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Please acknowledge this work in any resulting paper or presentation as; Progesterone Prescribing Contraception in MDR3 Deficiency; Louise Levitt. [12/01/2026], Isleworth, UK: Patricia Bowen Library & Knowledge Service.

**Date of Search:** 12 January 2026

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# Progesterone Prescribing in MDR3 Deficiency

## 1. Intrahepatic cholestasis of pregnancy: Green-top Guideline No. 43 June 2022

**Item Type:** Journal Article

**Authors:** Girling J.; Knight C.L. and Chappell L.

**Publication Date:** 2022

**Journal:** BJOG: An International Journal of Obstetrics and Gynaecology 129(13), pp. e95–e114

**Access or request full text:** <https://libkey.io/10.1111/1471-0528.17206>

## 2. Sex Hormones and the Liver: Implications for Disease Progression and Hormonal Therapy

**Item Type:** Journal Article

**Authors:** Cazzagon, Nora;Gambato, Martina;Brunetto, Maurizia Rossana;Villa, Erica;Burra, Patrizia and Floreani, Annarosa

**Publication Date:** 2026

**Journal:** Liver International : Official Journal of the International Association for the Study of the Liver 46(2), pp. e70509

**Abstract:** The liver is central to sex hormone metabolism, and sex hormones in turn modulate hepatic physiology and disease processes. Oestrogens are often protective, while androgens tend to worsen disease progression. The clinical implications of hormonal therapies in patients with liver disease remain an area of active investigation. To review current evidence on the interplay between sex hormones and liver disease, with a focus on the safety and impact of hormonal therapies, including contraception, hormone replacement therapy, assisted reproductive technology and gender-affirming treatments. Prolonged or high-dose oestrogen exposure, particularly via oral contraceptives, has been associated with intrahepatic cholestasis and hepatocellular adenoma (HCA), especially in predisposed individuals. In contrast, hormone replacement therapy in postmenopausal women is generally safe and may confer metabolic and hepatic benefits. Oestrogens appear to slow fibrosis progression and reduce hepatocellular carcinoma risk, whereas androgens can promote steatosis and HBV-related oncogenesis. Hormonal therapies are safe in most patients with compensated chronic liver disease but require caution in settings such as in polycystic liver disease, where oestrogens can accelerate cyst growth. Emerging data also indicate a role of sex hormones in autoimmune and cholestatic diseases, as well as in outcomes of assisted reproduction and gender-affirming therapy. Hormonal therapies are feasible in most liver disease contexts, but individualised assessment, awareness of genetic predisposition, and disease-specific risks are essential to optimise safety and therapeutic benefit. Copyright © 2026 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd.

**Access or request full text:** <https://libkey.io/10.1111/liv.70509>

## 3. Contraceptive safety in liver disease: The cost of overstating risk

**Item Type:** Journal Article

**Authors:** Garriga M.;Cedars M.;Whetstone S. and Sarkar M.

**Publication Date:** 2025

**Journal:** Contraception 152, pp. 110974

**Access or request full text:** <https://libkey.io/10.1016/j.contraception.2025.110974>



#### 4. Safety of hormonal contraception among women with liver disease: an updated systematic review

**Item Type:** Journal Article

**Authors:** Kapp N.;Tepper N.K.;Nguyen A.T.;Garbarino S.;Kortsmit K.;Curtis K.M. and Whiteman M.K.

**Publication Date:** 2025

**Journal:** Contraception , pp. 111012

**Abstract:** Objectives: We sought to assess whether, among women with liver disease, there is an increased risk of adverse health effects with the use of hormonal contraception (HC). Study design: We conducted a systematic review of six databases from database inception through December 13, 2022. We searched for articles that examined changes in liver lesions and acute and chronic liver disease with the use of HC or after discontinuation of HC. We assessed the risk of bias for each study and certainty of evidence for all outcomes. Result(s): Thirteen articles met inclusion criteria, one with low risk of bias and the others with high risk of bias: three studies (four articles) were of women with focal nodular hyperplasia (FNH), five studies were of hepatocellular adenoma (HCA), and four studies were of acute or chronic hepatitis. The size and/or number of FNH lesions were generally not influenced by HC use. HCA progression was generally higher among current combined oral contraception (COC) users than those who discontinued, and lesions were stable or regressed in most women who discontinued COC or used progestin-only contraception. Studies found that viral hepatitis generally did not progress or increase in severity with the use of COC. Conclusion(s): Overall, a limited body of evidence suggested changes in FNH lesions were independent of hormonal contraceptive use. Estrogen-containing contraceptive method use was associated with HCA lesion progression; lesions generally remained stable with progestin-only contraceptive use. COC use did not increase progression or severity of disease among those with viral hepatitis. The certainty of evidence for all outcomes was very low. Implications: Liver conditions such as liver lesions, viral hepatitis, and cirrhosis are increasingly common in women of reproductive age. