

# Autoimmune liver disease: evaluating overlapping and cross-over presentations—a case-based discussion

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## Frontline Gastroenterology

**Autoimmune liver disease: evaluating overlapping and cross-over presentations - a case based discussion**

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3 **Autoimmune liver disease: evaluating overlapping and cross-over presentations- a case**  
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5 **based discussion**  
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**Abstract**

The three classic autoimmune liver diseases are recognised based on identifying varying clinical, laboratory, histological and radiological features which collectively classify patients. In the absence of defined aetiological factors it is recognised that disease spectrum is broad, and, in this context, it is not infrequent for disease boundaries to be blurred, leading to overlapping features which may be present at the time of diagnosis, or may appear later in the course of disease. Given the absence of accepted diagnostic criteria for overlap/cross-over syndromes, alongside weak data for intervention, it is recommended that a multi-disciplinary, patient-specific approach is used to establish individual treatment pathways.

## INTRODUCTION

Autoimmune liver disease covers a spectrum of uncommon but important liver diseases including primary biliary cirrhosis/cholangitis (PBC), autoimmune hepatitis (AIH) and primary sclerosing cholangitis (PSC); each with their own specific classifying criteria (1,2). Whilst most patients meet diagnostic criteria for only one condition, some will have features of more than one condition presenting either simultaneously or sequentially. Such overlap presentations do not reflect distinct disease processes but are better considered as presentations that highlight the breadth of disease manifestation and severity. In those that have a distinct cross-over from one autoimmune liver disease to another, it may be considered as the development of a second autoimmune liver disease in the liver, just as patients with autoimmunity generally are prone to new autoimmune manifestations over time. Given the relatively rare nature of overlap syndromes, and with no randomised data to guide treatment, management of these patients can be challenging. This clinical review addresses competencies laid out in 2E of the 2010 UK Gastroenterology curriculum (Box 1) with a focus on the most common form of overlap (PBC-AIH).

**Box 1 – Gastroenterology curriculum 2010 competency**

Auto-immune liver disease including autoimmune hepatitis, PBC, PSC and overlap syndromes

- Recognise and appropriately investigate patients
- Appreciate and understand that this range of liver disease is frequently under diagnosed and may have been inappropriately managed
- Select appropriate immunomodulatory therapy, have awareness of side effects, and when they may well require specialist care
- Respond urgently to the management challenge of these severe and often acute diseases and involve more specialist services where required.

**BACKGROUND**

In their classic description, PBC and AIH are two distinct autoimmune liver diseases, each with their own clinical, biochemical, immunological and histopathological features (Table 1), as well as treatment response. In the majority of cases, distinguishing between a diagnosis of PBC and one of AIH is without strain but for a minority of patients who have features of more than one condition, either at the time of first presentation or over their disease course, the diagnostic process and treatment plan can be challenging. This is a broader reflection that many mechanisms underpinning liver and biliary injury in patients with autoimmune liver disease are shared.

Table 1 - Characteristics of PBC and AIH

	<b>Primary biliary cholangitis/ cirrhosis</b>	<b>Autoimmune hepatitis</b>
<b>Demographics</b>	<b>Female: male (10:1)</b>  <b>Typically age &gt;40</b>	<b>Female: male (3:1)</b>  <b>All age groups</b>
<b>Biochemical profile</b>	<b>Cholestasis</b>	<b>Hepatic</b>
<b>Autoantibody profile</b>	<b>AMA, gp210 sp100, anti- centromere</b>	<b>ANA, SMA, anti-F-actin, anti-SLA, anti LKM, anti LC</b>
<b>Immunoglobulin profile</b>	<b>IgM</b>	<b>IgG</b>
<b>Biopsy features</b>	<b>Lymphocytic cholangitis with ductopaenia, granulomas</b>	<b>Interface hepatitis, plasma cells</b>
<b>Treatment</b>	<b>Ursodeoxycholic acid</b>	<b>Immunosuppression</b>

AMA – anti-mitochondrial antibody, SMA – smooth muscle antibody, LKM – liver kidney microsomal, LC – liver cytosol, SLA soluble liver antigen

#### DEFINITION OF OVERLAP

1  
2  
3 Definitions of overlap syndrome are variable and have changed over time as our  
4  
5 understanding of autoimmune liver disease has developed. Generally, it is agreed that the  
6  
7 presence of a single feature of another condition (for example AMA positivity in a patient  
8  
9 with otherwise typical AIH or elevated aminotransferase activity in a patient with classical  
10  
11 PBC) is not sufficient to diagnose an overlap syndrome. The stringency of the definitions  
12  
13 applied impacts on the reported frequencies of overlap, and additionally reflect the interest  
14  
15 and background mechanistic viewpoint of investigators. If investigators believe that therapy  
16  
17 with immunosuppression is beneficial then there might be a tendency to apply less stringent  
18  
19 definitions, whereas if clinicians see overlap presentations as extreme presentations of one  
20  
21 underlying dominant, frequently biliary, process then there may be a reluctance to reach a  
22  
23 diagnosis of overlap unless every feature, including response to therapy, is demonstrable for  
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25 an individual patient.  
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### 35 **PREVALENCE**

36  
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38 Reported prevalence of PBC-AIH overlap varies depending on definitions used. A commonly  
39  
40 used set of classifying criteria derived by Chazouilleres et al (3) identified 12 cases of overlap  
41  
42 amongst 130 consecutive patients diagnosed with PBC (9.2%). Czaja (4) applied the IAIHG  
43  
44 (International Autoimmune Hepatitis Group) criteria to 37 patients with PBC and found that  
45  
46 7 (19%) satisfied the criteria for AIH. The timing at which such criteria are applied to patients  
47  
48 is relevant, as is the appreciation in PBC of a subset of patients with high risk, UDCA non-  
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50 responsive disease, that might mimic overlap biochemically (5).  
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## PRESENTATION

Patients with overlap syndromes can present in a number of different ways. Some may be identified at the time of diagnosis (the simultaneous presentation), whilst others have a diagnosis of one condition which is stable for a number of years before they develop features of another (the sequential presentation). In those with a simultaneous presentation, extra care needs to be taken when diagnosing overlap as this is most often a reflection of disease variation rather than a true overlap, and many would delay reaching such a diagnosis until after the dominant disease process is treated and a repeat evaluation is undertaken (case 1). The diagnosis in those with a sequential presentation is often much more straightforward and these patients are easier to characterise as having cross-over features. As is characteristic of classical AIH, some patients will have an indolent presentation (case 2) whilst some can have a much more florid presentation (case 3).

## DIAGNOSIS

Whilst the presence of a deviation from the normally expected features of a condition should alert the clinician to the fact that a patient may have overlap, the patient should be viewed holistically and no single feature that differs from expected can be used as the sole basis for diagnosis of overlap. The most commonly used criteria in suspected PBC-AIH overlap was developed by Chazouillieres et al (3) (Table 2). Using these criteria, a diagnosis of overlap is proposed if a patient has two out of the three features of PBC as well as two out of three features of AIH. These criteria combine biochemical, immunological and histological features with biopsy being a mandatory requirement. Perhaps in a reflection of

an absent gold standard, these criteria are reported as having a high sensitivity (92%) and specificity (97%) for PBC-AIH overlap (6).

**Table 2: Classifying criteria for PBC-AIH overlap**

<p><b>PBC features</b></p> <p><b>ALP &gt;2 x ULN or GGT &gt;5 x ULN</b></p> <p><b>AMA ≥ 1:40</b></p> <p><b>Liver biopsy showing florid duct lesions *</b></p>
<p><b>And</b></p>
<p><b>AIH features</b></p> <p><b>ALT &gt;5 x ULN</b></p> <p><b>IgG &gt;2 x ULN or positive smooth muscle antibody</b></p> <p><b>Liver biopsy showing moderate or severe periportal or periseptal lymphocytic piecemeal necrosis *</b></p>

\*histology is mandatory to classify PBC-AIH in this way

#### The role of autoantibodies

Establishing the autoantibody profile in patients with autoimmune liver disease is useful in diagnosis and carries a prognostic role helping to establish the disease phenotype, risk of progression and in some cases response to treatment. They can cause additional confusion

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2  
3 for example when a patient with otherwise classical PBC is found to have a positive anti  
4  
5 SMA. Again, a holistic view of the patient and clinical scenarios is essential. PBC specific  
6  
7 antinuclear antibodies can be useful where there is diagnostic doubt (i.e. AMA negative  
8  
9 disease) with anti-Sp100 and anti-gp210 having a high specificity for PBC (>95%). In addition,  
10  
11 Nakamura et al (7) demonstrated that anti-gp210 positivity was an independent risk factor  
12  
13 for progressive disease (including end stage hepatic failure, hepatocellular carcinoma and  
14  
15 variceal bleeding) and liver transplant and that biopsies from these patients typically  
16  
17 showed severe interface hepatitis and lobular inflammation. This phenotype can often be  
18  
19 confused for PBC-AIH overlap. However, gp210 positivity is a marker of a poor response to  
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21 steroids (8). The significance of anti sp100 positivity is less well understood but is also  
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23 thought to be associated with more rapidly progressive disease (9).  
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## 32 **TREATMENT**

