GriffithUNIVERSITY Queensland, Australia Centre for Applied Health Economics

# Evidence evaluation for the diagnostic accuracy of iridology: a systematic review

Version 3.1 Date 04 May 2023

*Prepared for* National Health and Medical Research Council

Prepared by Centre for Applied Health Economics Griffith University

#### Copyright

#### © Commonwealth of Australia 2022

All material presented in this publication is provided under a Creative Commons Attribution 4.0 International licence (www.creativecommons.org.au), with the exception of the Commonwealth Coat of Arms, NHMRC logo and content identified as being owned by third parties. The details of the relevant licence conditions are available on the Creative Commons website (www.creativecommons.org.au), as is the full legal code for the CC BY 4.0 International licence.

#### Attribution

Creative Commons Attribution 4.0 International Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided that you attribute the work. The NHMRC preference is that you attribute this publication (and any material sourced from it) using the following wording:

Source: National Health and Medical Research Council.

#### Use of images

Unless otherwise stated, all images (including background images, icons and illustrations) are copyrighted by their original owners.

#### Contact

To obtain information regarding NHMRC publications or submit a copyright request, contact:

communications@nhmrc.gov.au

# **Report Information**

### Authors

Maujean, A.<sup>1</sup>, McFadden, K., Downes, M.<sup>1</sup>

1. Centre for Applied Health Economics, Griffith University, Australia

### Dates

This evidence evaluation and accompanying technical report received approval from the National Health and Medical Research Council (NHMRC) Natural Therapies Working Committee (NTWC) on 04 May 2023.

The protocol for the evidence evaluation was approved by 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)<sup>1</sup>. 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 evidence evaluation was developed by the Centre for Applied Health Economics at Griffith University in conjunction with NHMRC, NTWC, and the Department of Health and Aged Care, Natural Therapy Advisory Panel (NTREAP). It describes the main body of evidence related to the diagnostic accuracy of Iridology. Supplementary data are provided in Appendices A to H. All associated materials have been developed in a robust and transparent manner in accordance with relevant best practice standards <sup>2,3,4.</sup>

### Funding

This review is funded by the Australian Government Department of Health and Aged Care via the NHMRC, under contract 2021-22C007.

### Acknowledgements

Thank you to the members of the Department's Natural Therapies Review Expert Advisory Panel and the National Health and Medical Research Council's Natural Therapies Working Committee for their advice and comments throughout the creation of this document.

Membership and other details of the Panel and Committee can be found at:

www.health.gov.au/committees-and-groups/natural-therapies-review-expert-advisory-panel

www.nhmrc.gov.au/about-us/leadership-and-governance/committees/natural-therapies-working-committee

<sup>&</sup>lt;sup>1</sup> The 2015 Review of the Australian Government Rebate on Private Health Insurance for Natural Therapies Published by: Australian Government Department of Health <a href="https://www.health.gov.au/internet/main/publishing.nsf/Content/phi-natural-therapies">https://www.health.gov.au/internet/main/publishing.nsf/Content/phi-natural-therapies</a>

<sup>&</sup>lt;sup>2</sup> Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy: Macaskill. P. et al: In: Cochrane; 2013.

<sup>&</sup>lt;sup>3</sup> Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement: D. Moher, A. et al; PLoS Med 2009 Vol. 6 Issue 7 Pages e1000097; <u>https://www.ncbi.nlm.nih.gov/pubmed/19621072</u>

<sup>&</sup>lt;sup>4</sup> GRADE Handbook: Schünemann H, Brożek J, Guyatt G and Oxman A: Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach 2013 Vol. (Updated October 2013)

# Plain language summary

### What was the aim of the review?

The aim of this review was to identify eligible studies and assess whether they demonstrate that iridology is effective as a diagnostic tool using at least one measure of diagnostic accuracy (e.g., sensitivity, specificity, predictive values) for any described injury, disease, medical condition, or preclinical condition commonly seen by practitioners who utilise iridology as a diagnostic tool.

This review is targeted for the Australian Government Department of Health and Aged Care to assist in their Natural Therapies Review, which is designed to determine whether certain natural therapies, including iridology, have enough evidence of effectiveness to be considered re-eligible for private health insurance rebates.

This review is not designed to be a complete review of all studies published for iridology, nor is it intended to inform decisions about whether an individual or practitioner should utilise iridology as a diagnostic tool.

### Key messages

For the populations (or conditions) assessed with manual examination of the iris or images of the iris, the evidence shows, with low certainty, that iridology is not an effective diagnostic tool.

The results were consistent with the only relevant systematic review found, which concluded that iridology is not an effective diagnostic tool.

### What was studied in this review?

This review identified studies using a planned literature search, with no limit on publication date. Included studies needed to compare iridology to a valid reference standard which was defined as confirmed diagnosis by a medical practitioner. Study participants could be recruited via any type of sampling method (i.e., consecutive, random, or convenience). Assessment of cost effectiveness, safety and studies of healthy populations were not included in this review.

Studies published in languages other than English were listed, but not included in the assessment.

Studies were assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) framework. GRADE is a method to assess how confident (or certain) systematic review authors can be that the results reported (estimates of effect) in studies are correct. The assessment made by the reviewer is then described as either:

- very low certainty meaning the true effect is probably markedly different from the estimated effect;
- low certainty meaning the true effect might be markedly different from the estimated effect;
- moderate certainty meaning that the true effect is probably close to the estimated effect;
- high certainty meaning the authors have a lot of confidence that the true effect is similar to the estimated effect.

### What studies did we identify in this review?

Using a planned approach, 701 studies from 13 databases were collected and examined. No citations were provided through the Department's public call for evidence or by other key stakeholders. Out of the 701 studies identified, 5 studies covering 5 conditions were assessed in the evidence evaluation.

No ongoing studies or protocols were identified but 15 studies in a language other than English were identified, about half of which may have had data to contribute.

### What were the main results of the review?

The analysis included results from 5 studies with a total of 1,197 participants and investigated varying conditions (kidney disease, cancer, gallbladder disease and orthopaedic trauma). Overall studies suggested that manual iridology was not a reliable or accurate diagnostic technique. The accuracy of identification for a specific disease versus no disease was not greater than chance (50%). The evidence provided low certainty that manual examination using iridology:

- cannot accurately detect differences between patients with kidney disease and patients without kidney disease.
- cannot accurately detect differences between patients with colon carcinoma and patients without colon carcinoma.
- cannot accurately detect differences between patients with gallbladder disease and patients without gallbladder disease.
- cannot accurately detect differences between patients with cancer (breast, ovary, uterus, prostate or colorectum) and patients without cancer (breast, ovary, uterus, prostate or colorectum).
- cannot accurately detect differences between patients with orthopaedic trauma and patients without orthopaedic trauma.

### Implications for health policy and research

This review assessed the evidence of manual examination in iridology to inform the Australian Government about health policy decisions for private health insurance rebates. The review is not designed to cover all the reasons that people use iridology for diagnosis and is not intended to inform individual choices about using iridology for diagnosis.

The results of this review indicate that for the populations (or conditions) assessed with manual examination of the iris or images of the iris, the evidence shows, with low certainty, that iridology is not an effective diagnostic tool.

### How up to date is this review?

Searches were conducted from the earliest date included in the databases until May 2022. Studies published after this date are not included in this review.

# **Executive Summary**

### Background

Iridology is a diagnostic system based on the premise that every organ has corresponding location(s) within the iris of the eye, in which structural and pigmentation components can serve as indicators for condition(s) and/or problem(s) in the human body. Practitioners who use iridology, examine and capture images of the iris to identify the indicators for conditions. When using iridology for diagnosis the practitioner then compares observations of an individual's iris to iris charts, which are "maps" that divide the iris into regions linked to specific organs or body parts. Typically, there are 80-90 areas identified on topographic charts of the iris, with minor variations based on different schools of thought.

In 2015, an Overview of systematic reviews conducted for the Australian Government found no evidence demonstrating the effectiveness of iridology in diagnosing any clinical condition.

### Objective

The objective of this review was to collate, synthesise and critically appraise available evidence on the diagnostic accuracy of iridology as assessed by at least one measure (e.g., sensitivity, specificity, predictive value, or Area Under the Curve) for any described injury, disease, medical condition, or preclinical condition seen by practitioners who utilise iridology as a diagnostic tool. This information will be used by the Australian Government in deciding whether to reinclude iridology as eligible for private health insurance rebates, after it was excluded in 2019. This review is not designed to assess all the reasons that people use iridology for diagnosis, or to inform individual choices about using iridology for diagnosis.

### **Search methods**

Literature searches were conducted in 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, and PAHO Virtual Health Library from database inception to May 2022 to identify relevant studies. The public was also invited by the Department of Health and Aged Care to submit references for published research evidence, but none were provided. There were no limits on language or date of publication in the search.

### **Selection criteria**

Studies which measured the diagnostic accuracy of iridology for diagnosis of a condition via comparison to a valid reference standard (i.e., diagnosis made by a medical practitioner) were eligible for inclusion. Studies were not excluded based on sampling method (i.e., consecutive, random, or convenience sampling was included). Participants of any age with any injury, disease, medical condition, or preclinical condition were eligible for inclusion.

### Data collection and analysis

Two review authors independently checked the retrieved studies for inclusion relevance. Data was collected into Endnote, Covidence and Excel. Basic characteristics and study outcomes were extracted.

Studies were assessed for risk of bias using the QUADAS-2 tool, and the certainty of evidence was appraised using GRADE.

All relevant outcomes were considered. Study characteristics, intervention and results data were tabulated and described narratively for each study. No metanalysis was conducted due to the differences in the interventions and study populations.

Evidence Evaluation for the Diagnostic Accuracy of Iridology Systematic Review

### Main results

A total of 701 studies from 13 databases were collected and examined. From the 701 studies identified, 5 studies covering 5 conditions were assessed in the evidence evaluation.

Studies examined the use of manual examination of the iris (or images of the iris) by iridologists (or other observers). In settings where iridologists knew the condition that they were investigating, their identification of a specific disease versus no disease was similar to chance (50%). Where the iridologists did not know what condition was under investigation, the reported accuracy was reduced and sensitivity was 4% (i.e. only 4% of people were correctly identified as having the disease they did, when more than one disease was included).

Overall, the evidence provides low certainty that iridology:

- **cannot** accurately detect differences between patients with kidney disease and patients without kidney disease.
- **cannot** accurately detect differences between patients with colon carcinoma and patients without colon carcinoma.
- **cannot** accurately detect differences between patients with gallbladder disease and patients without gallbladder disease.
- **cannot** accurately detect differences between patients with cancer (breast, ovary, uterus, prostate or colorectum) and patients without cancer (breast, ovary, uterus, prostate or colorectum).
- **cannot** accurately detect differences between patients with orthopaedic trauma and patients without orthopaedic trauma.

### Limitations

The existing evidence for iridology as a diagnostic tool is limited to a small number of studies. It is unclear whether other studies have been done and not published (common when no effect of a treatment is found) or whether very few studies have been conducted.

The assessment of the diagnostic accuracy of iridology did not include consideration of harms or costeffectiveness.

### Conclusions

The evidence provides low certainty that diagnostic accuracy for manual examination in iridology ranges between 40% (sensitivity 4%) when multiple conditions are included to 50% (chance) when the choice is between a specific disease and not that disease. The evidence did not show any clear benefit of the use of iridology for diagnosing specific diseases compared to normal practice. Overall studies suggested that manual iridology was not a reliable or accurate diagnostic technique.

### **Protocol registration on PROSPERO**

The final approved systematic review protocol was registered on the International Prospective Register of Systematic Reviews (PROSPERO) (registration number: <u>CRD42022323024</u>).

# Contents

Report Information	3
Authors	3
Dates	3
History	3
Funding	3
Acknowledgements	3
Plain language summary	4
What was the aim of the review?	4
Key messages	4
What was studied in this review?	4
What studies did we identify in this review?	4
What were the main results of the review?	5
Implications for health policy and research	5
How up to date is this review?	5
Executive Summary	6
Background	6
Objective	6
Search methods	6
Selection criteria	6
Data collection and analysis	6
Main results	7
Limitations	7
Conclusions	7
Protocol registration on PROSPERO	7
Contents	8
List of Tables	9
List of Figures	10
List of Appendices	10
List of Abbreviations	10
1. Background	11
1.1. Description of condition	11
1.2. Description of intervention	11
1.3. How the intervention might work	12
1.4. Why it is important to do this review?	12
2. Objectives	12

3.		Methods	12
	3.1.	Search	12
	3.2.	Screening	13
4.		Results	13
	4.1.	Description of studies	13
	4.2.	Kidney diseases	16
	4.3.	Colon carcinoma	20
	4.4.	Gallbladder disease	24
	4.5.	Cancer of different organs (breast, ovary, uterus, prostate or colorectum)	28
	4.6.	Orthopaedic trauma	32
5.		Discussion	36
	5.1.	Summary of main results	36
	5.2.	Overall completeness and applicability of evidence	36
	5.3.	Certainty of the evidence	37
	5.4.	Potential biases in the review process	37
	5.5.	Agreements and disagreements with other studies or reviews	37
	5.6.	Limitations of the review	37
6.		Authors' Conclusions	38
	6.1.	Implications for policy	38
	6.2.	Implications for research	38
7.		Author contributions and declaration of interests	38
8.		References	39

# List of Tables

Table 1. Summary of studies identified in the systematic literature search by disease of interest     Table 2. Risk of bias summary: review authors' judgements about each risk of bias item – kidney disease     Table 3. Summary of diagnostic accuracy results for kidney disease studies.	. 15 . 17 . 18
Table 4. The certainty of the evidence assessed using the GRADE procedure: kidney disease via manual examination.	.19
Table 5. Risk of bias summary: review authors' judgements about each risk of bias item – colon carcinoma	.21
Table 6. Summary of diagnostic accuracy results	.22
Table 7. The certainty of the evidence assessed using the GRADE procedure: colon carcinoma via manual	
examination	.23
Table 8. Risk of bias summary: review authors' judgements about each risk of bias item – gallbladder disease. Table 9. Summary of diagnostic accuracy results	25 .26
Table 10. The certainty of the evidence assessed using the GRADE procedure: gallbladder disease via manua examination.	al .27
Table 11. Risk of bias summary: review authors' judgements about each risk of bias item – cancer of differentorgans (breast, ovary, uterus, prostate or colorectum)Table 12. Summary of diagnostic accuracy results.	.29 .30

Table 13. The certainty of the evidence assessed using the GRADE procedure: cancer (breast, ovary, uterus,	
prostate, or colorectum) via manual examination	31
Table 14. Risk of bias summary: review authors' judgements about each risk of bias item – orthopaedic traum	a33
Table 15. Summary of diagnostic accuracy results orthopaedic trauma	34
Table 16. The certainty of the evidence assessed using the GRADE procedure: orthopaedic trauma via manua	al
examination	35

# List of Figures

Figure 1. PRISMA flowchart for outcomes that relate to the diagnostic accuracy of iridology......14

# **List of Appendices**

Appendix A	Searching, selection criteria and screening
Appendix B	Methods of data appraisal, extraction, analysis, and reporting for included studies
Appendix C	Citation details of studies assessed at full text but not included
Appendix D	Details of Included studies
Appendix E	Detailed risk of bias forms
Appendix F	Detailed study descriptions and outcomes
Appendix G	Differences between protocol and review
Appendix H	How comments from methodological review were addressed

# List of Abbreviations

AUC	Area Under Curve
СМ	Complementary Medicine
FN	False Negative
FP	False Positive
FPG	Fasting plasma glucose
GRADE	Grading of Recommendations, Assessment, Development and Evaluations
MLA	Machine learning algorithm
NHMRC	National Health and Medical Research Council
NPV	Negative Predictive Value
NTREAP	Natural Therapies Expert Advisory Panel
NTWC	Natural Therapies Working Committee
OGTT	Oral glucose tolerance test
PPV	Positive Predictive Value
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PROSPERO	International Prospective Register of Systematic Reviews
QUADAS-2	Quality Assessment of Diagnostic Accuracy Studies 2
TN	True Negative
TP	True Positive

Evidence Evaluation for the Diagnostic Accuracy of Iridology Systematic Review

# 1. Background

### 1.1. Description of condition

Searches were limited to any human clinical condition, but target conditions were not pre-specified to include the breadth of iridology practice. The review identified a range of clinical conditions. Most conditions of interest had only one identified study associated with them, including: colon carcinoma, gallbladder disease, and orthopaedic trauma. Only one study focused on more than one iridology organ system (cancers of different organs – breast, ovary, uterus, prostate, or colorectal). There were no studies that examined the whole iris for assessment of disease or conditions in the whole body as would be normal in clinical practice.

There is limited information available on the reasons for seeking diagnosis via iridology, rather than traditional diagnostic tools in Australia. Iridology may provide an alternative, non-invasive form of diagnosis which may be sought out by people who are: 1) unable or unwilling to undergo standard diagnostic tests (i.e., scared of needles, unwilling to undergo colonoscopy or similar), or by those who prefer alternative or traditional health approaches.

There is also limited information on the clinical management pathway of patients using iridology for diagnosis in Australia. In Australia, most practitioners do not specialise in iridology (there are no or few iridologists) but iridology may be used for diagnosis by range of natural health practitioners.

### 1.2. Description of intervention

Iridology has been around since the 19th century, and it has been promoted by some alternative medicine practitioners (1). Iridology is not an intervention but rather a practice that claims to diagnose illness or disease by examining the patterns, colours, and other characteristics of the iris (the coloured part of the eye) (2). Iridology may be used as a diagnostic tool by a wide variety of professionals in the natural health community to confirm clinical observations.

Iridology is based on the premise that every organ has corresponding location(s) within the iris of the eye, in which structural and pigmentation components can serve as indicators for condition(s) and/or problem(s) in the human body (1). According to iridology, the iris is a map of the body, and each part of the iris corresponds to a different organ or system in the body. Practitioners of iridology examine the iris and capture images of the iris to identify the indicators for conditions. The iridologist then compares observations of an individual's iris to iris charts, which are "maps" that divide the iris into regions linked to specific organs or body parts (1). Typically, there are 80-90 areas identified on topographic charts of the iris, with minor variations based on different schools of thought (1).

There are several charts used in iridology to map the various areas of the iris and their supposed corresponding organs or systems in the body. As male and females have different reproductive organs, the zones are slightly different for those organs. The most used chart is the Bernard Jensen chart (or variations of it), which is named after a prominent iridologist who popularized the practice in the United States in the 20th century (1). Other iridiagnosis charts tend to be modifications of the Bernard Jensen chart for their interpretation (3, 4).

