris disease examination. Iridology is not to determine disease, but to reflect degeneration of organic functions, toxin precipitation and various unhealthy situations caused by mental or other factors. Iris test technique applies simple and non-invasive healthy examination method, helps the people prevent disease, and regularly follows up self-health conditions to achieve real-time prevention and treatment. The system consists of four modules: eye image capture, image preprocessing, texture feature extraction and symptomatic analysis. Following the input of eye image, the required iris part is acquired from eye images by using image preprocessing module. The texture feature extraction module utilizes 2-D Gabor filter to extract texture feature. The symptomatic analysis module uses fuzzy theory to evaluate severity of organ symptoms.	2010	5	2616- 2621	
Liver Detection Based on Iridology using Local Binary Pattern Extraction	Lestari, R. F.; Nugroho, H. A.; Ardiyanto, I.	Iridology is one of the technologies that is used in medical sector for helping the medical staffs in analyzing the patient's health from the observed iris. The assessment is based on mapping that uses iridology chart or Jensen diagram. In iris-mapping-process, the location representing each organ is close to each other, thus it is quite difficult to distinguish the normal and abnormal characteristics of the organs. This factor has the potential to cause some errors in analyzing the iris. Thus a computerized system with image processing techniques will help to detect damaged fiber networks more accurately. Therefore, this study will be focused on diagnosing the liver condition based on the iris-mapping image of the right eye, by using the eXtended Center Symmetric Local Binary Pattern (XCS-LBP) method. The XCS-LBP method is used due to its extraction method feature, which is known to be more robust towards the changes of light and noises. Hence, the XCSLBP method is able to extract the features more clearly in order to get normal and abnormal iris characteristics. The result shows that the XCS-LBP method provides 92% of accuracy, 83% of sensitivity, and 100% of specificity and precision other than that of the compared methods.	2019			
Auto cropping for application of heart abnormalities detection through Iris based on mobile devices	Kusumaningtyas, E. M.; Barakbah, A. R.; Hermawan, A. A.; Candra, S. R.; Bagar, F. N. C.; Zainudin, A.; Al Rasyid, M. U. H.; Briantoro, H.; Akbar, Z. F.	As the WHO says, heart disease is a main cause of death and examining it by current methods in hospitals is not cheap. Iridology is one of the most popular alternative ways to detect the condition of organs. Iridology is a science field that makes a health non-expert or practitioner to study signs in the iris that are capable of showing abnormalities in the body, including basic genetics, toxin deposition, dam circulation, and other weaknesses. Research on computer iridology has been done before. One is about the computer's iridology system to detect heart conditions. Some previous works used manual cropping to get iris images and auto cropping on PC. This research presents auto cropping on iris images base on mobile devices. There are several stages such as capture eye base on target, pre-processing, cropping, segmentation, feature extraction and classification using Thresholding algorithms. The system we proposed was tested at Mugi Barokah Clinic Surabaya. This research resulted in an experimental using 20	2017	2017- January	108- 113	

		data indicating that the auto cropping results is 45% success for cropping process and all the success cropping brings accuracy for classification.				
Diabetes and Heart Disease Identification System Using Iris on the Healthcare Kiosk	Kusumaningtyas, E. M.; Barakbah, A.; Danggriawan, S.	Data reported by World Life Expectancy said, as many as 9.89% of Indonesia's population died due to suffering from heart disease and as much as 7.18% due to suffering from diabetes. The heart and pancreas are very important organs for the human body. The heart has a function to flow blood to all parts of the body. While the pancreas is the organ responsible for regulating insulin levels. Organs in the human body can also be damaged so that it can inhibit the work process of these organs. Damage to the pancreas causes diabetes. To find out whether a person has diabetes or heart disease, it is necessary to carry out time-consuming and expensive laboratory tests. In this study, we propose an identification system for diabetes and heart disease using irises on Healthcare Kiosk. The method used in detecting diseases of the body through the iris is called iridology. This identification system will be in the form of a desktop application that can be used at Healthcare Kiosk. The stages carried out in this study were photographing the patient's left eye using a special camera called an Eyeronec, target-based cropping, preprocessing, auto-cropping using integral projection, auto-cropping to remove sclera, taking pancreatic and heart ROI, feature extraction and classification. Auto cropping shows results 60% successful, 33% scant, and 7% failed. The classification process was carried out by training 31 training data that was labeled normal or abnormal by iridology experts. In this study, the system testing accuracy was 83.87% for diabetes and 80.65% for heart disease.	2021			
Heart abnormalities detection through Iris based on mobile	Kusuma, F. D.; Kusumaningtyas, E. M.; Barakbah, A. R.; Hermawan, A. A.; Muliawati, T. H.; Ardiansyah, M. F.; Sari, D. M.; Permatasari, D. I.; Mu'arifin,	Heart disease is the main cause of the death. Some modern examination methods in hospitals need a lot of money for this disease. So there is Iridology, one of the popular alternative ways to have a preliminary detection for the condition of organs. Many studies before that combine this method with the computation system. This research proposes a new model for detecting the heart abnormalities through iris based on mobile with several phases of the process, such as capturing based on target, pre-processing, auto crop based on a histogram analysis, heart area extraction feature and classification using thresholding algorithm. This detection is conducted on images taken by the camera of a mobile device and the testing process is carried out on a mobile device. The technique used to capture the iris has affect to the cropping method and the classification process. This experiment is assisted by the iridology expert in Surabaya Mugi Barokah Clinic. The system performance produces 86.66% precision. Some mistakes happen due to the unsuccessful cropping results. The unsuccessful result will impact the segmentation process and the result of segmentation in the heart area.	2019		152- 157	
Kidney disease detection through iris image	Kumari, S.; Dhiraj, B.	Iris picture examination for clinical analysis is a standout amongst the most productive non-obtrusive finding techniques for deciding wellbeing organ's status. Right and opportune finding is a basic, yet basic necessity of therapeutic science. From the writing, it is discovered that cutting edge innovation additionally bombs in part of cases to analyze ailment accurately. Iridodiagnosis is an option branch of restorative science, which can be utilized for demonstrative purposes. The different calculations are created	2018		2193- 2197	

		for picture quality appraisal, division of iris, iris standardization and clinical element order for clinical conclusion. The fake neural system is utilized for preparing and arrangement reason. This approach will be helpful in the determination field which is speedier, client inviting and less tedious. The Purpose of this paper is to utilize existing iris recognition strategies as an elective strategy to watch the presence of kidney disease in our body, a MATLAB program has been made to recognize the Presence of kidney disease in human body. The consequences of a contextual investigation is exhibited in this paper which demonstrates a 82% right grouping for subjects who are experienced kidney issues and 93% right order for ordinary subjects. Nonetheless, it is important to perform broad investigations with sicknesses that don't have visual indications as per traditional prescription to approve iridology as a substantial logical strategy.				
An iris based lungs pre-diagnostic system	Hussain, T.; Haider, A.; Muhammad, A. M.; Agha, A.; Khan, B.; Rashid, F.; Raza, M. S.; Din, M.; Khan, M.; Ullah, S.; Ahmed, A. T.; Ayguade, E.	Human lungs are essential respiratory organs. Different Obstructive Lung Diseases (OLD) such as bronchitis, asthma, lungs cancer etc. affects the respiration. Diagnosing OLD in the initial stage is better than diagnosing and curing them later. The delay in diagnosing OLD is due to expensive diagnosing tool and experts requirement. Therefore, a non-invasive diagnosing tool for OLD is required that identifies dysfunctional lungs without the support of expert, complex and expensive diagnostic System (ILPS). The ILPS takes iris images as input and identifies dysfunctional Lungs based on iridology map. While testing with 50 lungs patients, the results confirm that the ILPS identifies dysfunctional lungs patients with the accuracy of 88%.	2019			
Iridology: Another look	Holl, R. M.	Iridology, the study of the iris of the eye, has existed for approximately 100 years. Yet, many controversies remain as to its usefulness in determining health problems. To further the understanding of iridology, research on clients with chronic renal failure was conducted. This study was specifically done to reevaluate the findings found by Simon, Worthen, and Mitas (1979). In their study, iridologists were unable to distinguish clients with renal failure from clients without renal failure. The findings of this study indicate that the level of expertise of the iridologist is extremely important.	1999			
Identification of efficient features for detection of diabetes through iris patterns	Hiremath, B.; Vajrala, N.; Kavyashree Prasad, S. P.; Balakrishnan, R.; Yeshwanth, N.; Jayantha, B. S.	Iridodiagnosis is one of the diagnostic strategies in Naturopathy that relies upon changes in Iris for diagnosing disease conditions it's an alternative diagnostic technique using which several diseases are detected through the Iris patterns, colors, and other characteristics. More than 62 million individuals in India are currently diagnosed with- Type 2Diabetes Mellitus [1]. We have developed a non-invasive tool which apart from detecting diabetes can also identify pre-diabetes and objectively ascertain subjective I risk to develop diabetes in the recent futureThis project aims to develop a quantitative non-invasive tool for detection of diabetes. Early diagnosis of diabetes might facilitate taking appropriate life-style interventions in preventing diabetes-Images of Iris from diabetic and non-diabetic individuals were obtained using Iris scope and areas in the iris representing liver area-were isolated through segmentation, -extraction of spatial features from GLCM and the features such as contrast, correlation, homogeneity,	2018		2258- 2263	

		dissimilarity, difference variance and entropy were identified as the most efficient for classification.						
Application of liver disease detection using iridology with back-propagation neural network	Herlambang, R. G. A. N. P.; Isnanto, R. R.; Ajub, A. Z.; Isnanto, R. R.; Facta, M.; Widianto, E. D.; Eridani, D.	Iridology is the study of iris structure as a reflection of the organ condition and system in the human's body. In this study, the organ which is detected is liver. To determine the condition of the liver through iris, texture analysis and classification process are needed to distinguish iris of eye that contains the condition of normal and abnormal liver. The purpose of this study is to detect the condition of the liver through iris using back-propagation neural network with the Gray Level Co-occurrence Matrix (GLCM) for feature extraction.	2016				123- 127	
Identification of Coronary Heart Disease through Iris using Gray Level Co- occurrence Matrix and Support Vector Machine Classification	Gunawan, V. A.; Putra, L. S. A.; Imansyah, F.; Kusumawardhani, E.	Now-a-days, coronary heart disease is one of the deadliest diseases in the world. An unfavorable lifestyle, lack of physical activity, and consuming tobacco are the causes of coronary heart disease aside from genetic inheritance. Sometimes the patient does not know whether he has abnormalities in heart function or not. Therefore, this study proposes a system that can detect heart abnormalities through the iris, known as the Iridology method. The system is designed automatically in the iris detection to the classification results. Feature extraction using five characteristics is applied to the Gray Level Co-occurrence Matrix (GLCM) method. The classification process uses the Support Vector Machine (SVM) with linear kernel variation, Polynomial, and Gaussian to obtain the best accuracy in the system. From the system simulation results, the use of the Gaussian kernel can be relied on in the classification of iris conditions with an accuracy reaches 87%. This study has succeeded in detecting heart conditions through the iris by dividing the iris into normal iris and abnormal iris.	2022	International Journal of Advanced Computer Science and Applications	13	1	639- 648	
An Iris based Smart System for Stress Identification	Haider, A.; Hussain, T.; Agha, A.; Khan, B.; Rashid, F.; Muzamil, S.; Taleb Ahmed, A.; Alharbi, S. A.; Ayguade, E.	The critical stress problem is a crucial issue that needs considerations and requires a solution. A number of methods are used to identify and control the stress which includes different counseling programs and medication. But the diagnosis and identification of the stress and its levels is an important issue which does not have an on-time and accurate solution. Therefore, a non-invasive stress identification system is required that can identify stress and it's level. In this work, we have proposed and developed a non-invasive smart system for stress identification (SSSI). The SSSI takes human iris image and applies machine learning techniques to identify the level of stress based on the iridology map. While testing with 50 subjects having stress, the results confirm that the SSSI identifies the stress with an accuracy of 98%.	2019					
On a methodology for detecting diabetic presence from iris image analysis	Chaskar, U. M.; Sutaone, M. S.	Iris image analysis for clinical diagnosis is one of the most efficient non-invasive diagnosis methods for determining health status of organs. Correct and timely diagnosis is a critical, yet essential requirement of medical science. From the literature, it is found that modern technology also fails in lot of cases to diagnose disease correctly. The attempt is being made to explore the area of diagnosis from different perspectives. The approach used is a combination of ancestor's technology Iridodiagnosis with modern technology. Iridodiagnosis is an alternative branch of medical science, which can be used for diagnostic purposes. To begin with a database is created of eye images with	2012					

		clinical history of subject's emphasis on diabetic (type II) disease in pathological laboratory. The various algorithms are developed for image quality assessment, segmentation of iris, iris normalization and clinical feature classification for clinical diagnosis. The artificial neural network is used for training and classification purpose. The entire process shows classification accuracy of 90 â ⁻¹ / ₄ 92 percent between diabetic and non-diabetic subjects. A significant improvement is demonstrated in classification performance over the existing approaches. This approach will be useful in the diagnosis field which is faster, user friendly and less time consuming.						
Iris-based image processing for cholesterol level detection using gray level co- occurrence matrix and support vector machine	Daniel, M.; Raharjo, J.; Usman, K.	Serious illnesses such as strokes and heart attacks can be triggered by high levels of cholesterol in human blood that exceeds ideal conditions, where the ideal cholesterol level is below 200 mg/dL. To find out cholesterol levels need a long process because the patient must go through a blood sugar test that requires the patient to undergo fasting for 10â€"12 hours first before the test. Iridology is a branch of science that studies human iris and its relation to the wellness of human internal organs. The method can be used as an alternative for medical analysis. Iridology thus can be used to assess the conditions of organs, body construction, and other psychological conditions. This paper proposes a cholesterol detection system based on the iris image processing using Gray Level Co-Occurrence Matrix (GLCM) and Support Vector Machine (SVM). GLCM is used as the feature extraction method of the image, while SVM acts as the classifier of the features. In addition to GLCM and SVM, this paper also construct a preprocessing method which consist of image resizing, segmentation, and color image to gray level conversion of the iris image. These steps are necessary before the GLCM feature extraction step can be applied. In principle, the GLCM method is a construction of a matrix containing the information about the proximity position of gray level images pixels. The output of GLCM is fed to the SVM that relies on the best hyperplane. Thus, SVM performs as a separator of two data classes of the input space. From the simulation results, the system built was able to detect excess cholesterol (< 200 mg/dL), risk of cholesterol (200â€"239 mg/dL) and high cholesterol (> 240 mg/dL). The accuracy rate obtained was 94.67% with an average computation time of 0.0696s. It was using each of the 75 training and test data, with the second-order parameters used are contrastâ€"correlationâ€"energyâ€"homogeneity, pixel distance = 1, quantization level = 8, Polynomial kernel types and One Against One Multiclass.	2020	Engineering Journal	24	5	135- 144	
Computer Aided C Diagnosis of M Gastrointestinal Diseases Based on Iridology	Carrera, E. V.; Maya, J.	Gastrointestinal diseases are important causes of mortality and expenses around the world. Since conventional methods for diagnosing gastrointestinal problems are expensive and invasive, alternative medicine techniques emerge as a possibility for helping physicians in this type of diagnosis. Hence, this work proposes a computer aided diagnosis system based on iridology for early detection of gastrointestinal diseases. The proposed system employs image processing and machine learning algorithms to identify gastrointestinal disorders in iris images. The evaluation of the system uses 100 iris images showing a maximum accuracy of 96% and a predictive capacity of 99%. This work shows that alternative medicine techniques have potential for diagnosing problems associated to gastrointestinal disorders.	2018	4th International Conference on Technology Trends (CITT)	895		531- 541	

Measurement of Cholesterol Conditions of Eye Image using Fuzzy Local Binary Pattern (FLBP) and Linear Regression	Andana, S. N.; Jovamizanti, L.; Apraz Ramatryana, I. N.	Cholesterol is a complex fat compound, which is produced from the body and food substances. Cholesterol is needed by the body for the formation of cell walls and as a raw material for several hormones. But if the cholesterol content in the blood is excessive, it will cause the disease. To find out cholesterol levels in the blood, a laboratory check is usually done by taking blood samples. However, in the world of iridology, a technique for analyzing disease and weakness in the body is based on the shape and structure of the iris. One of the diseases that can be analyzed through the iris is cholesterol. Cholesterol, through the iris is marked by a change in iris pattern called Arcus Senilis. To see the cholesterol ring in the eye is not easy, because everyone has a different iris structure so that it becomes a characteristic of identification with someone. In this research, a system for measuring cholesterol levels through eye images has been designed so that it can facilitate a person in detecting cholesterol levels early. The process to be carried out starts from taking 60 training eye images and 30 test eye images using a mobile camera. Then the results of the photograph will be carried out using the feature extraction using FLBP and obtain the best FLBP operator there is sampling point 8 and radius 4 with F=7. After knowing the characteristic value, it was analyzed using linear regression to obtain measurement modeling. The results of the measurement model will be used to determine cholesterol levels. The results in this study are still quite large at 38.28 with a computational time of 11 seconds for each test image.	2019		79-84	F
Diabetes prediction Ar system based on Sa iridology using machine learning	Aminah, R.; Saputro, A. H.	Diabetes is a disease whose initial symptoms are often undetectable. As a result, many cases of diabetes are not detected early. Iridology can be an alternative to detect diabetes early. This method can reveal the state of the organ in the body before the appearance of symptoms of a disease. In this paper, a diabetes prediction system based on iridology or through iris images was constructed using machine learning. Machine learning used to simplify the detection process. The developed system consists of eye image acquisition instruments and image processing algorithms. Iris images were captured using Camera Iriscope Iris Analyzer Iridology. The GLCM (Gray Level Co-Occurrence Matrix) method is used for feature extraction processes to obtaining texture characteristics in the image. The kNN (k Nearest Neighbor) method are used to classify diabetic and non-diabetic classes. The classification results are then validated by using the k-fold cross-validation method and evaluated by using the confusion matrix. Two subject groups were evaluated: one was 16 subjects non-diabetic and 11 subjects diabetic. The results show that the accuracy is 85.6%, false-positive rate (FPR) is 11.07%, false-negative rate (FNR) 20.40%, specificity 0.889, and sensitivity 0.796.	2019			
Application of Ar machine learning Sa techniques for diagnosis of diabetes based on iridology	Aminah, R.; Saputro, A. H.	Complementary and alternative medicine (CAM) is a system and therapy in the medical field that works based on knowledge, abilities, and practice. CAM is used to maintain health, diagnose disease, or to prevent and treat mental and physical illness. This technique can predict and treat disease. At the same time, machine learning has been widely used in the application of the biomedical field as a tool for diagnosing disease. The purpose of this work is to validate the use of iridology as a valid scientific technique to diagnose diabetes disease. Iridology combined with machine learning to simplify the	2019		133- 138	

		diagnose process. Iris images were captured using Camera Iriscope Iris Analyzer Iridology. The region of interest (ROI) was cropped according to the location of the pancreas organ on iridology chart. The Gray Level Co-Occurrence Matrix method has been implemented for feature extraction. Five different classifiers method is used to classify diabetic and non-diabetic classes. The results are then validated and evaluated by using the k-fold cross-validation and confusion matrix, respectively. The subject consisted of two groups: one was 16 subjects non-diabetic and 11 subjects diabetic. The results show that the best accuracy is 85.6%, with specificity is 0.90, and the sensitivity is 0.80.						
Identification of Heart Disease with Iridology Using Backpropagation Neural Network	Ade Putra, L. S.; Rizal Isnanto, R.; Triwiyatno, A.; Gunawan, V. A.; Wibowo, F. W.	Heart is an organ which function is to pump blood throughout the whole body. Because of it's never-ending work, heart is prone to have problems. Which is why a simpler and more efficient method to identify and recognize heart complication is needed. By using iridology, heart complication can be recognized through the iris. This research was done to create a system which can recognize a problem that is happening on the heart by observing the iris. The system will feature extraction by using two methods, Principal Component Analysis (PCA) and Gray Level Co-occurrence Matrix (GLCM), these are done to identify the effects of feature extraction method against the success rate and classification using Backpropagation Neural Network. The result showed that the success rate of using PCA produced 90% and using GLCM was 77.5%.	2018				138- 142	
Identification of diabetes in pancreatic organs using iridology	Adelina, D. C.; Sigit, R.; Harsono, T.; Rochmad, M.; Bagar, F. N. C.; Zainudin, A.; Al Rasyid, M. U. H.; Briantoro, H.; Akbar, Z. F.	Diabetes is a general disease often infected in humans. Many ways to detect diabetes, one of them is checking blood pressure, but this way is not effective, because it takes blood first and take a lot of time. Iridology is one way analysis health based on the iris. Therefore we need a tool used to identify pancreatic damage as an indication of diabetes through iridology. Load image is the first step to identify pancreatic organs based on the iris. The eye image that we used as the input system comes from the eye clinic database. The next step is adaptive median filtering used in the process preprocessing to reduce the noise on the image. After that the next step is segmentation process using hough circle transform method. The results of segmentation will be normalized and take the Region of interest. ROI will be done feature extraction by using GLCM (Gray Level Co-Occurrence Matrix). To know the condition of pancreas organ using backpropagation method.	2017		2017- January		114- 119	
Screening and identifying hepatobiliary diseases through deep learning using ocular images: a prospective, multicentre stud	Xiao, W.; Huang, X.; Wang, J. H.; Lin, D. R.; Zhu, Y.; Chen, C.; Yang, Y. H.; Xiao, J.; Zhao, L. Q.; Li, J. P. O.; Cheung, C. Y. L.; Mise, Y.; Guo, Z. Y.; Du, Y. F.; Chen, B. B.; Hu, J. X.; Zhang,	Background Ocular changes are traditionally associated with only a few hepatobiliary diseases. These changes are non-specific and have a low detection rate, limiting their potential use as clinically independent diagnostic features. Therefore, we aimed to engineer deep learning models to establish associations between ocular features and major hepatobiliary diseases and to advance automated screening and identification of hepatobiliary diseases from ocular images. Methods We did a multicentre, prospective study to develop models using slit-lamp or retinal fundus images from participants in three hepatobiliary departments and two medical examination centres. Included participants were older than 18 years and had complete clinical information; participants diagnosed with acute hepatobiliary diseases were excluded. We trained seven slit-lamp models and seven fundus models (with or without hepatobiliary disease [screening	2021	Lancet Digital Health	3	2	E88- e97	

K.; Lin, X. S.;	model] or one specific disease type within six categories [identifying model]) using a			
Wen, W.; Liu, Y.	development dataset, and we tested the models with an external test dataset.			
Z.; Chen, W. R.;	Additionally, we did a visual explanation and occlusion test. Model performances were			
Zhong, Y. S.; Lin,	evaluated using the area under the receiver operating characteristic curve (AUROC),			
H. T.	sensitivity, specificity, and F1* score. Findings Between Dec 16, 2018, and July 31,			
	2019, we collected data from 1252 participants (from the Department of Hepatobiliary			
	Surgery of the Third Affiliated Hospital of Sun Yat-sen University, the Department of			
	Infectious Diseases of the Affiliated Huadu Hospital of Southern Medical University, and			
	the Nantian Medical Centre of Aikang Health Care [Guangzhou, China]) for the			
	development dataset; between Aug 14, 2019, and Jan 31, 2020, we collected data from			
	537 participants (from the Department of Infectious Diseases of the Third Affiliated			
	Hospital of Sun Yatsen University and the Huanshidong Medical Centre of Aikang			
	Health Care [Guangzhou, China]) for the test dataset. The AUROC for screening for			
	hepatobiliary diseases of the slit-lamp model was 0.74 (95% CI 0.71-0.76), whereas			
	that of the fundus model was 0.68 (0.65-0.71). For the identification of hepatobiliary			
	diseases, the AUROCs were 0.93 (0.91-0.94; slit-lamp) and 0.84 (0.81-0.86; fundus) for			
	liver cancer, 0.90 (0.88-0.91; slit-lamp) and 0.83 (0.81-0.86; fundus) for liver cirrhosis,			
	and ranged 0.58-0.69 (0.55-0.71; slit-lamp) and 0.62-0.70 (0.58-0.73; fundus) for other			
	hepatobiliary diseases, including chronic viral hepatitis, non-alcoholic fatty liver disease,			
	cholelithiasis, and hepatic cyst. In addition to the conjunctiva and sclera, our deep			
	learning model revealed that the structures of the iris and fundus also contributed to the			
	classification. Interpretation Our study established qualitative associations between			
	ocular features and major hepatobiliary diseases, providing a non-invasive, convenient,			
	and complementary method for hepatobiliary disease screening and identification,			
	which could be applied as an opportunistic screening tool.			

Table C2. Characteristics of excluded studies – exclusion reason: wrong intervention (n=7).

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Notes
Diagnosis of Diseases Based on Iridology Using Fuzzy Logic	Madhouse, Z.; Kayli, A.; Himmami, L.	Abstract Many automatic methods have been introduced in iridology to predict diseases according to the iridology chart. This is important to prevent diseases before they develop. This research aims to find a computer model for the early diagnosis of diseases in the brain, back, pelvis, abdomen, and chest using the iridology chart based on fuzzy logic. Image preprocessing for the iris aims to find the ring, code, and features of the iris. Five fuzzy models have been built for diagnosis and to determine a person's disease rate based on specific features that were extracted from the iris as the input variables. Each model	2021	Scientific Journal of King Faisal University	22	1 1	70-76	No test set; only training set; pre diagnostic testing set
		contains four membership functions for each input or output variables. Laci model for fuzzification and defuzzification. The five models that were built to diagnose the five diseases of iridology have an accuracy rate of over 98%, with an average accuracy of 98.6223%. The results mean that the models are qualified for use by doctors as medical tools to diagnose specific diseases or as a tool for the public to reassure them about their health.						

The iris image analysis for health science and medical science research	Waniek, D.; Andonie, R.; Garbacca, I.; Cismas, S.		1990	Alternative Med	3	3	187- 94	Not a diagnostic test
Pre-diagnostic tool to predict obstructive lung diseases using iris recognition system	Bansal, A.; Agarwal, R.; Sharma, R. K.; Panigrahi, B. K.; Tiwari, S.; Singh, P. K.; Trivedi, M. C.; Mishra, K. K.	In human beings Lungs are the essential respiratory organs. Their weakness affects respiration and lead to various obstructive lung diseases (OLD) such as bronchitis, asthma or even lung cancer. Predicting OLD at an earlier stage is better than diagnosing and curing them later. If it is determined that a human is prone to OLD, human may remain healthy by doing regular exercise, breathing deeply and essentially quitting smoking. The objective of this work is to develop an automated pre-diagnostic tool as an aid to the doctors. The proposed system does not diagnose, but predict OLD. A 2D Gabor filter and Support Vector Machine (SVM) based iris recognition system has been combined with iridology for the implementation of the proposed system. An eye image database, of 49 people suffering from OLD and 51 healthy people has been created. The overall maximum accuracy of 88.0% with a sample size of 100 is encouraging and reasonably demonstrates the effectiveness of the system.	2019		669		71-79	Not a diagnostic test
Novel approach of molecular genetic understanding of iridology: Relationship between iris constitution and angiotensin converting enzyme gene polymorphism	Um, J. Y.; An, N. H.; Yang, G. B.; Lee, G. M.; Cho, J. J.; Cho, J. W.; Hwang, W. J.; Chae, H. J.; Kim, H. R.; Hong, S. H.; Kim, H. M.	Iridology is the study of the iris of the eye to detect the conditions of the body and its organs, genetic strengths and weaknesses, etc. Although iridology is not widely used as a scientific tool for healthcare professionals to get to the source of people's health conditions, it has been used as a supplementary source to help the diagnosis of medical conditions by noting irregularities of the pigmentation in the iris among some Korean Oriental medical doctors. Angiotensin converting enzyme (ACE) gene polymorphism is one of the most well studied genetic markers of vascular disease. We investigated the relationship between iridological constitution and ACE polymorphism in hypertensives. We classified 87 hypertensives and 79 controls according to iris constitution and determined the ACE genotype of each individual. DD genotype was more prevalent in patients with a neurogenic constitution than in controls. This finding supports the hypothesis that D allele is a candidate gene for hypertensives and iris constitution.	2005					Not a diagnostic test
Iridology based diagnosis of kidney abnormalities due to diabetes mellitus	Padmasini, N.; Aarthi, J.; Deepika, U.; Deepshikhaa, R.	Iridology is a very useful technique to diagnose the abnormalities in various parts of our human body. The human iris is connected to all parts of the body through nerve strands. Iridologists see the eyes as windows into the body's state of health through iris images. Iridologists claim they can use the iridology charts to distinguish between healthy organs and those that are overactive, inflamed, or distressed through the change in pigmentation or due to lacunae formation in the various iris regions. Asthe diabetic population is increasing day by day, it is crucial to detect early changes in the kidneys due to Type 1 or Type 2 diabetes, in order to avoid kidney failure. This work aims to diagnose the presence of any abnormality in the kidney due to diabetes mellitus using iris images as well as iridology charts and hence, automatically categorizing normal and abnormal cases using the Random Forest Classification algorithm. Through this algorithm 83.33 percent accuracy is achieved. As a pilot study twenty four normal and abnormal images were	2022	Journal of Current Science and Technology	12	1	43-51	No test set; only training set

		taken and analyzed. However, more images are to be analysed to claim iridology as a tool for diagnosing kidney ailments.						
Digestive diseases & iridology: a clinical study of hospitalized patients	Berdonces, J.L		1989		76		564- 566	Not a diagnostic test
Learning to predict diabetes from iris image analysis	Chaskar, U. M; Sutaone, M.S	Iris image analysis for clinical diagnosis is one of the most efficient non invasive diagnosis methods for determining organs health status. Iridodiagnosis is an alternative branch of medical science which can be used for diagnostic purposes. To begin with we created database of eye images with clinical history of subject's emphasis on diabetic subject (Type II) in pathological laboratory/Hospital. The entire process involves various modules such as image quality assessment, segmentation of iris, iris normalisation and clinical feature classification for clinical diagnosis. The artificial neural network is used for training and classification purpose. The entire process shows classification accuracy of 72-75% between diabetic and non-diabetic subjects.	2012	International Journal of Biomedical Engineering and Technology	9	1	88-89	Not a diagnostic test

Table C3. Characteristics of excluded studies – exclusion reason: wrong outcomes (n=2).

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Notes
Iris image analysis of patient Chronic Renal Failure (CRF) using watershed algorithm	Sitorus, M. A. R.; Purnomo, M. H.; Wibawa, A. D.	Iridology is one alternative ways to know the health condition of the human organs. In iridology, the existance of broken tissue on the iris image in a certain area is representing the condition of a specific organ. Renal or kidneys are the example of the organs that can be seen through the iris. Focus of this research is to analyze the iris image of patient Chronic Renal Failure (CRF). According to the GFR (Glomerular Fitration Rate) in the blood of the patients, CRF could reached 5 stages. In this paper the analysis was limited to the patients of CRF who have already been in hemodialysis treatment (stage 5). The number of hemodialysis patients who participated in this research was 40 people. The iris image of CRF patients were taken using specific iris camera. Watershed transform technique was used to extract the features of iris image of hemodialysis patients. The ROI (region of interest) of iris image of renal organ is at 5.35-5.95 (252Ű - 268Ű) for right eye and at 6.05-6.6 (272Ű - 288Ű) for left eye assuming that the circle of iris is dividedinto 120 points (3600). The medical records of patients were used to validate the result of this iridology study. The result shows that 90% of patients hemodialysis has shown broken tissue on their right iris and 94% has shown broken tissue on their left iris. In conclusion, the condition of renal organ of CRF patients can be seen through the broken tissue in iris image.	2016				54-58	Prognostic accuracy outcomes
The sign of the Cross of Andreas in the iris and Diabetes Mellitus:	Salles, L. F.; da Silva, M. J. P.	Objective: To compare the development of diabetes mellitus in subjects with and without the sign of the Cross of Andreas in the iris over a period of four years.	2015					Prognostic accuracy outcomes; measures development of

A longitudinal study					disease ongitudinally for
				t	hose who have
				á	a particular
				f	eature in iris

Table C4. Characteristics of excluded studies – exclusion reason: wrong reference standard (n=1).

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Notes
Title Iris the picture of health: Towards medical diagnosis of diseases based on iris pattern	Authors Amerifar, S.; Targhi, A. T.; Dehshibi, M. M.	Abstract Complementary medicine emphasizes therapies which are claimed to improve quality of life, prevent disease, and address conditions that conventional medicine has limited success in curing. Iridology is an alternative medicine technique which examines patterns, colors, and other characteristics of the iris to determine information about a patient's systemic health. The objective of this paper is to validate the use of iridology to find out body's organs abnormalities. The proposed method consists of (i) finding the center of iris and its radius, (ii) mapping iridology chart into extracted iris image, and (iii) geometrical analyzing characteristics of the iris to find out which abnormities may be exist in the patient. Two sets of experiment were conducted which in the first one, performance of the proposed was evaluated on CASIA Iris Image Database; and in the second set, a subjective test was given from an iridologist. It	Year 2016	Journal	Volume	Issue	Pages 120- 123	Notes Reference standard reported as diagnosis by non-medical practitioners; Compared to iridologist; no diagnosis given
		was observed in the course of experiments that the accuracy of the proposed method is comparable with that of given from the iridologist. The results of a case study is demonstrated in this paper which shows a 82% correct classification for subjects who are suffered from kidney problems and 93% correct classification for normal subjects. However, it is necessary						
		to perform extensive studies with diseases that do not have ocular manifestations according to conventional medicine in order to validate iridology as a valid scientific technique.						

C2. Citation details of studies from public call (excluded)

No citations were received through the Department's public call for evidence or by other key stakeholders.

C3. Citation details of studies from studies awaiting classification and reports not retrieved

Completed studies identified as potentially eligible for inclusion that could not be retrieved, translated, or provided insufficient or inadequate data, are listed below.

Table C5. Characteristics of studies awaiting classification (n=15).

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Reason	Interpretation
Potential use of iridodiagnosis in clinical practice	Shul'pina, N. B.; Vints, L. A.		1986	Vestnik oftalmologii	102	3	63-6	Studies published in language other than English language	Likely to be a review article and unlikely to affect findings of the review.
Iridodiagnosis in diseases of the hepatobiliary system and kidneys	Lukash, N. V.; Pol'skaia, L. V.; Kliaritskaia, I. L.	Overall fifty patients with chronic hepatitis and 50 patients with concurrent pathologies were examined. The patients with chronic active hepatitis and in coexisting pathologies showed more profound depression of the immunity system as well as striking alterations on the iris of the eye. The former patient group received basic therapy, while the latter one were given immunomodulating agents against the background of basic therapy. Iridodiagnosis will, we believe, help in detecting concurrent pathologies of the hepatobiliary and urinary systems. The dynamics of the pathological signs in the iris is strongly related to the clinicoimmunological picture of the illness. Iridodiagnosis is a reliable test of a therapeutic effect in patients with chronic diseases of the hepatobiliary system and in those cases having this medical problem concurrently with the urinary system pathologies.	1996	Likarska Sprava		2-Jan	113-5	Studies published in language other than English language	Unclear effect on review outcomes, though abstract seems to suggest iridology has a role in practice.
Correlation between iridology and general pathology	Demea, S.	"PURPOSE: The research proposal is to evaluate the association between certain irian signs and general pathology of studied patients.IMETHOD: There were studied 57 hospitalized patients; there was taken over all their iris images, which were analyzed through iridological protocols; in the same time the pathology of these patients was noted from their records in the hospital, concordant with the clinical diagnosis; all these information were included in a database for a computerised processing.IRESULTS: The correlations resulted from, shows a high connection between the irian constitution establish through iridological criteria and the existent pathology.ICONCLUSIONS: Iris examination can be very useful for diagnosis of a certain general pathology, in a holistic approach of the patient."	2002	Oftalmologia	55	4	64-9	Studies published in language other than English language	Unclear effect on review outcomes, though abstract seems to suggest iridology has a role in practice.
Diagnostic possibilities of iridodiagnostics in general clinical practice	ZaÇīkova, M. V.; Krasnoperova, M. A.; Shkliaev, E. K.; EdlinskiÇī, I. B.; Liiaskin, M. I.	The state of the iris has been studied in 817 persons, of them in 150 workers of oil-industry, in eye office conditions. Iridodiagnostics was performed in one and the same person using two methods: with the help of a slit lamp "SL-56" and a magnifying glass. For topic diagnostics, a scheme of projection zones of the iris was used, proposed by Vida and Deck. The results obtained were compared with clinical diagnosis made in the out- or in-patient's departments by internist, gynaecologist or other specialists. In 80.1% of the subjects a pathologic sign situated in the corresponding zone of the iris has	1989	Oftalmologich eskii zhurnal		1	39-41	Studies published in language other than English language	Abstracts seems to suggest poor sensitivity and is unlikely to effect review outcomes.

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Reason	Interpretation
		almost precisely indicated the affected organ. Among the whole number of subjects in 37% of persons the revealed pathologic signs of the iris have indicated the physicians to the organ where the disease had not been earlier diagnosed.							
The use of iridoscopy in prophylactic examinations	Zubareva, T. V.; Gadakchian, K. A.	To study the method of iridodiagnosis, clinical and iridoscopic examinations were conducted in 1104 patients and healthy persons, of them 516 men and 588 women, aged from 18 to 65 years. The contingent of the subjects represented 6 groups of patients with the most frequently observed pathology and a control group. The results obtained allow to consider that iridoscopy is indeed a sufficiently informative method for diagnostics of organ pathology without differentiation, in most of cases, between nosologic units, and achieves the highest effect in combination with detailed collected complaints and the anamnesis. The method can be used in prophylactic examinations of big contingents. The attempt to formalize iridoscopic data has shown that it is possible, in principle, to draw up a diagnostic algorithm, to describe it in one of programming languages and to work out an iridodiagnostic complex.	1989	Oftalmologich eskii zhurnal		4	233-5	Studies published in language other than English language	Unlikely to effect review outcomes, though abstract seems to suggest iridology has a theoretical role in practice.
The iridodiagnostic study of hereditary signs	Vints, L. A.		1990	Voenno- meditsinskii zhurnal		9	55	Studies published in language other than English language	Unclear effect
Examination of the iris in diseases of the digestive organs and the role of ophthalmologists in their diagnosis	Ganich, T. M.; KotelianskiÇı, E. O.		1988	Oftalmologich eskii zhurnal		2	103-105	Studies published in language other than English language	Unclear effect
Observations on scope and limits of iridodiagnosis	Strauss		1951	Hippokrates	22	1	22-23	Studies published in language other than English language	Unclear effect
Basic concepts of iridodiagnosis	Strauss		1950	Hippokrates	21	12	336-338	Studies published in language other than English language	Likely a review article

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Reason	Interpretation
Iris diagnosisa bad alternative in alternative medicine	Berggren, L.		1984	Läkartidninge n	81	51	4852- 4855	Studies published in language other than English language	Likely a review article
Iridiology and iridodiagnostics	Klisiński, J.		1984	Wiadomosci Lekarskie	37	2	163-167	Studies published in language other than English language	Likely a review article
Iridodiagnosis in the system of the follow-up of the health status of the population living in an area contaminated by radioactive substances	Ponomarenko, V. M.; Shatilo, V. I.; Mal'tsev, V. I.; Polovka, V. M.; Didyk, V. S.; lakobchuk, V. A.; Golovko, V. A.	The authors substantiate the practical employment of the iridodiagnosis screening-test using a system of archiving and visualization of the iriS at the first stage of prophylactic medical examination and management. The economical and medical efficacy of the method has been established. Use of iridodiagnosis improved the detectability of pathologic conditions as compared with complex medical examination. Many specialists were freed from mass medical screening. The expenses for prophylactic medical examination became ten times less.	1992	Likarska Sprava	1		46-49	Studies published in language other than English language	Unlikely to effect review outcomes, though abstract seems to suggest iridology has a theoretical role in practice.
Iridodiagnosis of pancreatic pathology in childhood	Kameneva, O. P.; Alekseev, V. F.; Levitskaia, S. V.		1988	Pediatriia	5		62-65	Studies published in language other than English language	Unclear effect
The effectiveness of rapid iridodiagnosis in mass examinations in a polyclinic	Vel'khover, E. S.; Pashnev, Vla; Nazarenko, K. P.		1988	Voenno- meditsinskii zhurnal	6		36-38	Studies published in language other than English language	Unclear effect
The iridodiagnostic syndrome of intracardiac hypertension	Vel'khover, E. S.; Pashnev, V. I.; Nazarenko, K. P.; Radysh, B. B.		1990	Voenno- meditsinskii zhurnal	2		38-41	Studies published in language other than English language	Unclear effect

Table C6. Characteristics of studies where reports were unable to be retrieved (n=4).

Title	Authors	Abstract	Year	Journal	Volume	Issue	Pages	Notes
Diagnosis at first glance? Complementary medical modalities. Part 6: Iridodiagnosis	Ernst, E.		2000	MMW- Fortschritte der Medizin	142	39	51	No full text available
Possibilities and errors of iridodiagnosis	Romashov, F. N.; Vel'khover, E. S.		1973	Eksperimentaln aia Khirurgiia i Anesteziologiia	18	2	49-56	No full text available
Iridology based vital organs malfunctioning identification using machine learning techniques	Madhusudhana Rao, T. V.; Srinivasa Rao, P.; Latha Kalyampudi, P. S.	This paper proposes a non-invasive method based on computerized iridology that can identify the malfunctioning of vital organs like the heart, lung and pancreas. Data of 100 patients suffering either from diabetes, heart disease or lung disease is collected. The data is used to develop an algorithm that can identify vital organ malfunctioning based on iridology. Measures like accuracy, error rate, precision, recall, specificity and F-measure are applied on the algorithm for evaluation. The results show an accuracy of 0.9166, which shows the effectiveness of the proposed algorithm. © 2020 SERSC.	2020	International Journal of Advanced Science and Technology	29	5	5544- 5554	No full text available
Holistic iridology as a global vision of the human being	Salome, J. G.		1989	Townsend Letter for Doctors and Patients	69		156-159	No full text available

C4. Citation details of ongoing studies

No ongoing studies or protocols were identified.

C5. Citation details of studies excluded from search results (high risk of bias)

There were 10 studies that met the inclusion criteria, but as per the Protocol were excluded based on being evaluated as high risk of bias. The study profiles (Table C.7-9) and diagnostic accuracy findings (Table C.10) are presented below.

Table C7. Overall risk of bias assessment for studies excluded as high risk of bias.

Study	Risk of bias	Risk of bias									
	Patient selection	Index test	Reference standard	Flow and timing							
Diabetes											
Banzi et al [9]	8	8	?	?							
Padmasini et al [10]	?	8	8	?							

Verma et al [11]	?	?		?
Wibawa et al [12]	8	8	8	?
Kidney disease				
Hussein et al [13]	?		?	?
Prayitno et al [14]	8	8	?	
Other				
Buchanan et al [15]	8		?	?
Ma et al [16]	?		?	?
Salles et al [17]	8	8	?	
Stearn et al [18]	8	8		?

C=Low risk; C=High risk; ? =Unclear risk

Table C8. Study profile summary for studies excluded as high risk of bias.

Study	Disease of interest	Study design	Country	Iridology method
Diabetes				
Banzi et al [9]	Diabetes	Cross-sectional	Indonesia	Computer-aided diagnosis
Padmasini et al [10]	Diabetes	Case control	India	Computer-aided diagnosis
Verma et al [11]	Diabetes	Case control	India	Computer-aided diagnosis
Wibawa et al [12]	Diabetes	Cross-sectional	Indonesia	Manual examination of images
Kidney disease				
Hussein et al [13]	Chronic renal failure	Case control	Egypt	Computer-aided diagnosis
Prayitno et al [14]	Renal failure in diabetics	Case control	Indonesia	Manual examination of images
Other				
Buchanan et al [15]	Ulcerative collitis; asthma; coronary heart disease; psoriasis	Case control (matched)	UK	Computer-aided diagnosis
Ma et al [16]	Gastrointestinal diseases	Case control	China	Computer-aided diagnosis
Salles et al [17]	Anxiety	Cross-sectional	Brazil	Manual examination of images
Stearn et al [18]	Hearing loss	Case control	South Africa	Manual examination of images

Table C9. Summary of iridological methods used for studies excluded as high risk of bias.

Study	Image capture	Image transformation and feature extraction	Analysis technique	Classifier (MLAs)	Reference standard
Diabetes Mellitus					
Banzi et al [9]	Logitech c920 programmed with OPENCV/C++	Gabor filter, localization, rubber sheet normalisation PCA feature extraction	MLA	NN	Insulin normality test

Padmasini et al [10]	Iriscope (Shiny vision) 1280x1024 pixels	Segmentation GLCM feature extraction	MLAs	k-NN SVM RF	Diagnosis (unspecified)
Verma et al [11]	Iris scanner IriMagic 1000BK 640 × 480 pixels	CHT Rubber sheet normalisation ROI segmentation Gabor filters and GLCM feature extraction	MLAs	NN SVM	Diagnosis (blood glucose test)
Wibawa et al [12]	Mini DV Technology and Pinnacle Video Capture Card DV500	ROI cropping	Manual examination of images	-	Insulin normality test
Kidney disease					
Hussein et al [13]	MultiPIX Handheld Iridology Camera (Iris Supplies Ltd)	CHT algorithm; Rubber sheet normalisation Cropping ROI Histogram equalisation Wavelet transform and Gabor filtering	MLA	ANFIS	Diagnosis (chronic renal failure stage 4 or 5 (GFR ≤ 29))
Prayitno et al [14]	Dino-Lite ver. 2.0 (iridology camera) Frame grab from 1–2-minute video	CCGE ROI cropping	Manual examination of images	-	Diagnosis (by doctor, confirmed by medical report)
Other				·	
Buchanan et al [15]	Standard equipment for iris photography	Digitised onto a Quantimet 520 image procession system to develop of 512x512 pixel representation Local thresholding technique	Computer analysis (presence of features in iris areas)	-	Consultant diagnosed (unspecified)
Ma et al [16]	Color charge-coupled device camera Frame grabbed from 10-second video	Light spot correction Iris localization Collarette localization PCA for feature selection	MLAs	SOM, SVM and Fisher classifiers	Medical diagnosis (unspecified)
Salles et al [17]	Digital camera with iridological lens	-	Manual examination of images (number of tension rings)	-	State-Trait Anxiety Diagnostic Inventory (STAI)
Stearn et al [18]	Digital camera with a pixel resolution of 7.2 mega pixels	-	Manual examination of images by 1 iridologist	-	Moderate to profound hearing loss, as confirmed from audiologic records

Table C10. Summary of diagnostic accuracy results for studies excluded as high risk of bias.