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35 Whilst PBC and AIH both fall under the umbrella term of autoimmune liver disease, their  
36  
37 treatment strategies are distinct. Currently, ursodeoxycholic acid (UDCA) is the only  
38  
39 treatment licensed for use in PBC (where it is given at a dose of 13-15mg/kg/day), and the  
40  
41 mainstay of treatment for AIH is immunosuppression initially with corticosteroids, and  
42  
43 subsequently azathioprine. There is a paucity of randomised data to guide treatment  
44  
45 guidelines for overlap.  
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49  
50 In practice, treatment is commonly guided by the mode of presentation with different  
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52 strategies employed for those with simultaneous presentations than for those with distinct  
53  
54 sequential presentations. In a patient who has overt features of both PBC and AIH at first  
55  
56 presentation it is often best to treat with UDCA for six months and then re-evaluate, with  
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3 some then considering the addition of corticosteroids if liver biochemical parameters  
4  
5 continue to support the presence of a potentially corticosteroid responsive hepatitis.  
6  
7 However, the patient demographics are important; we now recognise, for example, that  
8  
9 patients diagnosed with PBC before the age of 50, have a high (50%) chance of treatment  
10  
11 failure with UDCA, highlighting a more aggressive disease perhaps better considered to be a  
12  
13 hepatitic PBC rather than PBC-AIH overlap with the former not responding to steroids.  
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16  
17 For a patient with established PBC who subsequently develops features of AIH are offered  
18  
19 treatment as per standard AIH guidelines, however with close attention to demonstrating  
20  
21 response. Exclusion of drug induced liver injury is important, as is identification of AMA  
22  
23 negative PBC. The latter group were classically first described as 'autoimmune cholangitis'  
24  
25 precisely because they had elevated IgG values and were AMA negative (10).  
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### 33 **WHEN TO REFER FOR SPECIALIST OPINION**

34  
35 Due to the lack of specific diagnostic criteria for overlap, the variety of modes of  
36  
37 presentation and the relative rarity of the condition, it can often be difficult to positively or  
38  
39 negatively determine the diagnosis of an overlap syndrome. This can lead to under  
40  
41 treatment with the risk of uncontrolled disease progressing to fibrosis and cirrhosis or over  
42  
43 diagnosis leading to patients receiving escalating immunosuppression and the associated  
44  
45 risk of treatment side effects. Referral to a specialist centre with a high volume caseload of  
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47 patients with autoimmune liver disease should be considered in the following  
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49 circumstances:  
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55 • Patients with UDCA unresponsive disease
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- Patients diagnosed with PBC under the age of 50
- Patients with potential overlap where there is diagnostic uncertainty or where immunosuppression is ineffective (ie failure of AST or ALT to fall despite an adequate dose of steroids and azathioprine)

#### TAKE HOME MESSAGES

- Suspect the diagnosis of overlap in any patient with features of more than one condition either at diagnosis or over the disease course.
- There is no single diagnostic feature for overlap and the patient should be viewed individually, over time, with a focus on the dominant histologic process in particular.
- Be cautious when diagnosing overlap in the young patient with PBC and inflammatory features on biochemistry and histology.
- Liver biopsy, with review by a specialist histopathologist, is essential in the evaluation of overlap presentations.
- If in doubt, refer to a multi-disciplinary expert team for advice.
- Be cognisant that age, gender and ethnicity can impact disease presentation in autoimmune liver disease.