The Bernard Jensen chart is divided into zones, with each zone corresponding to a different part of the body. Each zone is located in the eye based on the clock position of that zone. The zones are further divided into segments, and each segment is associated with a particular organ or system in the body. The chart also includes symbols, colours, and other markings that are supposed to indicate various health conditions or imbalances.

There are other Iridology charts available that do not just focus on the body systems. The Rayid chart, which was developed by an Australian iridologist named Denny Johnson (5). The Rayid chart is based on a different theory of iris diagnosis focusing on psychology, genetic behaviour, personality traits, relationship tendencies and behavioural patterns and includes different zones and markings than the Bernard Jensen chart. Other iridology

charts include the Peter Mandel chart, which is used in a form of iridology called "multidimensional iridology," and the Angelina Martina chart, which is used in a form of iridology that focuses on emotional and psychological health (6).

There are multiple options for capturing images of the iris for the purpose of iridology. These include physical observation, images/scans obtained via digital cameras, integrated and/or adapted iridoscopes (which are purpose-built cameras for iris photography), other types of illumination and image recording, and image editing software (e.g. Adobe Photoshop, or specific software for images of irises) (7, 8, 9). Interpretation of the iris or iris images are completed by a practitioner trained in iridology.

### 1.3. How the intervention might work

Iridology is a method which examines the patterns, colours and structure of a person's iris in order to determine information about the wider health of the body (1). The practice of analysing the iris dates back centuries, but modern iridology was popularised by Dr Ignatz von Peczely (1).

Proponents of iridology believe that changes in the intricate tissue structure of the iris can indicate a current or future clinical manifestation of a disease, and as such iridology can be used as a diagnostic tool (1). Because the iris is connected to hundreds of thousands of nerve endings, blood vessels and other tissue structures, it is thought to correspond to the body's internal function. Using iris charts as a guide, practitioners use observations of the iris for diagnosis.

Classified as a complementary medicine (CM) in Australia, iridology may be practised by a wide variety of professionals, mostly within the natural health community. Certification is available, though this is non-medical.

### 1.4. Why it is important to do this review?

The purpose of this review is to enable consumers, health care providers and policy makers to make informed decisions about care, the Australian Government will use this review to assist in deciding whether iridology should be re-eligible for private health insurance rebates. An Overview of systematic reviews conducted in 2015 found no systematic reviews assessing the accuracy of iridology as a diagnostic tool. This review will differ from the 2015 publication by including primary research and extending the dates of the original review.

In Australia, complementary medicine and therapies are often used in conjunction with conventional medicine. Iridology may be used as a diagnostic tool by a wide variety of professionals in the natural health community to confirm clinical observations. The purpose of this review is to identify and evaluate the evidence for the accuracy of iridology as a diagnostic tool.

# 2. Objectives

The objective of this review was to collate, synthesise, and critically appraise available evidence on the accuracy of iridology as a diagnostic tool, using at least one measure of diagnostic accuracy (e.g., sensitivity, specificity, predictive values, or Area Under the Curve) for any described injury, disease, medical condition, or preclinical condition commonly seen by practitioners of iridology.

# 3. Methods

### 3.1. Search

A full description of the systematic review methods is provided in Appendix A.

A systematic review protocol was pre-registered with the International Prospective Register of Systematic Reviews (PROSPERO). Search strategies were predetermined by multiple reviewers, and no limits were set on publication date. Thirteen databases were included in the searches. As iridology is a diagnostic test rather than an intervention, the methodologies for this systematic review were based on those reported in the Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy (10).

As well as the database searches, forwards and backwards citation search (of included studies' references and citing articles) was conducted to locate any further applicable studies.

### 3.2. Screening

Two reviewers independently carried out title, abstract and full-text screening using the following inclusion criteria:

- Population: People of any age with any injury, disease, medical condition, or preclinical condition
- Intervention: Manual examination of an iris or images of an iris
- Comparator: Valid reference standard (diagnosis by a medical practitioner)
- Outcomes: Any measure of diagnostic accuracy

Population and outcome prioritisation was not required for this report, however prognostic accuracy outcomes were excluded. Diagnosis by a medical practitioner was considered the reference standard given it is the standard for confirming the presence or absence of a condition.

Any disagreements were resolved through consultation with a third reviewer. Data extraction from study reports was conducted by extracted by two authors independently.

# 4. Results

### 4.1. Description of studies

#### 4.1.1. PRISMA flowchart

In total, 1,062 studies were identified in the searches (which included 9 additional studies from citation searches). No studies were provided by the Department's call for evidence. After title, and abstract screening, 603 studies were excluded as they did not meet inclusion criteria (including 8 of the articles from the citation searches), with 106 studies for full text screening. While attempting to retrieve full-text reports, 4 studies were unretrievable and 15 were foreign language reports that were not able to be translated using the review protocol approach (see Appendix A5.3), leaving 87 studies assessed for eligibility. After full text screening 5 studies met the inclusion criteria for measuring the diagnostic accuracy of iridology. The full PRISMA flowchart is presented in Figure 1 below.



Figure 1. PRISMA flowchart for outcomes that relate to the diagnostic accuracy of iridology.

### 4.1.2. Excluded studies

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 included in Appendix C1.

Ten studies were excluded after full-text review due to high risk of bias, as per the protocol. Details of these studies are included in Appendix C5.

Studies which assessed Machine Learning Algorithms (MLAs) in relation to iridology charts were initially considered for inclusion. Six MLA studies were examined in detail but examination confirmed that the studies were about developing MLAs and not representative of the use of iridology in current clinical practice in Australia. The studies were therefore not relevant to the objective of the review and were excluded from the main report. The MLA studies were generally of poor quality, with many details missing and were judged to be of unclear risk of bias and low to very low certainty. Information about these MLA studies are included in Appendix C6.

#### 4.1.3. Studies awaiting classification

Completed studies identified as potentially eligible for inclusion that could not be retrieved, translated, or provided insufficient or inadequate data, are listed in Appendix C3. This includes 4 citations that could not be retrieved, and 15 studies awaiting classification (including studies in languages other than English).

### 4.1.4. Ongoing studies

No ongoing studies were identified at the time of the search (as noted in Appendix C4).

### 4.1.5. Included studies

There were 5 studies identified as eligible for inclusion in the review, and not at high risk of bias. An overview of these studies is provided in Table 1 and detailed descriptions are provided in Appendix F. Key outcome information was missing from all reports of the included studies. Corresponding authors were contacted; however, no responses were received.

As shown in Table 1, all were individual disease-specific studies: kidney disease (2) colon carcinoma (11), gallbladder disease (12), cancer (breast, ovary, uterus, prostate, or colorectum) (13), and orthopaedic trauma (14).

Study designs were all case control. Studies were conducted in Germany (n=2), Netherlands (n=1), and USA (n=2) and were published between 1979 and 2021.

No meta-analysis was conducted due to the heterogeneity in the disease of interest. Key results related to diagnostic accuracy outcomes are summarised in the following sections by disease of interest.

Study	Year	Disease of interest	Study design	Country	Journal	Iridology method
Simon et al (2)	1979	Kidney disease	Case control	USA	JAMA	Manual examination
Herber et al (11)	2008	Colon carcinoma	Case control (matched)	Germany	Ophthalmologe	Manual examination
Knipschild (12)	1988	Gallbladder disease	Case control (matched)	Netherlands	BMJ	Manual examination

#### Table 1. Summary of studies identified in the systematic literature search by disease of interest.

Münstedt et al (13)	2005	Cancer (breast, ovary, uterus, prostate, or colorectum)	Case control	Germany	The Journal of Alternative and Complementary Medicine	Manual examination
Worrall et al (14)	2002	Orthopaedic trauma	Case control	USA	The Scientific Review of Alternative Medicine	Manual examination

### 4.2. Kidney diseases

### 4.2.1. Description of condition

Clinically, kidney disease is a condition that is characterised by gradual loss of kidney function. Early stages of kidney disease are generally asymptomatic, but as the condition worsens it leads to reduced glomerular filtration rate, which leads to a build-up of fluid and toxins in the body (15). Kidney disease that lasts for more than 3 months is considered chronic kidney disease (CKD), which can have effects on cardiovascular health and risks evolving into end-stage kidney disease (15). The estimated global prevalence of CKD is approximately 13.4% (15); in Australia this was estimated as only 0.8% (237,800 people) (16).

Kidney disease is generally diagnosed with an Estimated Glomerular Filtration Rate (eGFR) test, which is a blood test that measures kidney function (17). Blood pressure tests, urine tests, diagnostic imaging, and other blood tests (e.g., measuring creatinine and urea) can also form part of the diagnostic procedure (17). Treatment depends on the stage at diagnosis, varying from lifestyle changes and/or blood pressure medication, through to kidney transplant and dialysis. Delayed diagnosis can mean significantly worse outcomes.

Iridology is used to diagnose "kidney problems", rather than kidney disease specifically. The area of the iris related to the kidney, based on iridology charting, lies medial of the 6 o'clock position in each of the irises.

### 4.2.2. Description of studies

Four studies met the inclusion criteria for measuring the diagnostic accuracy of iridology for diagnosis of kidney disease. Two studies were removed due to high risk of bias (see Appendix C5) and these and an additional MLA study (see Appendix C6) were not considered in the evidence synthesis.