Study	Analysis technique	Classifier (MLA)	# Participants	ТР	FP	TN	FN	Inconclusive	PPV	NPV	Accuracy	Sensitivity	Specificity	AUROC
Diabetes														
Banzi et al [9]	MLA	NN	10	8/10	-	-	-	-	-	-	-	-	-	-
Padmasini et al	MLAs	k-NN	Case: 45	-	-	-	-	-	97.67%	90.62%	94.67%	93.33%	96.67%	-
[10]		SVM	Control: 30	-	-	-	-	-	100%	93.75%	97.33%	95.56%	100%	-

		RF		-	-	-	-	-	100%	96.77%	98.67%	97.78%	100%	-
		RF		-	9.41%	-	-	-	-	-	89.61%	92.36%	90.59%	-
		AB		-	-	-	-	-	-	-	-	94.56%	84.89%	-
		SVM		-	-	-	-	-	-	-	-	90.58%	87.67%	-
		NN		-	-	-	-	-	-	-	-	78.95%	63.45%	-
Verma et al [11]	MLAs (Gabor feature	NN	50^	-	-	-	-	-	-	-	89%	87.14%	91.75%	-
	extraction)	SVM		-	-	-	-	-	-	-	60%	60.73%	64.43%	-
	MLAs (GLCM feature	NN		-	-	-	-	-	-	-	75%	71.38%	79.17%	-
	extraction)	SVM		-	-	-	-	-	-	-	68%	62.33%	73%	-
Wibawa et al [12]	Manual examination of images	-	42	-	-	-	-	-	-	-	-	-	-	-
Kidney disease														
Prayitno et al [14]	Manual examination of images	-	Case: 47	76.6%	-	-	23.4%	-	-	-	76.6%	76.6%	-	-
Hussein et al [13]	MLA	ANFIS	Case: 56 Control: 60	46/56	1/60	56/60	3/56	10/116	-	-	96.8%	-	-	-
Other		•	•	-		•		-	•		•		-	
Buchanan et al [15]	Computer analysis (presence of features in iris areas)	-		No signif as relatir	ficant diffe	rence bet ific organs	ween caso S.	e/controls in pre	sence or a	absence c	f any featur	es in the iris d	lefined by irido	ologists
Ma et al [16]	MLA – gastrointestinal disease	SOM,	Case: 142	83.6%			89.8%							
	MLA – enteritis system disease	SVM and Fisher	Control: 150	90.3%										
Salles et al [17]	Manual examination of images	-	58	Correlati	on betwee	en numbe	r of iris ter	sion rings and	STAI class	sification 8	5% (reporte	ed as significa	nt).	
Stearn et al [18]	Manual examination of images by 1 iridologist	-	Case: 27 Control: 26	16/27	5/26	21/26	11/27					59%	81%	

ANFIS=Adaptive Neuro-Fuzzy Inference System; MLA=Machine Learning Algorithm;

Table C11. Risk of bias table – judgements for the results for studies excluded as high risk of bias.

	Was a consecutive or random sample of patient enrolled?	Was a case- control design avoided?	Did the study avoid inappropriat e exclusions?	Could the selection of patients have introduced bias?	Is there concern that the included patients do not match the review question	Were the index test results interpreted without knowledge of the results of the reference standard?	If a threshold was used, was it pre- specified?	Could the conduct or interpretatio n of the index test have introduced bias?	Is there concern that the index test, its conduct, or interpretation differ from the review question?	Is the reference standard likely to correctly classify the target condition?	Were the reference standard results interpreted without knowledge of the results of the index test?	Could the reference standard, its conduct, or its interpretatio n have introduced bias?	Is there concern that the target condition as defined by the reference standard does not match the review question?	Was there an appropriate interval between index test(s) and reference standard?	Did all patients receive the same reference standard?	Were all patients included in the analysis?	Could the patient flow have introduced bias?
Excluded studies bas	ed on quali	ty			1.	l	L .	L	1.	L.			1.		L .	1	
Padmasini et al [10]	Unclear	No	Unclear	Unclear	Low	No	Yes	High	Low	Yes	Unclear	High	Low	No	Yes	Yes	Unclear
Prayitno et al [14]	Unclear	No	No	High	Low	No	No	High	Low	Unclear	Unclear	Unclear	Low	Yes	Yes	Yes	Unclear
Verma et al [11]	Unclear	No	Unclear	Unclear	Low	Unclear	Unclear	Unclear	Low	Yes	Unclear	Unclear	Low	Unclear	Unclear	Unclear	Unclear
Wibawa et al [12]	Unclear	No	Unclear	High	Low	Unclear	Unclear	High	Low	Unclear	No	High	Low	Unclear	Yes	Unclear	Unclear
Hussein et al [13]	Unclear	No	Yes	Unclear	Low	Yes	No	Unclear	Low	Yes	Unclear	Unclear	Low	Unclear	Yes	Yes	Unclear
Buchanan et al [15]	Yes	No	Unclear	Low	Low	Yes	Unclear	Low	Low	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Yes	Unclear
Ma et al [16]	Yes	No	No	Unclear	Low	Yes	Unclear	Low	Low	Unclear	Yes	Unclear	Low	Unclear	Yes	Yes	Unclear
Salles et al [17]	Unclear	No	No	High	Low	Unclear	Unclear	High	Unclear	Yes	Unclear	Unclear	Low	Yes	Yes	Yes	Unclear
Stearn et al [18]	No	No	No	Low	Low	Yes	Unclear	High	Low	Yes	Yes	Low	Low	Yes	Yes	No	Low

C6. Citation details of MLA studies (not clinically relevant)

There were six additional MLA studies examined, which were later excluded as not representative of current clinical practice in Australia. All studies had information missing. Risk of bias was therefore judged as unclear in all cases. There were significant concerns with the accuracy and reliability of information reported, with duplication of results across all Samant and Agarwal's studies. Some participant characteristics were reported as exactly the same across these studies (yet differed in sample number or other characteristics), however, the authors gave no indication that there was any sample crossover in reports. The results of all three studies have therefore been presented separately, though it should be noted that this information is potentially incorrect and/or duplicated. Certainty was calculated for each of the three conditions relating to these six MLA studies and was very low for Diabetes and Liver Disease and low for Kidney Disease.

The MLS studies did not compare to results from clinical iridology. Many of the MLA studies reported results from other MLA studies (some of which were excluded from this review due to high risk of bias) as "comparisons" of iridology models. Often, these comparisons do not account for bias in the referenced studies and in some cases, results are reported incorrectly or taken at face value without considering the implications of the study design or methodology on reliability of reported results.

Table C11. Risk of bias summary: MLA studies (not clinically relevant) -

Risk of bias				Applicability				
Patient selection	Index test	Reference standard	Flow and timing	Patient selection	Index test	Reference standard		
8	\odot	?	?	?	8	?		
?	8	\odot	\odot	?		\odot		
?	?	?	\odot	?		\odot		
?	?	\odot	\odot			\odot		
				·				
?	\odot	\odot	?	?	?	?		
?	\odot	?	?			\odot		
	Risk of bias Patient selection	Risk of bias Patient selection Index test Image: Selection Index test Image: Selection Image: Selection Image: Selection	Risk of bias Patient selection Index test Reference standard Image: Selection ? ? Image: Selection ? Image: Selection Image: Selection ? Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection	Risk of bias Patient selection Index test Reference standard Flow and timing Image: Selection Image: Selection ?	Risk of bias Applicability Patient selection Index test Reference standard Flow and timing Patient selection Image: Selection Image: Selection Image: Selection Image: Selection Patient selection Image: Selection Image: Selection Image: Selection Image: Selection Patient selection Image: Selection Image: Selection Image: Selection Image: Selection Patient selection Image: Selection Image: Selection Image: Selection Image: Selection Patient selection Image: Selection Image: Selection Image: Selection Image: Selection Patient selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection <td>Risk of bias Applicability Patient selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Index test Image: Selection Index test Image: Selection Index test Image: Selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection I</td>	Risk of bias Applicability Patient selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Index test Image: Selection Index test Image: Selection Index test Image: Selection Index test Reference standard Flow and timing Patient selection Index test Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection Image: Selection I		

☺=Low risk; <mark></mark>⊖=High risk; **?**=Unclear risk

Table C13. Risk of bias table: judgements for the results of MLA studies

Study	DOMAIN 1: PATIENT SELECTION					DOMAIN 2	INDEX TE	ST(S)		DOMAIN 3	3: REFEREI	NCE STAN	DARD	DOMAIN 4: FLOW AND TIMING			
	Was a	Was a	Did the	Could the	Is there	Were the	lf a	Could the	Is there	Is the	Were the	Could the	Is there	Was there	Did all	Were all	Could the
	consecutiv	case-	study	selection	concern	index test	threshold	conduct or	concern	reference	reference	reference	concern that	an	patients	patients	patient
	e or	control	avoid	of patients	that the	results	was used,	interpretati	that the	standard	standard	standard,	the target	appropriate	receive	included	flow have
	random	design	inappropri	have	included	interpreted	was it pre-	on of the	index test,	likely to	results	its	condition as	interval	the same	in the	introduce
	sample of	avoided?	ate	introduced	patients do	without	specified?	index test	its conduct,	correctly	interpreted	conduct,	defined by the	between	reference	analysis?	d bias?
	patient		exclusions	bias?	not match	knowledge		have	or	classify	without	or its	reference	index test(s)	standard?		
	enrolled?		?		the review	of the		introduced	interpretati	the target	knowledge	interpretati	standard does	and			
					question	results of		bias?	on differ	condition?	of the	on have	not match the	reference			
						the			from the		results of	introduced	review	standard?			
						reference			review		the index	bias?	question?				
						standard?			question?		test?						
Diabetes																	
Bansal et al [19]	Unclear	No	Unclear	Yes	Unclear	Yes	Unclear	Unclear	Yes	Unclear	Yes	Unclear	Unclear	Unclear	Yes	Yes	No
Samant et al [20]	Unclear	No	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	No	Yes	Unclear	Unclear	No	Yes	Unclear	Yes	No
Samant et al [21]	Unclear	No	Unclear	Unclear	Unclear	No	Yes	Unclear	No	Yes	Unclear	Unclear	No	Yes	Yes	Yes	No
Samant et al [22]	Unclear	No	Unclear	Unclear	No	Unclear	Unclear	Unclear	No	Yes	Unclear	No	No	Yes	Yes	Yes	Unclear
Kidney Disease																	
Muzamil et al [23]	Yes	No	Unclear	No	No	Yes	Yes	No	Unclear	Yes	Yes	No	No	Unclear	Yes	Yes	Unclear
Liver Disease																	

Rehman et al [24]	Unclear	No	No	No	No	Yes	Yes	Unclear	No	Yes	Unclear	Unclear	No	Unclear	Yes	Yes	Unclear
																1	