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**CASE EXAMPLES****Case 1**

Miss A presented age 34 with pruritus and cholestatic jaundice (bilirubin 113, ALP 286). Autoantibody screen showed a positive AMA, SMA was negative and IgG was within normal range. She was diagnosed with PBC and commenced on UDCA. After 4 months of treatment with UDCA her ALP remained raised at 379 and her ALT was mildly elevated at 56. She underwent a liver biopsy which showed interface activity and portal inflammation. She was given a diagnosis of overlap syndrome and was commenced on prednisolone but this was stopped after three months. This was followed by a further rise in ALT to 97. As such, prednisolone was restarted and azathioprine added. Despite remaining on prednisolone 20mg and azathioprine being titrated up to 1.5mg/kg/day her ALT remained raised. Her prednisolone was further increased to 30mg and she was referred for tertiary opinion. At this time, she was symptomatic from her steroid use. Her original biopsy was reviewed and whilst it was felt that inflammatory activity was present this could be consistent with biliary disease. Extended serology showed positive ANA 1:100 (multidot pattern), sp100 positive, gp210 negative. The overall impression was that this was not overlap and immunosuppression was withdrawn and UDCA was continued. The patient's biochemistry remained abnormal and she is likely to progress to transplant unless new therapies emerge.

Learning points: this case illustrates a young patient who met diagnostic criteria for PBC but with some features that are inconsistent with classic PBC. It is recognised that patients diagnosed with PBC before the age of 50 have a 50% chance of being UDCA treatment non-responders and that non-response is frequently characterised on the basis of elevated serum aminotransferase activity (11). These patients, sometimes referred to as hepatic

1  
2  
3 variant PBC, often have features that suggest overlap syndrome (in this case raised ALT and  
4  
5 biopsy features) and differentiating between the two can be complex. In these cases,  
6  
7 involvement of a centre with experience of complex autoimmune disease is vital with expert  
8  
9 opinion from a specialist hepatologist and histopathologist. Whilst some argue that in such  
10  
11 “hepatitic PBC” presentations, with interface hepatitis, that Budesonide has a favourable  
12  
13 effect, randomised controlled data to this effect is still lacking. There is, however, emerging  
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15 evidence for second line therapies for UDCA treatment unresponsive PBC such as the FXR  
16  
17 agonist obeticholic acid (12). Whilst this patient was not responsive to UDCA by established  
18  
19 criteria, there is no evidence that UDCA should be stopped in these cases and second lines  
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21 therapies when available are used in addition to rather than instead of UDCA. It is also  
22  
23 important to note in this patients that use of immunosuppression is a frequent contra-  
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25 indication to inclusion in a clinical trial, which therefore means that inappropriate use of  
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27 immunosuppression may prevent an individual from accessing newer trial based PBC  
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## Case 2

Mrs. B was diagnosed at the age of 58 with PBC. Extended serology showed AMA positivity (titre 1:100), ANA negative, sp100 and gp210 negative with a normal IgG and raised IgM. She was commenced on treatment with UDCA and her ALP normalised. In 2013 (approximately 6 years after her original diagnosis) she developed symptoms of poor appetite, malaise and diarrhoea. Blood tests performed in primary care showed a predominantly hepatic picture (Bilirubin 15, ALT 255, AST 150, ALP 106, albumin 42, GGT 74). She underwent a viral screen (negative for CMV, EBV, Hepatitis A, B, C, E) and repeat



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3 immunology (SMA >1:160, IgG 19.04, IgM 7.9). Drug history revealed no culprit medications.

4  
5 Biopsy was consistent with AIH with confluent/bridging necrosis, plasma cells, interface  
6  
7 hepatitis and rosettes. She remained on UDCA and was started on prednisolone 20mg with  
8  
9 the addition of azathioprine 50mg once biochemical response to steroids was achieved and  
10  
11 titrated to a dose of 150mg. The patient achieved normal tests.  
12  
13

14  
15 Learning points: this case illustrates a consecutive diagnosis of two diagnoses (PBC followed  
16  
17 by AIH) which is the most common type of overlap seen in the outpatient setting. Given the  
18  
19 time separating the presentations, it is appropriate to investigate the new liver biochemical  
20  
21 changes as for any patient; viral screen, drug screen, autoimmune screen. In this case there  
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23 were clear features of AIH and treatment was commenced as per standard guidelines.  
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### 31 Case 3