Study design was case control conducted in the USA in 1979. Cases were defined as participants with a diagnosis of the condition of interest; controls were defined as participants without a diagnosis of the condition of interest. Further details are provided below and in Appendix F1.

There was not enough information in study reports of the enrolled participants to determine if the population was indicative of those with kidney disease in Australia.

#### Simon et al (1979) (2)

This study recruited patients from two medical centres in California (95 control patients and 48 cases). Cases were selected based on having renal dysfunction, and severity ranged from near normal to requiring haemodialysis. Participants were diagnosed based on increased plasma creatinine concentration.

Iridology examination was performed by six separate observers (3 iridologists and 3 ophthalmologists). The observers were provided photographs of the iris and asked to identify patients with disease. There was some concern expressed about the methods from the observers and iridologists, as they were not familiar with using photographs for diagnosis in iridology. The study used the Bernard Jensen chart for zone identification.

#### 4.2.3. Risk of bias per item

The risk of bias for each study assessed by QUADAS-2 is presented below. The overall risk of bias as assessed for the study was unclear.

Study	Risk of bias	3		Applicability			
	Patient selection	Index test	Reference standard	Flow and timing	Patient selection	Index test	Reference standard
Manual exam	ination						
Simon et al (2)	?			?		?	

#### Table 2. Risk of bias summary: review authors' judgements about each risk of bias item - kidney disease

□=Low risk; <sup>(C)</sup>=High risk; ? =Unclear risk

#### 4.2.4 Main comparison

A summary of the diagnostic accuracy results is presented in Table 3.

#### Simon et al (1979) (2)

Based on poor reporting, it was difficult to determine a risk of bias; therefore, it was considered that there was an unclear risk of bias. Based on the information provided in the report, summary estimates of diagnostic accuracy which were not reported, were calculated by the assessment team. These were based on Clopper and Pearson's calculation of confidence intervals for proportion which rely on certain assumptions and from the paucity of information in the study, may not hold for the population.

The highest reported diagnostic accuracy for kidney disease was calculated as 59.4% (95% CI: 50.9% - 67.6%). The lowest reported accuracy was calculated as 42.0% (95% CI: 33.8% - 50.5%).

Overall, the study reported that observers could not distinguish patients with or without kidney disease accurately.

#### Table 3. Summary of diagnostic accuracy results for kidney disease studies.

Study	Analysis technique	Classifier (MLA)	# Participants	TP	FP	TN	FN	Inconclusive	PPV (95% CI)	NPV (95% CI)	Accuracy (95% CI)	Sensitivity (95% Cl)	Specificity (95% Cl)					
Manual exa	Manual examination																	
Simon et al (2)	Manual examination of images by 3	-	Case: 48 Control: 95	27	41	21	54	-	39.7% (28% - 52.3%)	72% (60.4% - 81.8%)	56.6% (48.1% - 64.9%)	56.3% (41.2% - 70.5%)	56.8% (46.3% - 67%)					
	iridologists	iridologists			18	53	30	42	-	25.4% (15.8% - 37.1%)	58.3% (46.1% - 69.8%)	42.0% (33.8% - 50.5%)	37.5% (24% - 52.6%)	44.2% (34% - 54.8%)				
		Manual examination of images by 3 ophthalmologists	amination by 3 logists					42	84	6	11	-	33.3% (25.2% - 42.3%)	64.7% (38.3% - 85.8%)	37.1% (29.1% - 45.5%)	87.5% (74.8% - 95.3%)	11.6% (5.9% - 19.8%)	
	Manual examination of images by 3 ophthalmologists						/anual examination f images by 3			26	36	22	59	-	41.9% (29.5% - 55.2%)	72.8% (61.8% - 82.1%)	59.4% (50.9% - 67.6%)	54.2% (39.2% - 68.6%)
				25	49	23	46	-	33.8% (23.2% - 45.7%)	66.7% (54.3% - 77.6%)	49.7% (41.2% - 58.1%)	52.1% (37.2% - 66.7%)	48.4% (38% - 58.9%)					
				11	23	37	72	-	32.4% (17.4% - 50.5%)	66.1% (56.4% - 74.9%)	58.0% (49.5% - 66.2%)	22.9% (12% - 37.3%)	75.8% (65.9% - 84%)					

Note: All numbers rounded to 1 decimal place. Abbreviations: NPV=Negative Predictive Value; PPV=Positive Predictive Value; TP=True Positive; FN=False Negative; TN= True Negative; FP=False Positive

\*Calculated based on other accuracy results data provided in report.

### 4.2.5. Summary of findings and evidence statements

The certainty of the evidence for diagnosing kidney disease using iridology is presented in Tables 4.

#### Table 4. The certainty of the evidence assessed using the GRADE procedure: kidney disease via manual examination.

Outcome	Accuracy Sensitivity† Specificity†								
Patient or population: Adults with diagnosed kidney disease (case) or without (control) Settings: NR Index tests: Iridology using manual examination of iris images by iridologists and ophthalmologists Comparison: Nil									
<b>Reference standards:</b> Diagnosis via medical history (plasma creatinine level 1.5 mg/dL or greater) <b>Limitations:</b> Only one study met eligibility criteria; small sample.									
No. of studies	1	1	1						
Number of participants	Case: 48 Control: 95		-						
Summary range (95% CI) – highest calculated accuracy (ophthalmologist)	59.4% (50.9% - 67.6%)	54.2% (39.2% - 68.6%)	62.1% (51.6% - 71.9%)						
Summary range (95% CI) – lowest calculated accuracy (iridologist)	37.1% (29.1% - 45.5%)	87.5% (74.8% - 95.3%)	11.6% (5.9% - 19.8%)						
What do the results mean	Iridology using manual examination of iris images would correctly detect kidney disease or correctly identify healthy cases in around 29 to 68 out of 100 people.	Iridology using manual examination of iris images would correctly identify 39 to 95 out of 100 people with kidney disease.	Iridology using manual examination of iris images would miss around 6 to 72 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‡	0	0	0						
Directness‡ª	-1	-1	-1						
Precision‡	0	0	0						
Publication Bias‡ <sup>b</sup>	-1	-1	-1						
GRADE of Evidence for Outcome	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \Theta \Theta$						
Overall GRADE	$\oplus \oplus \ominus \ominus$ (low certainty)								
Comment There is low certainty evidence that iridology using manual examination of images cannot diagnose kidney disease more than chance.									

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

<sup>‡</sup>These modifiers can impact the GRADE by 1 or 2 points.

The evidence suggests that manual examination by iridologists or other observers cannot detect differences in the irises between patients with kidney disease and patients without. The sensitivity and specificity of iridology were also low.

### 4.3. Colon carcinoma

### 4.3.1. Description of condition

Colorectal cancer (also termed colon carcinoma) occurs when the cells that line the colon or the rectum become abnormal and grow out of control (18). Most colorectal cancers are a result of smaller polyps which slowly increase in size and eventually progress to the invasive cancer stage (18). It is estimated that in Australia, there were 55,387 people living with treated colorectal cancer in 2017 (19).

Colorectal cancer is typically diagnosed with a colonoscopy following symptoms and referral from a general practitioner. Australia also has a national bowel screening program whereby eligible individuals are invited to do an at-home faecal immunochemical test (FIT) every two years, regardless of symptoms (20). Some colorectal cancers are also diagnosed via CT scan.

Prognosis is significantly impacted by time and stage of diagnosis (hence the national screening program). In addition, those diagnosed with colorectal cancer who are 70 years or younger have their tumour screened for Lynch syndrome to determine if they carry the genetic mutation, and if their family is therefore at increased risk. Therefore, timely diagnosis for an individual can have important flow on health impacts for family members.

According to the iridology chart, the regions relevant to colorectal cancer are associated with the area between 11 and 1 o'clock in both eyes (transverse colon), 8 and 11 o'clock in the right eye (ascending colon), 1 o'clock and 4 o'clock in the left eye (descending colon) and 7 o'clock in the left eye.

### 4.3.2. Description of studies

One study met the inclusion criteria for measuring the diagnostic accuracy of iridology for diagnosis of colon carcinoma, using manual examination of iris images.

The study design was case control conducted in Germany in 2008. Cases were defined as participants with a diagnosis of the condition of interest; controls were defined as participants without a diagnosis of the condition of interest. Further information is provided below and in Appendix F2.

There was not enough information in study reports of the enrolled participants to determine if the population was indicative of those with colon cancer in Australia.

#### Herber et al (2008) (11)

This paper was translated from German.

Patients were recruited from a single hospital in Germany. There were 29 patients with histologically proven malignant tumours (cases), and 29 without tumours who had undergone a screening colonoscopy and were matched on age, gender, and previous illness (controls). Diagnosis was supported by histological confirmation and admission to hospital for surgical removal of the carcinoma. Photographs of the iris of each patient were presented to two iridologists; the iridologists were asked to identify which patients were diagnosed with malignancy in the colon. Though not stated what charts were used, the zones used matched the Bernard Jensen chart.

### 4.3.3. Risk of bias per item

The risk of bias for each study assessed by QUADAS-2 is presented below. The overall risk of bias as assessed for the study was unclear.