Study	Methods	Participants	Interventions	Outcomes	Notes
Bansal et al [19]	 Trial design: case control Type of publication: journal publication Setting: Not reported Recruitment dates: Not reported Country: India Language: English 	 Number of participants: 40 case; 40 control Age (diabetic group): 45% (18 out of 40) aged 21–40 years; 37.5% (15 out of 40) aged 61–80 years; 17.5% (7 out of 40) aged 61–80 years. Gender: case (25 male, 15 female); control (22 male, 18 female) Condition details: Confirmed Diabetes Type II diagnosis (2 months to 20 years post diabetes; mean duration of diabetes was ~8 years) Comorbidities: 1 subject had cardiovascular disease; 5 subjects hypertension; 2 had eye surgery 	 Details of intervention I-SCAN 2 dual iris scanner (Cross Match Technologies) CHT transformation, rubber sheet normalisation 2D discrete wavelet transformation feature extraction MLA using SVM (RBF) 	 Relevant review outcomes reported Accuracy 	 Sponsor/funding: GLA University, Mathura, India, (partially supporting this research) Correspondence with the author team: Not reported Information on ethics: Informed written consent of each person and ethical approval from Institutional Ethical Committee.
Samant et al [20]	 Trial design: case control Type of publication: journal publication Setting: Not reported Recruitment dates: Not reported Country: India Language: English 	 Number of participants: 100 case; 100 control Age: case (53.32+-9.9); control (52.86+-10.63) Gender: case (58M; 42F); control (56M; 44F) Comorbidities: Not reported 	 Details of intervention I-SCAN 2 dual iris scanner (Cross Match Technologies) Gray infra-red images taken of both irises simultaneously Modified CHT algorithm Rubber sheet normalisation Cropped ROI (pancreas) DWT feature extraction MLAs using BT, RF, AB, NN, SVM 	 Relevant review outcomes reported FP, Accuracy, Sensitivity, Specificity 	 Sponsor/funding: Not reported Correspondence with the author team: Not reported Information on ethics: Not reported
Samant et al [21]	 Trial design: case control Type of publication: journal publication Setting: Not reported Recruitment dates: Not reported Country: India Language: English 	 Number of participants: 180 case; 158 control Case classification: diabetic <2 years (35); 2-5 years (47); 5-10 years (37); 10-20 years (52); >10 years (9) Age: case (53.32+-8.56); control (52.86+-9.98) Gender: case (102M; 78F); control (91M; 67F) Comorbidities: Not reported 	 Details of intervention I-SCAN 2 dual iris scanner (Cross Match Technologies) Gray infra-red images taken of both irises simultaneously Modified CHT algorithm Rubber sheet normalisation Cropped ROI (pancreas) DWT and GLCM feature extraction MLAs using BT, SVM, AB, GL, NN, RF 	 Relevant review outcomes reported Accuracy, Sensitivity, Specificity 	 Sponsor/funding: Not reported Correspondence with the author team: Information on ethics: The protocol followed for the data acquisition was approved by University Research Board, Thapar University, Patiala
Samant et al [22]	 Trial design: case control Type of publication: journal publication 	 Number of participants: 250 case; 84 control Case classification: diabetic <2 years (84); 2-10 years (84); >10 years (82) 	 Details of intervention I-SCAN 2 dual iris scanner (Cross Match Technologies) 	Relevant review outcomes reported	 Sponsor/funding: Not reported

Table C14. Study characteristics and Outcomes of MLA studies (not clinically relevant)

	 Setting: Not reported Recruitment dates: Not reported Country: India Language: English 	 Age: diabetic <2 years (51.36+-9.89); 2-10 years (52.69+-6.86); >10 years (55.84+-7.05); control (53.32+-8.56) Gender: case (140M; 110F); control (48M; 36F) Comorbidities: Not reported 	 Gray infra-red images taken of both irises simultaneously CHT algorithm Rubber sheet normalisation Cropped ROI (pancreas) GLCM and GLRL feature extraction Feature selection: PCA with 100% SEV; Modified t-test with 30 features MLAs using CT, MT, QSVM, CSVM, FGSVM, MGSVM, EBoT, EBaT, SKNN 	 Accuracy, Sensitivity, Specificity 	 Correspondence with the author team: Not reported Information on ethics: Not reported
Muzamil et al [23]	 Trial design: case control Type of publication: journal publication Setting: IIMCT-Pakistan Railway Hospital and NIRM-National Institute of Rehabilitation Medicine Recruitment dates: Not reported Country: Pakistan Language: English 	 Number of participants: 1000 case; 1000 control Age: Not reported Gender: Not reported Comorbidities: Not reported 	 Details of intervention 24 Megapixel Digital Single Lens Reflex Canon Camera Cropping ROI Convolution layers for feature extraction MLA using NN 	 Relevant review outcomes reported TP, FN, FP, TN, Accuracy 	 Sponsor/funding: "This work is supported by the Higher Education Commission (HEC) of Pakistan under the Technology Development Fund with project Number TDF03-097 and National Research Program for Universities (NRPU) with project grant no. 8153/Federal/ NRPU/R&D/HEC/2017." Information on ethics: "All of the research publication ethics and anonymity of subjects are respected at all stages of the project."
Rehman et al [24]	 Trial design: case control Type of publication: journal publication Setting: 3 hospitals of Islamabad/Rawalpindi, Pakistan Recruitment dates: Not reported Country: Pakistan Language: English 	 Number of participants: 453 case; 426 control Age: Not reported Gender: Not reported Comorbidities: Not reported 	 Details of intervention I-SCAN 2 dual iris scanner (Cross Match Technologies) 640x480 pixels CHT Rubber sheet normalisation Cropping ROI GLCM and GLRL feature extraction Student t-test for feature selection MLA using Stack learning (11 classifiers) 	 Relevant review outcomes reported TP, FN, FP, TN, Accuracy, Sensitivity, Specificity 	 Sponsor/funding: Not reported Information on ethics: Approval of all ethical and experimental procedures and protocols was granted by the Institutional Review Committee (IRC), Islamic International Medical College, Riphah International University Islamabad, Pakistan, under Application No. Riphah /IRC/ 21/04).

Study	Analysis technique	Classifier (MLA)	# Participants	TP	FP	TN	FN	Inconclusive	PPV	NPV	Accuracy	Sensitivity	Specificity	AUROC
Diabetes	•													<u>.</u>
Bansal et al [19] *	MLA	SVM (RBF)	Case: 40 Control: 40	-	-	-	-	-	-	-	87.5%	-	-	-
Samant et al [20]	MLA	BT	Case: 100	-	-	-	-	-	-	-	-	78.36%	74.59%	-
		RF	Control: 100	-	9.41%	-	-	-	-	-	89.61%	92.36%	90.59%	-
		AB	1	-	-	-	-	-	-	-	-	94.56%	84.89%	-
		SVM	1	-	-	-	-	-	-	-	-	90.58%	87.67%	-
		NN]	-	-	-	-	-	-	-	-	78.95%	63.45%	-
Samant et al	MLA (t-test feature selection	1	Case: 180	-	-	-	-	-	-	-	89.38%	99.03%	84.23%	-
[21]*	with 40 features)	RF	Control: 158	-	-	-	-	-	-	-	89.63%	98.80%	96.87%	-
	MLA (t-test feature selection	AB	1	-	-	-	-	-	-	-	89.18%	99.78%	82.70%	-
	with 50 features)	RF	1	-	-	-	-	-	-	-	89.97%	99.73%	89.42%	-
Samant et al	MLA (PCA with 100% SEV	QVSM	Case: 250	-	-	-	-	-	-	-	95.81%	86.99%	93.98%	-
[22]*	feature selection)	EBaT	Control: 84	-	-	-	-	-	-	-	95.81%	87.00%	93.76%	-
		CSVM]	-	-	-	-	-	-	-	95.51%	86.70%	93.86%	-
	MLA (Modified t-test feature	EBoT	1	-	-	-	-	-	-	-	95.81%	87.13%	89.18%	-
	selection with 30 features)	EBaT]	-	-	-	-	-	-	-	94.61%	86.09%	69.09%	-
		FGSVM]	-	-	-	-	-	-	-	94.01%	85.63%	88.95%	-
		CSVM]	-	-	-	-	-	-	-	94.31%	85.79%	87.75%	-
Kidney disease						-	<u>.</u>							
Muzamil et al [23]	MLA	NN	Case: 100 Control: 100	98%	5%	95%	2%				96.8%			
Liver disease														
Rehman et al [24]	MLA (student t-test for feature selection)	Stack learning (11 classifiers)	Case: 453 Control: 426	98%	2%	98%	2%			98%	98%	97.7%		

Table C15. Summary of diagnostic accuracy results for MLA studies (not clinically relevant).

AB=Adaptive Boosting Model; BT=Binary Tree Model; CSVM=Cubic Support Vector Machine; EBaT=Bagged Tree; EBoT=Boosted Tree; FGSVM= Fine Gaussian Support Vector Machine; MLA=Machine Learning Algorithm; NN=Neural Network Model; PCA= Principle Component Analysis; RBF=Radial Basis Function; QSVM= Quadratic Support Vector Machine; RF=Random Forest; SEV=Specific Explained Variance; SVM=Support Vector Machine; TP=True Positive; TN= True Negative; FP=False Positive; FN=False Negative.

*Only the best and/or most significant results from the classifier and feature extraction combinations are reported.

Table C16. Certainty of evidence (GRADE): diabetes via MLA (not clinically relevant).

Outcome	Accuracy	Specificity†				
Patient or population: Adults with diagnosed diabetes type II (cas Setting: NR Index tests: Iridology using MLA Comparison: Nil Reference standards: Diagnosis via blood glucose test (n=3 studie Limitations: Different index tests were used; concerns about samp	e) or without (control) es) or NR (n=1 study) ling procedures and accuracy of reporting; res	ults not applicable to clinical practice, only to th	ne population that was used in the study.			
No. of studies	4	4	4			
Number of participants	Case: 570ª Control: 382					
Summary range (95% CI) – highest calculated accuracy (Random Forest classifier)	97.9% (95.7% - 99.2%)	98.8% (95.8% - 99.9%)	96.9% (92.6% - 99.1%)			
Summary range (95% CI) – lowest calculated accuracy (Neural Networks classifier)	71.2% (64.4% - 77.4%)	79.0% (69.6% - 86.5%)	63.5% (53.2% - 72.9%)			
What do the results mean	Iridology using MLA would correctly detect diabetes or correctly identify healthy cases in around 96 to 99 out of 100 people.	Iridology using MLA would miss around 0 to 4 out of 100 people with diabetes.	Iridology using MLA would miss around 7 to 1 out of 100 healthy cases.			
Type of evidence	Case-control	Case-control	Case-control			
Starting GRADE	$\oplus \oplus \oplus \oplus$	$\oplus \oplus \oplus \oplus$	$\oplus \oplus \oplus \oplus$			
Decrease GRADE‡			•			
Risk of Bias‡	0	0	0			
Consistency‡ ^b	-1	-1	-1			
Directness‡ ^c	-1	-1	-1			
Precision‡	0	0	0			
Publication Bias‡ ^d	-1	-1	-1			
GRADE of Evidence for Outcome	$\oplus \Theta \Theta \Theta$	$\oplus \ominus \ominus \ominus$	$\oplus \ominus \ominus \ominus$			
Certainty of the GRADE evidence	$\oplus \ominus \ominus \ominus$ (very low certainty)	•	·			
Comment	The evidence is very uncertain about the d	liagnostic accuracy of iridology using MLA	for diagnosis of diabetes.			

a. There were significant concerns with reporting of information and duplication of samples and results across all Samant and Agarwal's studies, though there was not enough information to determine if repeated. The results of all three reports have therefore been presented, though it should be noted that this information is potentially duplicated or reported incorrectly.

b. The literature is not well established in the area.

c. the complete breadth of the diagnostic factors (i.e. whole of iris) is not is not well represented in the available studies

d. The evidence consists of a number of small studies all with a positive bias

†These outcomes were considered the most critical by the guideline developers.