32  
33 Mrs. C had a known diagnosis of PBC and was on treatment with UDCA at a dose of 1000mg  
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35 daily. In late 2014 she presented for her routine out patient follow up and was found to be  
36  
37 jaundiced with grade 1 encephalopathy. The patient reported that she had first noticed the  
38  
39 jaundice two weeks prior associated with loose stools and vomiting. There was no history of  
40  
41 new medications (either prescribed or over the counter) and no recent travel. Blood tests at  
42  
43 presentation showed bilirubin 258, ALT 1211, ALP 141, albumin 28, INR 3.9. Blood tests  
44  
45 taken one month prior showed bilirubin 9, ALT 246, ALP 170, INR 1.0, albumin 39. Non  
46  
47 invasive liver screen was performed (Hepatitis A, B, C, E, CMV, EBV negative; IgG 25, IgM  
48  
49 11.77, IgA 3.43; AMA positive >1:100, SMA negative, ANA negative, gp210 and sp100  
50  
51 negative). She was commenced on Tazocin and Fluconazole and transferred to her nearest  
52  
53 liver transplant centre where she was admitted to critical care due to worsening  
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3 encephalopathy. She was placed on the super urgent transplant list and received a donor  
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5 liver two days later. Explant histology revealed submassive necrosis. Biliary features were  
6  
7 present but with mild fibrosis only.  
8  
9

10 Learning points: A florid presentation of AIH on the background of established PBC is rare.  
11  
12 Whilst most will present like case 2, it is important to recognise acute AIH in the context of a  
13  
14 patient with underlying PBC and to differentiate from a decompensation of PBC.  
15  
16 Management should be as for any patient with acute AIH and liver transplant assessment  
17  
18 should be considered. In this case the prior presence of early PBC was not a  
19  
20 contraindication to super-urgent registration for transplantation given the distinct clinical  
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22 presentation of an acute and evolving severe liver injury.  
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**BEST OF FIVE QUESTIONS****Question 1**

A 38-year-old female is referred by her GP with abnormal liver biochemistry tests having presented with fatigue and pruritus. She is a smoker with a 10 pack year history and drinks approximately 6-10 units of alcohol per week. Her liver biochemistry shows bilirubin 34, ALT 312, ALP 283, albumin 45, GGT 178. A non invasive liver screen is performed.

Which of these features is not one of the criteria set out by Chazouilleres for the diagnosis of PBC-AIH overlap?

A – AMA titre 1:160

B – ALP 273

C – ALT 312

D – decrease in ALT to 150 and ALP to 130 after 4 months of treatment with UDCA

E – IgG 32.4

Answer: D

This scenario describes a young patient presenting with classical symptoms associated with PBC (fatigue and itch) but a pattern of liver biochemistry that is mixed with both a raised ALP and ALT. Answers A, B, C, E are all elements of Chazouilleres criteria for overlap. The response to UDCA treatment suggests that this is a hepatitic PBC rather than overlap.

**Question 2**

Mrs. D was diagnosed with PBC at the age of 52 and commenced on UDCA at a dose of 14mg/kg/day. After nine months of treatment her liver biochemistry was entirely normal.

She is reviewed in clinic on an annual basis. At a routine follow up she is noted to be

1  
2  
3 clinically jaundiced. On questioning she reports that she has been off work from her job as a  
4  
5 nurse for the last 2 weeks as she felt unwell with joint aches and pains following her  
6  
7 returned from holiday in Thailand 3 weeks ago. She was treated for a dental infection two  
8  
9 weeks ago. Her blood tests are shown below:  
10

11  
12 Bilirubin 87, AST 346, ALT 234, ALP 157, albumin 35

13  
14 AMA 1:160, SMA 1:80, IgG 21

15  
16 Hb 112, WCC 12.3, platelets 156, MCV 102

17  
18 **Hepatitis B surface antigen negative, hepatitis B surface antibody positive, hepatitis B core**  
19  
20 **antibody negative.**  
21

22  
23 Which of these is the least likely cause of her acute illness?  
24

- 25  
26  
27 A. Alcoholic hepatitis  
28 **B. Augmentin related liver injury**  
29 C. Hepatitis A  
30 D. Immunisation against Hepatitis B  
31 E. PBC/AIH overlap  
32

33  
34  
35 Answer B:  
36

37  
38 This scenario describes a patient with established PBC who develops a new onset jaundice  
39  
40 with a predominantly hepatitic pattern. All of the above conditions can cause a hepatitic  
41  
42 jaundice. AST is higher than ALT and MCV is raised which could suggest alcoholic hepatitis.  
43  
44 Given her profession she is likely to have been immunized against hepatitis B which explains  
45  
46 the serology. Hepatitis A is a risk given her recent travel. Her blood tests could be consistent  
47  
48 with overlap although biopsy is mandatory for the diagnosis. Whilst Augmentin can cause a  
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50 hepatitic pattern it is more commonly associated with cholestatic jaundice.  
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### Competing interests

The authors declare no competing interests

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