Study	Risk of bi	as		Applicability						
	Patient selection	Index test	Reference standard	Flow and timing	Patient selection	Index test	Reference standard			
Manual examination										
Herber et al (11)	?			?		?	C			

Table 5. Risk of bias summary: review authors' judgements about each risk of bias item – colon carcinoma.

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

#### 4.3.4 Main comparison

A summary of the diagnostic accuracy results is presented in Table 6.

#### Herber et al (2008) (11)

Based on poor reporting, it was difficult to determine a risk of bias; therefore, it was considered that there was an unclear risk of bias. Based on the information provided in the report, summary estimates of diagnostic accuracy which were not reported, were calculated by the assessment team. These were based on Clopper and Pearson's calculation of confidence intervals for proportion which rely on certain assumptions and from the paucity of information in the study, may not hold for the population.

The highest reported diagnostic accuracy for colon cancer was calculated as 53.4% (95% CI: 39.9% - 66.7%). The lowest reported accuracy was calculated as 51.7% (95% CI: 38.2% - 65%).

Overall, the study reported that observers could not distinguish patients with or without colon carcinoma accurately.

#### Table 6. Summary of diagnostic accuracy results.

Study	Analysis technique	Classifier	#	TP	FP	TN	FN	Inconclusive	PPV (95% CI)	NPV (95% CI)	Accuracy (95%	Sensitivity	Specificity
		(MLA)	Participants								CI)	(95% CI)	(95% CI)
Manual examina	ation												
Herber et al (11)	Manual examination of	-	Case: 29	17	16	13	12	-	51.5%	52%	51.7%	58.6%	44.8%
	images by Iridologist 1		Control: 29						(33.5% - 69.2%)	(31.3% - 72.2%)	(38.2% - 65%)	(38.9% - 76.5%)	(26.4% - 64.3%)
	Manual examination of			16	14	15	13	-	53.3%	53.6%	53.4%	55.2%	51.7%
	images by Iridologist 2								(34.3% - 71.7%)	(33.9% - 72.5%)	(39.9% - 66.7%)	(35.7% - 73.6%)	(32.5% - 70.6%)

Note: All numbers rounded to 1 decimal place. Abbreviations: NPV=Negative Predictive Value; PPV=Positive Predictive Value; TP=True Positive; FN=False Negative; TN= True Negative; FP=False Positive.

<sup>^</sup>Data was provided as percentages and was converted into numbers. <sup>\*</sup>Calculated based on other accuracy results data provided in report.

### 4.3.5. Summary of findings and evidence statements

The certainty of the evidence for manual examination of the iris or images of the iris to diagnose patients with colon carcinoma is presented in Table 7.

# Table 7. The certainty of the evidence assessed using the GRADE procedure: colon carcinoma via manual examination.

Outcome	Accuracy	Sensitivity†	Specificity†							
Patient or population: Adults with diagnosed colon carcinoma (case) or without (control)     Settings: NR     Index tests: Iridology using manual examination of iris images     Comparison: Nil     Reference standards: Diagnosis via medical history (admitted for colon carcinoma surgery)     Limitations: Only one study met eligibility criteria; small sample.										
No. of studies 1 1										
Number of participants	Case: 29 Control: 29									
Summary range (95% CI) – highest calculated accuracy (iridologist)	53.4% (39.9% - 66.7%)	55.2% (35.7% - 73.6%)	51.7% (32.5% - 70.6%)							
Summary range (95% CI) – lowest calculated accuracy (iridologist)	51.7% (38.2% - 65%)	58.6% (38.9% - 76.5%)	44.8% (26.4% - 64.3%)							
What do the results mean	Iridology using manual examination of iris images would correctly detect colon carcinoma or correctly identify healthy cases in around 51 to 53 of 100 people.	Iridology using manual examination of iris images would miss around 41 to 46 of 100 people with colon carcinoma.	Iridology using manual examination of iris images would miss around 48 to 55 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‡ <sup>b</sup>	-1	-1	-1							
GRADE of Evidence for Outcome	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$							
Overall GRADE	$\oplus \oplus \ominus \ominus$ (low certain	ty)								
Comment	There is low certainty of examination of images than chance.	evidence that iridology ( cannot diagnose colon	using manual carcinoma more often							

Note: All numbers rounded to 1 decimal place.

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

b. The evidence consists of one small 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 from manual examination by iridologists suggests they could not accurately detect differences in irises of patients with colon cancer and patients without. The sensitivity and specificity of the method were also low.

### 4.4. Gallbladder disease

### 4.4.1. Description of condition

Gallbladder disease is the result of blockage of the flow of bile through bile ducts commonly caused by gallstones, which causes irritation, inflammation, and pain (21). Gallstones are typically diagnosed using an ultrasound but can be found with other imaging modalities (such as CT or MRI) and are also often diagnosed incidentally (22). Gallstones, if causing problems, are referred for surgery to remove the stones or the entire gallbladder. Non-operative therapy is sometimes also recommended, which involves self-management primarily via diet and lifestyle.

Timely diagnosis of gallstones is not often necessary, as many people have them and live with them without issue (22). However, if gallstones begin to cause problems (such as a biliary colic, cholecystitis, or infection) diagnosis and treatment can be urgent.

According to the iridology chart, the gallbladder is associated with the lower lateral part (between 7 and 8 o'clock) in the right eye iris (12). Presence of gall stones is indicated by small, dark spots in this region; inflammation of the gallbladder is indicated by white lines in this region (12).

### 4.4.2. Description of studies

One study met the inclusion criteria for measuring the diagnostic accuracy of iridology for diagnosis of gallbladder disease, using manual examination of iris images.

The study design was case control conducted in the Netherlands in 1988. Cases were defined as participants with a diagnosis of the condition of interest; controls were defined as participants without a diagnosis of the condition of interest. Further information is provided below and in Appendix F3.

There was not enough information in study reports of the enrolled participants to determine if the population was indicative of those with gallbladder disease in Australia.

#### Knipschild (1988) (12)

In this study, 39 patients who had their gallbladder removed were recruited from a single university hospital in the Netherlands (cases). The same number of patients with unrelated diseases were recruited from the same hospital and matched based on age and gender (controls). Diagnosis was supported by presence of gall stones and inflammation confirmed by examination. The chart used for the iridiagnosis was not stated, based on the information provided it would have been up to the discretion of the iridologist.

Five experienced iridologists were presented with slide images of both irises. No medical history was provided to the iridologists (they were only informed that some of the slides were of patients with gallbladder disease). The iridologists were asked to grade the probability of gallbladder disease for each patient using a grading system of: definite, probable, possible, do not know, possibly not, probably not, definitely not. A grade of definite, probable, or possible was considered to be a positive diagnosis in analysis; a grade of definitely not, probably not or possibly not was considered to be a negative diagnosis in analysis; a grade of "do not know" was considered inconclusive.

### 4.4.3. Risk of bias per item

The risk of bias for each study assessed by QUADAS-2 is presented below. The overall risk of bias as assessed for the study was low.

Evidence Evaluation for the Diagnostic Accuracy of Iridology Systematic Review

Study	Risk of bi	as		Applicability				
	Patient selection	Index test	Reference standard	Flow and timing	Patient selection	Index test	Reference standard	
Manual exa	mination			•				
Knipschild (12)						$\odot$		

Table 8. Risk of bias summary: review authors' judgements about each risk of bias item – gallbladder disease.

☺=Low risk; 😕=High risk; ? =Unclear risk

#### 4.4.4 Main comparison

A summary of the diagnostic accuracy results is presented in Table 9 below.

#### Knipschild (1988) (12)

Based on the information provided in the report, summary estimates of diagnostic accuracy which were not reported, were calculated by the assessment team. These were based on Clopper and Pearson's calculation of confidence intervals for proportion which rely on certain assumptions and from the paucity of information in the study, may not hold for the population. While not explicitly stated, it seems the authors ignored the inconclusive test results when estimating sensitivity and specificity in the analysis.

The highest reported diagnostic accuracy for gallbladder disease was calculated as 51.3% (95% CI: 39.7% - 62.8%). The lowest reported accuracy was calculated as 47.4% (95% CI: 36.0% - 59.1%).

Overall, the study reported that observers could not distinguish patients with or without colon carcinoma accurately.

#### Table 9. Summary of diagnostic accuracy results.

Study	Analysis technique	Classifier	#	TP	FP	TN	FN	Inconclusive	PPV	NPV	Accuracy	Sensitivity	Specificity
		(MLA)	Participants						(95% CI)				
Manual ex	Manual examination												
Knipschild (12)	Manual examination of images by Iridologist 1	-	Case: 39 Control: 39	19	18	21	20	-	51.4% (34.4% - 68.1%)	51.2% (35.1% - 67.1%)	51.3% (39.7% - 62.8%)	48.7% (32.4% - 65.2%)	53.8% (37.2% - 69.9%)
	Manual examination of images by Iridologist 2			21	23	16	18	-	47.7% (32.5% - 63.3%)	47.1% (29.8% - 64.9%)	47.4% (36.0% - 59.1%)	53.8% (37.2% - 69.9%)	41% (25.6% - 57.9%)
	Manual examination of images by Iridologist 3			21	16	17	9	15	-	-	60%*	70%*	52%*
	Manual examination of images by Iridologist 4			21	22	16	17	2	-	-	49%*	55%*	42%*
	Manual examination of images by Iridologist 5			19	17	19	19	4	-	-	51%*	50%*	53%*

Note: All numbers rounded to 1 decimal place.