‡These modifiers can impact the GRADE by 1 or 2 points.

Abbreviations: NR=Not reported

There was evidence from four studies which used MLA to examine regions of the iris identified as associated with the pancreas in iridology text; four additional studies were excluded due to high risk of bias. Using MLA techniques, overall, the evidence is very uncertain about detecting differences in the irises between patients with and without diabetes.

The studies used a variety of methods to determine associations between iris characteristics and the disease – these included different methods of feature selection, feature extraction and MLA classification. However, none of the reported methods related to how iridology is carried out in current practice, and the diagnostic accuracy results were based on analysis of singular, small populations. While none of the studies explicitly referenced use of a "training set", the analysis conducted was essentially development of a MLA, rather than testing an iridological method in practice.

Table C17. Certainty of evidence (GRADE): kidney disease via MLA (not clinically relevant).

Outcome	Accuracy Sensitivity† Specificity†							
Patient or population: Adults diagnosed with kidney disease (case) or without Settings: NR Index tests: Iridology using MLA Comparison: Nil Reference standards: Diagnosis via medical history (<30 GFR) Limitations: Only one study met eligibility criteria; not tested on independent/b	(control) lind sample; results not applicable to clinic	al practice, only to the population that was	used in the study.					
No. of studies	1	1	1					
Number of participants	Case: 1000 Control: 1000							
Summary range (95% CI)	96.8% (95.9% - 97.5%)	98.2% (97.2% - 98.9%)	95.4% (93.9% - 96.6%)					
What do the results mean	Iridology using MLA would correctly detect kidney disease or correctly identify healthy cases in around 96 of 100 people.	Iridology using MLA would miss around 2 of 100 people with kidney disease.	Iridology using MLA would miss around 5 of 100 healthy cases.					
Type of evidence	Case-control	Case-control	Case-control					
Starting GRADE	$\oplus \oplus \oplus \oplus$	$\oplus \oplus \oplus \oplus$	$\oplus \oplus \oplus \oplus$					
Decrease GRADE‡								
Risk of Bias‡	0	0	0					
Consistency‡	0	0	0					
Directness‡ ^a	-1	-1	-1					
Precision‡	0	0	0					
Publication Bias‡ ^b	-1	-1	-1					
GRADE of Evidence for Outcome	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \Theta \Theta$	$\oplus \oplus \Theta \overline{\Theta}$					
Overall GRADE	$\oplus \oplus \ominus \ominus$ (low certainty)							

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Comment

Note: All numbers rounded to 1 decimal place.

- a. the complete breadth of the diagnostic factors (i.e. whole of iris) is not is not well represented
- b. The evidence consists of one study

Abbreviations: NR=Not reported

†These outcomes were considered the most critical by the guideline developers.

‡These modifiers can impact the GRADE by 1 or 2 points.

The evidence suggests with low certainty that using an MLA technique could accurately detect differences in the irises between patients with kidney disease and patients without. The analysis conducted was essentially development of a MLA, rather than testing an iridological method in practice.

Table C18. Certainty of evidence (GRADE): chronic liver disease via MLA (not clinically relevant).

Outcome	Accuracy	Sensitivity†	Specificity†
Patient or population: Adults diagnosed with CLD (case) or witho Settings: NR Index tests: Iridology using MLA Comparison: Nil Reference standards: Diagnosis via blood glucose test (n=3) or N Limitations: Not tested on independent, blind data; results not app	ut (control) IR (n=1) plicable to clinical practice, only to the populatio	n that was used in the study.	
No. of studies	1	1	1
Number of participants	Case: 453 Control: 426		
Summary range (95% CI)	98% (96.8% - 98.8%)	98.2% (96.6% - 99.2%)	97.7% (95.7% - 98.9%)
What do the results mean	Iridology using MLA would correctly detect diabetes or correctly identify healthy cases in around 98 of 100 people.	Iridology using MLA would miss around 2 of 100 people with CLD.	Iridology using MLA would miss around 2 of 100 healthy cases.
Type of evidence	Case-control	Case-control	Case-control
Starting GRADE	$\oplus \oplus \oplus \oplus$	$\oplus \oplus \oplus \oplus$	$\oplus \oplus \oplus \oplus$
Decrease GRADE‡			
Risk of Bias‡	0	0	0
Consistency‡	0	0	0
Directness‡ ^a	-1	-1	-1
Precision‡	0	0	0
Publication Bias‡ ^b	-1	-1	-1
GRADE of Evidence for Outcome	$\oplus \Theta \Theta \Theta$	$\oplus \Theta \Theta \Theta$	$\oplus \Theta \Theta \Theta$

Certainty of the GRADE evidence	$\oplus \ominus \ominus \ominus$ (very low certainty)
Comment	The evidence is very uncertain about the diagnostic accuracy of iridology using MLA for diagnosis of chronic liver disease.

Note: All numbers rounded to 1 decimal place.

a. the complete breadth of the diagnostic factors (i.e. whole of iris) is not is not well represented

b. The evidence consists of a one study

Abbreviations: NR=Not reported

†These outcomes were considered the most critical by the guideline developers.

These modifiers can impact the GRADE by 1 or 2 points.

The evidence is very uncertain about using MLA techniques to detect differences in the irises between patients with liver disease and patients without. The analysis conducted was essentially development of a MLA, rather than testing an iridological method in practice. There is no evidence for the application of MLA in clinical practice.

Appendix D: Details of included studies

D1. Details of Included studies

The studies included in this review tended to have few details provided. Those available are included in the main report and Appendix F.

The citations for included studies are as follows, listed in the order the conditions appear in the main text and appendices.

- Simon A, Worthen DM, Mitas li JA. An evaluation of iridology. Journal of the American Medical Association. 1979;242(13):1385-9.
- Herber S, Rehbein M, Tepas T, Pohl C, Esser P. [Looking for colorectal cancer in the patients iris?]. Ophthalmologe. 2008;105(6):570-4.
- Knipschild P. Looking for gall bladder disease in the patient's iris. BMJ. 1988;297(6663):1578-81.
- Münstedt K, El-Safadi S, Brück F, Zygmunt M, Hackethal A, Tinneberg H. Can iridology detect susceptibility to cancer? A prospective case-controlled study. Journal of Alternative & Complementary Medicine. 2005;11(3):515-9.
- Worrall R, Cannon W, Eastwood M, Steinberg D. Iridology: Diagnostic validity in orthopedic trauma. Scientific Review of Alternative Medicine. 2002;6:63-7.

Appendix E: Detailed risk of bias forms

E1. Kidney disease

Study	DOMAIN 1	: PATIENT	SELECTIO	N		DOMAIN 2	: INDEX TE	ST(S)		DOMAIN 3	: REFERE	NCE STANE	DARD	DOMAIN 4: FLOW AND TIMING			
	Was a	Was a	Did the	Could the	Is there	Were the	lfa	Could the	Is there	Is the	Were the	Could the	Is there	Was there	Did all	Were all	Could the
	consecutiv	case-	study	selection	concern	index test	threshold	conduct or	concern	reference	reference	reference	concern that	an	patients	patients	patient
	e or	control	avoid	of patients	that the	results	was used,	interpretati	that the	standard	standard	standard,	the target	appropriate	receive	included	flow have
	random	design	inappropria	have	included	interpreted	was it pre-	on of the	index test,	likely to	results	its	condition as	interval	the same	in the	introduce
	sample of	avoided?	te	introduced	patients	without	specified?	index test	its	correctly	interpreted	conduct, or	defined by the	between	reference	analysis?	d bias?
	patient		exclusions	bias?	do not	knowledge		have	conduct, or	classify the	without	its	reference	index test(s)	standard?		
	enrolled?		?		match the	of the		introduced	interpretati	target	knowledge	interpretati	standard does	and			
					review	results of		bias?	on differ	condition?	of the	on have	not match the	reference			
					question	the			from the		results of	introduced	review	standard?			
						reference			review		the index	bias?	question?				
						standard?			question?		test?						
Simon et al [25]	Unclear	No	Yes	Unclear	No	No	Yes	No	No	Yes	No	No	No	Unclear	Yes	Yes	Yes

Table E1. Risk of bias table: judgements for the results of included studies -	Kidney disease
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E2. Colon carcinoma

Table E2.	Risk of bias	table – iudgeme	nts for the results	s of included studi	es – Colon carcinoma

Study	DOMAIN 1: PATIENT SELECTION					DOMAIN	2: INDEX TE	EST(S)		DOMAIN 3:	DOMAIN 4: FLOW AND TIMING						
	Was a	Was a	Did the	Could the	Is there	Were the	lf a	Could the	Is there	Is the	Were the	Could the	Is there	Was there	Did all	Were all	Could the
	consecutiv	case-	study	selection	concern	index test	threshold	conduct or	concern	reference	reference	reference	concern that	an	patients	patients	patient flow
	e or	control	avoid	of patients	that the	results	was used,	interpretati	that the	standard	standard	standard, its	the target	appropriat	receive	included	have
	random	design	inappropri	have	included	interprete	was it pre-	on of the	index test,	likely to	results	conduct, or	condition as	e interval	the same	in the	introduced
	sample of	avoided?	ate	introduced	patients	d without	specified?	index test	its conduct,	correctly	interpreted	its	defined by the	between	reference	analysis?	bias?
	patient		exclusions	bias?	do not	knowledg		have	or	classify the	without	interpretatio	reference	index	standard?		
	enrolled?		?		match the	e of the		introduced	interpretatio	target	knowledge	n have	standard does	test(s)			
					review	results of		bias?	n differ	condition?	of the	introduced	not match the	and			
					question	the			from the		results of	bias?	review	reference			
						reference			review		the index		question?	standard?			
						standard?			question?		test?						
Herber et al [26]	Yes	No	Unclear	No	No	Yes	Unclear	No	No	Yes	Yes	No	No	Unclear	Yes	Yes	Unclear

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E3. Gallbladder disease

Table E3. Risk of bias table – judgements for the results of included studies – Gallbladder disease

Study	DOMAIN 1	1: PATIEN	T SELECT	ION		DOMAIN 2:	INDEX TES	T(S)		DOMAIN	3: REFERE	NCE STAN	DARD	DOMAIN 4: FLOW AND TIMING			
	Was a	Was a	Did the	Could the	Is there	Were the	lfa	Could the	Is there	Is the	Were the	Could the	Is there	Was there	Did all	Were all	Could the
	consecuti	case-	study	selection	concern	index test	threshold	conduct or	concern that	referenc	reference	reference	concern that	an	patients	patients	patient
	ve or	control	avoid	of	that the	results	was used,	interpretati	the index test,	е	standard	standard,	the target	appropriate	receive	included	flow have
	random	design	inappropri	patients	included	interpreted	was it pre-	on of the	its conduct, or	standard	results	its conduct,	condition as	interval	the same	in the	introduced
	sample of	avoided?	ate	have	patients	without	specified?	index test	interpretation	likely to	interpreted	or its	defined by the	between	reference	analysis?	bias?
	patient		exclusion	introduce	do not	knowledge		have	differ from the	correctly	without	interpretati	reference	index test(s)	standard?		
	enrolled?		s?	d bias?	match the	of the		introduced	review	classify	knowledge	on have	standard does	and			
					review	results of		bias?	question?	the	of the	introduced	not match the	reference			
					question	the				target	results of	bias?	review	standard?			
						reference				condition	the index		question?				
						standard?				?	test?						
Knipschild [27]	Yes	No	Unclear	No	No	Yes	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Unclear

E4. Cancer of different organs (breast, ovary, uterus, prostate or colorectum)

Table E4. Risk of bias table – judgements for the results of included studies – Cancer of different organs (breast, ovary, uterus, prostate or colorectum)

Study	DOMAIN 1: PATIENT SELECTION					DOMAIN 2: INDEX TEST(S)				DOMAIN 3	B: REFEREN	NCE STAND	ARD	DOMAIN 4: FLOW AND TIMING			
	Was a	Was a	Did the	Could the	Is there	Were the	lfa	Could the	Is there	Is the	Were the	Could the	Is there	Was	Did all	Were all	Could the
	consecutiv	case-	study	selection of	concern	index test	threshold	conduct or	concern	reference	reference	reference	concern that	there an	patients	patients	patient
	e or	control	avoid	patients have	that the	results	was used,	interpretat	that the	standard	standard	standard,	the target	appropriat	receive the	included in	flow have
	random	design	inappropria	introduced	included	interprete	was it	ion of the	index test,	likely to	results	its	condition as	e interval	same	the	introduced
	sample of	avoided?	te	bias?	patients	d without	pre-	index test	its conduct,	correctly	interpreted	conduct, or	defined by	between	reference	analysis?	bias?
	patient		exclusions		do not	knowledg	specified?	have	or	classify the	without	its	the	index	standard?		
	enrolled?		?		match the	e of the		introduced	interpretatio	target	knowledge	interpretati	reference	test(s)			
					review	results of		bias?	n differ from	condition?	of the	on have	standard	and			
					question	the			the review		results of	introduced	does not	reference			
						reference			question?		the index	bias?	match the	standard?			
						standard?					test?		review				
													question?				
Münstedt et al [28]	Unclear	No	Unclear	Unclear	No	Yes	Unclear	No	No	Yes	Yes	No	No	Unclear	Yes	Yes	Unclear

E5 Orthopaedic trauma

The risk of bias assessments for results are presented in the table below. The study was judged to have a low risk of bias overall.