Abbreviations: NPV=Negative Predictive Value; PPV=Positive Predictive Value; TP=True Positive; FN=False Negative; TN= True Negative; FP=False Positive.

\*Given uncertainty around inconclusive test results and how they were dealt with in the publication, PPV, NPV, and confidence intervals were not calculated for the last three iridologists.

### 4.4.5. Summary of findings and evidence statements

The certainty of the evidence for manual examination of the iris or images of the iris to diagnose patients with gallbladder disease is presented in Table 10.

# Table 10. The certainty of the evidence assessed using the GRADE procedure: gallbladder disease via manual examination.

Outcome	Accuracy	Sensitivity†	Specificity†								
Patient or population: Adults with diagnosed gallbladder disease (case) or without (control) Settings: NR Index tests: Iridology using manual examination of iris images											
<b>Reference standards:</b> Diagnosis via medical practitioner (presence of gall stones and inflammation confirmed by examinations) Limitations: Only one study met eligibility criteria; small sample size.											
No. of studies 1 1											
Number of participants Case: 39 Control: 39											
Summary range (95% CI) – highest calculated accuracy (iridologist)	51.3% (39.7% - 62.8%)	48.7% (32.4% - 65.2%)	53.8% (37.2% - 69.9%)								
Summary range (95% CI) – lowest calculated accuracy (iridologist)	47.4% (36.0% - 59.1%)	53.8% (37.2% - 69.9%)	41% (25.6% - 57.9%)								
What do the results mean	Iridology using manual examination of iris images would correctly detect gallbladder disease or correctly identify healthy cases in around 47 to 60 of 100 people.	Iridology using manual examination of iris images would miss around 30 to 51 of 100 people with gallbladder disease.	Iridology using manual examination of iris images would miss around 46 to 59 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‡ <sup>b</sup>	-1	-1	-1								
GRADE of Evidence for Outcome	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$								
Overall GRADE	$\oplus \oplus \ominus \ominus$ (low certain	ty)									
Comment	There is low certainty e examination of images often than chance.	evidence that iridology to cannot diagnose gallbl	using manual adder disease more								

Note: All numbers rounded to 1 decimal place.

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

b. The evidence consists of one small study all with a positive bias

Abbreviations: NR=Not reported

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

<sup>‡</sup>These modifiers can impact the GRADE by 1 or 2 points.

The evidence from manual examination suggests iridologists could not accurately detect differences in the irises between patients with gallbladder disease and patients without. The sensitivity and specificity of the method were also low.

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

### 4.5.1. Description of condition

Cancer is a leading cause of death globally. In Australia, an estimated 151,000 people were diagnosed with, and 49,000 people died from, cancer in 2021 (23). Treatment for cancer is dependent on the type and stage at diagnosis, therefore early detection and diagnosis is critical. Some treatment options include chemotherapy, radiotherapy, surgery, immunotherapy, and stem cell transplantation.

The diagnostic pathway for cancer depends on the type, location, and symptoms. Different tests are used to diagnose cancer, which generally include a combination of blood tests and/or diagnostic imaging (e.g., X-rays, CT scans, MRI, or ultrasounds) (23).

According to iridology, there are ten "zones" for a woman (nine for a man) across the left and right irises which are associated with the highlighted body areas and therefore would correspond with cancer of these organs.

#### 4.5.2. Description of studies

One study met the inclusion criteria for measuring the diagnostic accuracy of iridology for diagnosis of cancer across multiple organs using manual examination of iris in person.

The study design was case control conducted in Germany in 2005. Cases were defined as participants with a diagnosis of the condition of interest; controls were defined as participants without a diagnosis of the condition of interest. Further information is provided below and in Appendix F4.

There was not enough information in study reports of the enrolled participants to determine if the population was indicative of those with cancer in Australia.

#### Münstedt et al (2005) (13)

Patients were recruited from various outpatient departments of a single university hospital in Germany. A medical history of all patients was taken focusing on diseases of the heart, lungs, pancreas, thyroid, liver and gallbladder. There were 68 patients with histologically proven malignant tumours (cases), and 42 without tumours (controls). There was no description of what conditions, if any, the control patients had. Cancer diagnosis was defined as "a histologically proven malignant tumour, which had been diagnosed between 3 months and 5 years before the study". Tumours had to be in either the breast, ovary, uterus, prostate, or colorectum, but patients could have more than one organ affected. The chart used for the iridiagnosis was not stated, based on the information provided it would have been up to the discretion of the iridologist.

One iridologist carried out the iridology examination. The iridologist was given no prior patient history and the patient was covered except for their eyes. The iridologist was not allowed to converse with the patient. The iridologist did not know that any of the patients had any type of cancer and was expected to make a diagnosis based on examination of the iris.

### 4.5.3. Risk of bias per item

The risk of bias for each study assessed by QUADAS-2 is presented below. The overall risk of bias as assessed for the study was unclear.

Table 11. Risk of bias summary: review authors' judgements about each risk of bias item - cancer of c	different
organs (breast, ovary, uterus, prostate or colorectum).	

	-	-		-			
Study	Risk of bi	as		Applicability			
	Patient selection	Index test	Reference standard	Flow and timing	Patient selection	Index test	Reference standard
Manual exa	mination	•			•		
Münstedt et al (13)	?			?		$\odot$	?

☺=Low risk;; 😕=High risk; ? =Unclear risk

#### 4.5.4. Main comparison

A summary of the diagnostic accuracy results is presented in Table 12 below.

#### Münstedt et al (2005) (13)

Based on poor reporting, it was difficult to determine a risk of bias; therefore, it was considered that there was an unclear risk of bias. The paper only presented overall sensitivity (4%). Based on the information provided in the report, summary estimates of diagnostic accuracy which were not reported, were calculated by the assessment team. These were based on Clopper and Pearson's calculation of confidence intervals for proportion which rely on certain assumptions and from the paucity of information in the study, may not hold for the population. While not explicitly stated, it seems the authors ignored the inconclusive test results when estimating sensitivity and specificity in the analysis.

The reported diagnostic accuracy for all cancers was 40.4% (95% CI 31.1% - 50.2%). Results for each cancer separately could not be reported because of concerns with the data presented in the original report, including non-independence of controls.

Overall, the study reported that an iridologist could not distinguish patients with or without cancer accurately.

The authors did not provide the results for melanoma, bladder cancer, meningioma, and sarcoma. However, they did provide results for additional conditions that were identified in patients during the study. These are reported in the results, however, are not included in the review of evidence as the study design for these conditions did not meet inclusion criteria.

#### Table 12. Summary of diagnostic accuracy results.

Study	Analysis technique	Classifier (MLA)	# Participants	TP	FP	TN	FN	Inconclusive	PPV (95% CI)	NPV (95% CI)	Accuracy (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
Manual ex	amination												
Münstedt	All cancers	-	Case: 68	3	0	41	65	-	100%	38.7%	40.4%	4.4%	100%
et al (13)			Control: 41						(29.2% - 100.0%)	(29.4% - 48.6%)	(31.1% - 50.2%)	(1.0% - 12.9%)	(91.4% - 100%)

Note: All numbers rounded to 1 decimal place. Abbreviations: NPV=Negative Predictive Value; PPV=Positive Predictive Value; TP=True Positive; FN=False Negative; TN= True Negative; FP=False Positive.

### 4.5.5. Summary of findings and evidence statements

The certainty of the evidence for manual examination of the iris or images of the iris to diagnose patients with cancer (breast, ovary, uterus, prostate, or colorectum) is presented in Table 13.

# Table 13. The certainty of the evidence assessed using the GRADE procedure: cancer (breast, ovary, uterus, prostate, or colorectum) via manual examination.

Outcome	Accuracy	Sensitivity†	Specificity†
Patient or population: Adults diagnosed with Settings: NR Index tests: Iridology using manual examinati Comparison: Nil Reference standards: Diagnosis via medical Limitations: Only one study met eligibility crite	cancer (case) or without ( on of iris practitioner (histologically eria; small sample size.	control) confirmed)	
No. of studies	1	1	1
Number of participants	Case: 68 Control: 41		
Summary range (95% CI) – all cancers	40.4% (31.1% - 50.2%)	4.6% (1.0% - 12.9%)	100% (91.4% - 100.0%)
What do the results mean	Iridology using manual examination of iris images would correctly detect cancer or correctly identify healthy cases in around 31 to 50 out of 100 people.	Iridology using manual examination of iris images would miss around 99 to 82 out of 100 people with cancer.	Iridology using manual examination of iris images would miss around 0 to 9 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‡	0	0	0
Directness‡	0	0	0
Precision‡ª	-1	-1	-1
Publication Bias‡₀	-1	-1	-1
GRADE of Evidence for Outcome	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$
Overall GRADE	⊕⊕⊖⊖ (low certain	ty)	
Comment	There is low certainty examination of irises of chance.	evidence that iridology cannot diagnose cancer	using manual more often than

Note: All numbers rounded to 1 decimal place.

a. The accuracy across the different cancers varied dramatically

b. The evidence consists of one small 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 from manual examination suggests could not accurately detect differences in the irises between patients with cancer (breast, ovary, uterus, prostate or colorectum) and patients without. The sensitivity of the method was also low.

### 4.6. Orthopaedic trauma

### 4.6.1. Description of condition

Orthopaedic trauma can involve one or multiple broken bones, generally severe enough to require urgent surgery and ongoing treatment. Breaks are often caused by falling, sports injuries, occupational injuries and/or osteoporosis (reduction in bone density that is more common with increasing age) (24). Trauma can also involve the spinal cord, muscles, ligaments, and tendons.

Because of the range of presentations of orthopaedic trauma, typical diagnosis methods differ, but usually involve some form of diagnostic imaging (e.g., MRI, CT, or X-Ray). Delay in diagnosis of orthopaedic trauma can lead to a non-union or delayed union (where the bone does not mend properly) (24). It can also lead to compounding pain, tenderness or swelling, and overcompensation by other parts of the body. Additionally, there is a risk of infection from open fractures where skin is broken.

According to iridology, there are 16 "zones" across the left and right irises which are associated with different bones and therefore would correspond with orthopaedic trauma (14).

### 4.6.2. Description of studies

One study met the inclusion criteria for measuring the diagnostic accuracy of iridology for diagnosis of orthopaedic trauma, using manual examination of iris images.

The study design was case control conducted in the USA in 2002. Cases were defined as participants with a diagnosis of the condition of interest; controls were defined as participants without a diagnosis of the condition of interest. Further information is provided below and in Appendix F5.

There was not enough information in study reports of the enrolled participants to determine if the population was indicative of those with orthopaedic trauma in Australia.

#### Worrall et al (2002) (14)

This study underwent a major protocol change mid-project, as the researchers initially planned a prospective study where athletes participating in organised team sport had their iris images taken at the start of the sport season, with the plan to retake iris images after a major injury. However, only one participant (out of 358) was injured during the study period. Therefore, the protocol was modified to allow patients to be recruited from two hospitals that dealt with orthopaedic trauma.

In total, 60 participants were included in the study: 30 with orthopaedic trauma (cases) and 30 without (controls). The study recruited 13 observers (3 local iridologists and a group of 10 optometry students) to categorise the participants in the study. Participants had photographs taken of both eyes. There was no prior patient history presented to the observers or contact between the participants and the observers. The iris photographs were presented to the observers using slides projected side-by-side onto a high-quality screen. Each iridologist/student was asked to indicate whether orthopaedic trauma to an extremity was present in the participant slide. Slides judged unacceptable by iridologists were removed. The chart used for the iridiagnosis was not stated, based on the information provided it would have been up to the discretion of the iridologist.

### 4.6.3. Risk of bias per item

The risk of bias for each study assessed by QUADAS-2 is presented below. The overall risk of bias as assessed for the study was unclear.

Study	Risk of bi	as		Applicability			
	Patient selection	Index test	Reference standard	Flow and timing	Patient selection	Index test	Reference standard
Manual exa	mination						
Worrall et al (14)	?			?			0

Table 14. Risk of bias summary: review authors' judgements about each risk of bias item - orthopaedic trauma

☺=Low risk; 😕=High risk; ? =Unclear risk

#### 4.6.4. Main comparison

A summary of the diagnostic accuracy results is presented in Table 15 below.

#### Worrall et al (2002) (14)

Based on poor reporting, it was difficult to determine a risk of bias; therefore, it was considered that there was an unclear risk of bias. Results from 13 different clinicians (3 iridologists and 10 optometry students. Based on the information provided in the report, summary estimates of diagnostic accuracy which were not reported, were calculated by the assessment team. These were based on Clopper and Pearson's calculation of confidence intervals for proportion which rely on certain assumptions and from the paucity of information in the study, may not hold for the population. While not explicitly stated, it seems the authors ignored the inconclusive test results when estimating sensitivity and specificity in the analysis.

The highest reported diagnostic accuracy for orthopaedic trauma was calculated as 52.8% (95% CI: 49.1% - 56.5%). The lowest reported accuracy was calculated as 46.7% (95% CI: 33.7% - 60.0%).

Overall, the study reported that observers could not distinguish patients with or without orthopaedic trauma accurately.

#### Table 15. Summary of diagnostic accuracy results orthopaedic trauma.

Study	Analysis technique		# Participants	TP	FP	TN	FN	Inconclusive	PPV (95% CI)	NPV (95% CI)	Accuracy (95% Cl)	Sensitivity (95% CI)	Specificity (95% CI)
Manual examination													
Worrall et al (14)	Manual examination of	Total slides	Case: 62 Control: 25	32	15	10	30		68.1% (52.9% - 80.9%)	25% (12.7% - 41.2%)	48.3% (37.4% - 59.2%)	51.6% (38.6% - 64.5%)	40% (21.1% - 61.3%)
	images by 3 iridologists	Preferred slides <sup>a</sup>	Case: 40 Control: 20	21	13	7	19		61.8% (43.6% - 77.8%)	26.9% (11.6% - 47.8%)	46.7% (33.7% - 60%)	52.5% (36.1% - 68.5%)	35% (15.4% - 59.2%)
	Manual examina by 10 optometry	tion of images students	Case: 354 Control: 375	176	166	209	178		51.5% (46% - 56.9%)	54% (48.9% - 59.1%)	52.8% (49.1% - 56.5%)	49.7% (44.4% - 55.1%)	55.7% (50.5% - 60.8%)

Note: All numbers rounded to 1 decimal place. Abbreviations: NPV=Negative Predictive Value; PPV=Positive Predictive Value; TP=True Positive; FN=False Negative; TN= True Negative; FP=False Positive. a. Slides judged unacceptable by observers were removed from analysis – hence "preferred" slide. \*Calculated based on other accuracy results data provided in report.

### 4.6.5. Summary of findings and evidence statements

The certainty of the evidence for manual examination of the iris or images of the iris to diagnose patients with orthopaedic trauma is presented in Table 16.

# Table 16. The certainty of the evidence assessed using the GRADE procedure: orthopaedic trauma via manual examination.

Outcome Accuracy Sensitivity† Specificity†										
Patient or population: Adults diagnosed with orthopaedic trauma (case) or without (control) Settings: NR Index tests: Iridology using manual examination of iris images Comparison Nil Reference standards: Diagnosis – unspecified (admitted to hospital) Limitations: Only one study met eligibility criteria; small sample size; optometry students as observers is not relevant to real world practice; results from iridologists reported below.										
No. of studies	1	1	1							
Number of participants Case: 62 Control: 25										
Summary range (95% CI)	48.3% (37.4% - 59.2%)	51.6% (38.6% - 64.5%)	40% (21.1% - 61.3%)							
What do the results mean	Iridology using manual examination of iris images would correctly detect orthopaedic trauma or correctly identify healthy cases in around 47 to 53 of 100 people.	Iridology using manual examination of iris images would miss around 48 to 50 of 100 people with orthopaedic trauma.	Iridology using manual examination of iris images would miss around 44 to 65 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‡ <sup>b</sup>	-1	-1	-1							
GRADE of Evidence for Outcome	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \ominus \ominus$	$\oplus \oplus \Theta \Theta$							
Overall GRADE	$\oplus \oplus \ominus \ominus$ (low certaint	y)								
Comment	There is low certainty e examination of iris imag often than chance.	vidence that iridology u ges cannot diagnose ort	sing manual hopaedic trauma more							

Note: All numbers rounded to 1 decimal place.

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

d. The evidence consists of one small study all with a positive bias

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 iridologists and optometry students could not accurately detect differences in the irises between patients with orthopaedic trauma and patients without. The sensitivity and specificity of the method were also low.

# 5. Discussion

### 5.1. Summary of main results

There were 5 studies identified in this review, conducted on a range of diseases. No citations were provided through the Department's public call for evidence or by other key stakeholders.

Overall studies suggested that manual iridology was not a reliable or accurate diagnostic technique.

Overall, the evidence provides low certainty that manual examination in iridology:

- **cannot** accurately detect differences between patients with kidney disease and patients without kidney disease.
- **cannot** accurately detect differences between patients with colon carcinoma and patients without colon carcinoma.
- **cannot** accurately detect differences between patients with gallbladder disease and patients without gallbladder disease.
- **cannot** accurately detect differences between patients with cancer (breast, ovary, uterus, prostate or colorectum) and patients without cancer (breast, ovary, uterus, prostate or colorectum).
- **cannot** accurately detect differences between patients with orthopaedic trauma and patients without orthopaedic trauma.

### 5.2. Overall completeness and applicability of evidence

There were no studies that directly compared the use of iridology in a general population with different diseases. One study (13) allowed iridologists to identify patients with a broader range of disease than what the study was designed for, but the diseases were limited to five conditions and the sample size/power was not prespecified for the diseases. Comorbidities of the case and control populations were only presented in one study. The evidence that has been identified for kidney disease, colon carcinoma, gallbladder disease, orthopaedic trauma, and cancers of breast, ovary, uterus, or prostate – where the iridologists knew the diseases under investigation – was not adequate to support the use of iridology for the diagnosis in those conditions.

One translated study was assessed as it was already available; we do not anticipate that language bias impacted the overall evidence completeness or applicability as only one study was translated and included in the review. Other studies published in a language other than English were not translated and were not included in the synthesis but were listed in an inventory for completeness (Appendix C3). Of the 15 studies not included, 10 studies had only the title available, of these the four seemed likely to be literature reviews based on title alone. Of the five studies where abstracts were available, the authors concluded that iridology may play a role in practice; however, only one study reported actual results on the numbers of correct diagnoses, ZaÇkova et al (25), the sensitivity was 80% for zone identification, but only 37% for organ identification. Overall, the excluded studies were unlikely to affect the overall results of the review. Databases in languages other than English were not searched.

This report also initially considered studies using Machine Learning Algorithms (MLAs), however on further assessment it was concluded that these studies were not representative of current clinical practice of iridology in Australia and therefore not relevant to the objective of the review. All MLA

studies were assessed as low to very low certainty. Further information about these studies can be found in Appendix C6.

### 5.3. Certainty of the evidence

Risk of bias was assessed using QUADAS-2 which appraises both the risk of bias and the applicability of primary diagnostic accuracy studies (26). Detailed risk of bias forms reported in Appendix E.

Applicability to the relevant outcome was not found to be an issue across any of the studies. However, directness of the evidence was considered a problem as the complete breadth of the diagnostic factors for iridology (i.e. whole of iris) is not well represented in the available studies. The majority of studies only focused on one condition and discrete areas of the iris, rather than the whole iris, which would be the case in clinical practice. While using GRADE, it was considered that certainty may increase if the Area Under the Curve (AUC) demonstrated clear and consistent sensitivity-specificity, however the studies did not include this information.

#### 5.3.1. Overall risk of bias assessment

There was only one study that was considered to have a low risk of bias (Knipschild, 1988; ref 12), with the other all assessed as having unclear risk of bias. In addition, ten studies were excluded after full-text review due to high risk of bias. Details of these studies are included in Appendix C5. The majority of studies excluded because of high risk of bias (n=6) were in conditions that were covered above (Diabetes, Kidney disease). Other studies covered varying other conditions: Ulcerative collitis; asthma; coronary heart disease; psoriasis (n=1); Gastrointestinal diseases (n=1); Anxiety (n=1) and hearing loss (n=1). Overall, the findings of these studies are unlikely to change the conclusions of the review.

### 5.4. Potential biases in the review process

We took several steps to ensure the review process was robust. We followed standard methods and Cochrane best practice of requiring two review authors to independently screen studies, extract data, and assess risk of bias. None of the authors of this review were authors of included studies.

Despite this approach, it is possible that relevant literature, particularly unpublished or grey literature, may have been missed. It is also possible that non-reporting of information in the published articles may have influenced the risk of bias assessments.

### 5.5. Agreements and disagreements with other studies or reviews

One systematic review published in 1999 considered four studies and concluded that iridology was not a valid tool for diagnosis (27). Another systematic review published in 2008 (28), was considered in the 2015 overview conducted for the Australian Government, but was excluded because the results were based on opinion and no health outcomes were reported. Given the limitations and lack of relevance of the 2008 review it was also not considered in this review. Neither the 1999 nor 2008 reviews included risk of bias or overall certainty assessments. Overall, this review concluded findings consistent with the other systematic reviews of iridology.

### 5.6. Limitations of the review

Evidence Evaluation for the Diagnostic Accuracy of Iridology Systematic Review

Overall, the majority of evidence assessed in this review was low certainty as there were issues with study design, the number of studies for each outcome and sample sizes; however, the findings across the entire evidence body were similar. Despite the rigorous search approach, it is possible that relevant literature, particularly unpublished or grey literature, may have been missed. It is also possible that non-reporting of information in the published articles may have influenced the risk of bias assessments.

# 6. Authors' Conclusions

The evidence provides low certainty that diagnostic accuracy for manual examination in iridology is generally around 50% (chance). The studies assessed in this review did not detect a clear benefit of iridology for use in diagnosing conditions or compared to normal diagnostic practice. Evidence for adverse events of using iridology was not examined, however the evidence indicated that there were substantial risks of false positives and false negatives.

### 6.1. Implications for policy

This review assessed the evidence of manual examination of iridology to inform the Australian Government about health policy decisions for private health insurance rebates. The review is not designed to cover all the reasons that people use iridology as a tool for diagnosis and is not intended to inform individual choices about using iridology.

### 6.2. Implications for research

The studies identified in this review were generally considered low certainty. Further research into iridology is needed.

# 7. Author contributions and declaration of interests

All authors report no known conflicts of interest.

MD, KM and AM developed the protocols and performed the searches of the databases. KM and AM carried out the article screening and MD was involved in the discussion for final decision making. KM and AM carried out the article assessment and data extraction. All authors were involved in evidence synthesis and final report writing.

# 8. References

- 1. Jensen B. Iridology simplified. 5th ed. California, USA: Iridologists International; 1980.
- 2. Simon A, Worthen DM, Mitas Ii JA. An evaluation of iridology. Journal of the American Medical Association. 1979;242(13):1385-9.
- 3. Angerer J, Studies IfRil. Textbook of Eye Diagnosis: Eye Diagnosis as the Science of Optically Regulated Reflex Settings: Institute for Research into Iris Studies Pty Limited; 1987.
- 4. D.J P. Holistic Iridology® ~ Health Assessment Through External Ophthalmic Examination. The International Institute of Iridology. 2017.
- 5. Johnson D, Ness JE. What the Eye Reveals: Rayid Publications; 1995.
- 6. Mandel P. Compendium of Ophthalmotropic Genetic Therapy: (OGT): Esogetics; 2005.
- 7. Hareva DH, Lukas S, Suharta NO, editors. The smart device for healthcare service: Iris diagnosis application. 2013 eleventh international conference on ICT and knowledge engineering; 2013: IEEE.
- 8. Ma L, Zhang D, Li N, Cai Y, Zuo W, Wang K. Iris-based medical analysis by geometric deformation features. IEEE J Biomed Health Inform. 2013;17(1):223-31.
- 9. Othman Z, Prabuwono AS, editors. Preliminary study on iris recognition system: Tissues of body organs in iridology. 2010 IEEE EMBS Conference on Biomedical Engineering and Sciences (IECBES); 2010 30 Nov.-2 Dec. 2010.
- 11. Macaskill P, Gatsonis C, Deeks J, Harbord R, Takwoingi Y. Cochrane handbook for systematic reviews of diagnostic test accuracy. Version; 2010.
- 11. Herber S, Rehbein M, Tepas T, Pohl C, Esser P. [Looking for colorectal cancer in the patients iris?]. Ophthalmologe. 2008;105(6):570-4.
- 12. 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.
- 14. Worrall R, Cannon W, Eastwood M, Steinberg D. Iridology: Diagnostic validity in orthopedic trauma. Scientific Review of Alternative Medicine. 2002;6:63-7.
- 15. Lv J-C, Zhang L-X. Prevalence and disease burden of chronic kidney disease. Renal Fibrosis: Mechanisms and Therapies. 2019:3-15.
- 16. Australian Bureau of Statistics. Kidney disease. 2018.
- 17. American Kidney Fund. Blood test: eGFR (estimated glomerular filtration rate) 2022 [Available from: <u>https://www.kidneyfund.org/all-about-kidneys/tests/blood-test-</u> egfr#:~:text=eGFR%20(estimated%20glomerular%20filtration%20rate)%20is%20a%20measure%20of %20how,well%20your%20kidneys%20are%20working.
- Mármol I, Sánchez-de-Diego C, Pradilla Dieste A, Cerrada E, Rodriguez Yoldi MJ. Colorectal Carcinoma: A General Overview and Future Perspectives in Colorectal Cancer. International Journal of Molecular Sciences. 2017;18(1).
- 19. Cancer Australia. Bowel cancer (Colorectal cancer) in Australia statistics 2022 [Available from: <a href="https://www.canceraustralia.gov.au/cancer-types/bowel-cancer/statistics">https://www.canceraustralia.gov.au/cancer-types/bowel-cancer/statistics</a>.
- 20. Department of Health and Aged Care. About the National Bowel Cancer Screening Program 2021 [Available from: <u>https://www.health.gov.au/our-work/national-bowel-cancer-screening-program/about-the-national-bowel-cancer-screening-program</u>.
- 21. Stinton LM, Shaffer EA. Epidemiology of gallbladder disease: cholelithiasis and cancer. Gut Liver. 2012;6(2):172-87.
- 22. Agency for Clinical Innovation. Gallstones 2022 [Available from: https://aci.health.nsw.gov.au/networks/eci/clinical/ed-factsheets/gallstones.
- 23. Australian Institute of Health and Welfare. Cancer in Australia 2021 2021 [Available from: https://www.aihw.gov.au/reports/cancer/cancer-in-australia-2021/summary.
- 24. Australian Society of Orthopaedic Surgeons. Trauma 2018 [Available from: https://asos.org.au/orthopaedic-specialties/orthopaedic-trauma/.
- 25. Zaĭkova MV, Krasnoperova MA, Shkliaev EK, Edlinskiĭ IB, Liiaskin MI. [Diagnostic possibilities of iridodiagnostics in general clinical practice]. Oftalmol Zh. 1989(1):39-41.
- 26. Whiting PF, Rutjes AW, Westwood ME, Mallett S, Deeks JJ, Reitsma JB, et al. QUADAS-2: a revised tool for the quality assessment of diagnostic accuracy studies. Ann Intern Med. 2011;155(8):529-36.
- 27. Ernst E. Iridology: A Systematic Review. Complementary Medicine Research. 1999;6(1):7-9.
- 28. Salles LF, Silva MJ. [Iridology: a systematic review]. Rev Esc Enferm USP. 2008;42(3):596-600.