Study	DOMAIN 1	: PATIENT	SELECTION	1		DOMAIN 2:	INDEX TES	ST(S)		DOMAIN	3: REFERE	DARD	DOMAIN 4: FLOW AND TIMING				
	Was a	Was a	Did the	Could the	Is there	Were the	lf a	Could the	Is there	Is the	Were the	Could the	Is there	Was there	Did all	Were all	Could the
	consecutiv	case-	study avoid	selection of	concern	index test	threshold	conduct or	concern that	reference	reference	reference	concern that	an	patients	patients	patient
	e or	control	inappropria	patients	that the	results	was used,	interpretati	the index	standard	standard	standard,	the target	appropriate	receive	included	flow have
	random	design	te	have	included	interpreted	was it pre-	on of the	test, its	likely to	results	its conduct	condition as	interval	the	in the	introduced
	sample of	avoided?	exclusions	introduced	patients	without	specified?	index test	conduct, or	correctly	interpreted	or its	defined by the	between	same	analysis?	bias?
	patient		?	bias?	do not	knowledge		have	interpretatio	classify	without	interpretati	reference	index test(s)	referen		
	enrolled?				match the	of the		introduced	n differ from	the target	knowledge	on have	standard does	and	се		
					review	results of		bias?	the review	condition	of the	introduced	not match the	reference	standar		
					question	the			question?	?	results of	bias?	review	standard?	d?		
						reference					the index		question?				
						standard?					test?						
Worrall et al [29]	Unclear	No	Yes	No	No	Yes	No	No	No	Yes	Yes	No	No	Unclear	Yes	Unclear	Unclear

Table E5. Risk of bias table – judgements for the results of included studies – Orthopaedic trauma

Appendix F: Detailed study descriptions and outcomes

F1. Study details – Kidney disease

Table F1. Study characteristics and outcomes – Kidney disease

Study	Methods	Participants	Interventions	Outcomes	Notes
Simon et al [25]	 Trial design: case control Type of publication: journal publication Setting: University of California Medical Centre, Veterans Administration Medical Centre (San Diego) Recruitment dates: Not reported Country: USA 	 Number of participants: 48 case; 95 control Age: case (21-74); control (21-80) Gender: case (30M; 18F); control (55M; 40F) Comorbidities: Hypertension: case (7/48); control (6/95) Diabetes mellitus: case (7/48); control (3/95) 	 Details of intervention Photographs – 35mm slides; Medical Nikkor lens with a strobe ring flash at a magnification of XI.75 Manual examination of images by 3 iridologists and 3 ophthalmologists 	 Relevant review outcomes reported TP, FN, FP, TN, Sensitivity, Specificity 	 Sponsor/funding: Not reported Information on ethics: Not reported

F2. Study details – Colon carcinoma

Table F2. Study characteristics and outcomes – Colon carcinoma

Study	Methods	Participants	Interventions	Outcomes	Notes
Herber et al [26]	 Trial design: case control (matched) Type of publication: journal publication Setting: St. Elisabeth Hospital (Cologne) Recruitment dates: 2003- 2004 Country: Germany Language: German 	 Number of participants: 29 case; 29 control Participants matched for age, gender, and previous illnesses. Case classification: Stage 1 (n=1), Stage 2 (n=10), Stage 3 (n=13), Stage 4 (n=2) Exclusion criteria: Operations, injuries, and inflammation of one or both eyes Benign tumours of the colon Primary tumour in another organ Age (mean): control (61.8); case (61.4) Gender: 32 men; 26 women Not reported Comorbidities: Not reported Tumour classification was completed using p-TNM. Of 29 cases, 3 had T1 tumour, 2 had T2 tumour, 19 had T3 tumour and 5 had T4 tumour. Tumour were located in: rectum (n=13), sigmoid (n=7), ascending colon (n=3), descending colon (n=2), transverse colon (n=2), cecum (n=2). 	 Details of intervention Fundus camera (Zeiss Meditec AG) 35mm film Manual examination of images by 2 iridologists 	 Relevant review outcomes reported FN, FP, Accuracy, Sensitivity, Specificity 	 Sponsor/funding: Not reported Information on ethics: Not reported

F3. Study details – Gallbladder disease

Study	Methods	Participants	Interventions	Outcomes	Notes
Knipschild [27]	Trial design: case control (blinded, matched)	Number of participants: 39 case; 39 control	Details of intervention	Relevant review	Sponsor/funding:
	 Type of publication: journal publication 	Age: Not reported	Stereo colour slides (right iris)	outcomes reported	Not reported
	Setting: Hospital (Maastricht)	 Gender: case (14M; 25F); control (not 	 Magnified with magnifier 	 TP, TN, FN, 	 Information on
	 Recruitment dates: Not reported 	reported)	Manual examination of images	FP, Accuracy,	ethics: Not
	Country: Netherlands	Comorbidities: Not specifically reported – but	by 5 iridologists	Sensitivity,	reported
	Language: English	controls had "other, unrelated diseases"		Specificity	

F4. Study details – Cancer of different organs (breast, ovary, uterus, prostate or colorectum)

able F4. Study characteristics and outcomes	 Cancer of different organs (breast 	, ovary, uterus, prostate or colorectum)
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Study	Methods	Participants	Interventions	Outcomes	Notes
Münstedt et al [28]	 Trial design: case control Type of publication: journal publication Setting: recruited from the various outpatient departments of the University Hospital, Giessen Recruitment dates: March and July 2004 Country: Germany Language: English 	 Number of participants: 68 case; 42 control Case definition: histologically proven malignant tumor, which had been diagnosed between 3 months and 5 years before the study Age: case (62.4); control (54.6) Gender: case (17M; 51F); control (17M; 24F) Comorbidities: Heart disease: case (21/68); control (6/42) Lung disease: case (1/68); control (3/42) Thyroid disease: case (3/68); control (3/42) 	 Details of intervention Kaps iris microscope MI 920 HP (Kaps GmbH, Asslar Wetzlar, Germany) Manual examination (in person) by 1 iridologist 	 Relevant review outcomes reported TP, Sensitivity 	 Sponsor/funding: Not reported Information on ethics: The study protocol was submitted to the ethics committee of the University of Giessen (proposal no. 100/03).

F5. Study details – Orthopaedic trauma

Study	Methods	Participants	Interventions	Outcomes	Notes
Worrall et al [29]	 Trial design: case-control Type of publication: journal publication Setting: 2 local hospitals Recruitment dates: Not reported Country: USA Language: English 	 Number of participants: 30 case; 30 control Age: Not reported Gender: Not reported Comorbidities: Not reported 	 Details of intervention Slides were taken of orthopaedic trauma patients 3-14 days post-trauma. Nikon 35mm single-reflex camera Manual examination of images by 3 iridologists and 10 optometry students 	 Relevant review outcomes reported TP, TN, Accuracy, Sensitivity, Specificity 	 Sponsor/funding: This research was supported in part by a grant from the Council for Reliable Health Information/National Council Against Health Fraud Information on ethics: Approval was obtained from the U.C. Berkeley Committee for the Protection of Human Subjects

Table F5. Study characteristics and outcomes – Orthopaedic trauma

Appendix G: Differences between protocol and review

G1. Methods not implemented

Results were intended to be presented by plotting their sensitivity and specificity (and their 95% confidence intervals) both in forest plots and in a scatter plot in receiver operating characteristic (ROC) space. Due to the heterogeneity in interventions (methods of iridology) and outcomes (diagnostic accuracy measures), we were unable to make comparisons across studies.

No meta-analysis or sub-group analysis was conducted for the same reasons.

No sensitivity analysis based on level of bias was conducted as studies regarded as high risk of bias were excluded.

PROBAST was not included as no predictive studies were used.

G2. Changes from protocol

Studies relating to machine learning algorithms (MLAs) were not included in the main report. This was because investigation of the MLA studies concluded they are not relevant to the objective of the report because the methods are not representative of current clinical practice of iridology in Australia.

The MANTIS database was not accessed as it is no longer supported by Health Index.

Appendix H: How comments from methodological review were addressed

Methodological review (or peer review) was conducted to appraise the methodological quality and assess the appropriateness of reporting for this systematic review (including appendices).

For reporting, the methodological review assessed the systematic review against the *Preferred Reporting Items for a Systematic Review and Meta-analysis of Diagnostic Test Accuracy Studies* (PRISMA-DTA) Checklist.

Assessment of the methodological quality of the systematic review used criteria which aligned with the *Risk of Bias in Systematic Reviews* (ROBIS) tool. The assessment criteria were used to ensure the review was designed and conducted in accordance with:

- Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy
- GRADE guidance and GRADE working group criteria for determining whether the GRADE approach was used (GRADE handbook).
- (Where applicable) NHMRC's 2016 NHMRC Standards for Guidelines and relevant modules in NHMRC's Guidelines for Guidelines Handbook

The methodological review included the following ROBIS assessment criteria: (1) eligibility of studies for the review, (2) identification and selection of studies, (3) data collection and study appraisal, including assessing risk of bias of individual studies and (4) synthesis and interpretation of findings using GRADE.

The systematic review (including appendices) has been updated to reflect the amendments suggested by methodological review and NHMRC's Natural Therapies Working Committee, where appropriate. Updates resulting from methodological review included the addition of information and/ or clarification of the methods and results sections (inclusive of corresponding appendices). In summary the following was amended:

- where possible, additional data was added to results tables (e.g. calculated confidence intervals) to ensure clarity when interpreting findings.
- additional checks and interpretation of risk of bias assessments were conducted to ensure alignment with the QUADAS-2 tool guidelines.
- some amendments and clarifications were made to the risk of bias ratings for some populations.
- clarification of GRADE terminology relevant to the interpretation and certainty of results was also conducted, which resulted in an update to summary of findings tables across all populations.
- GRADE judgements were clarified for most GRADE domains (i.e. risk of bias, inconsistency, imprecision, indirectness).

Changes made to the report (and appendices) resulting from methodological review, did not impact the overall conclusions of the review.

A detailed record of responses to all comments indicating changes that were made, was provided to the NHMRC together with the amended Report and Appendices documents for transparency.

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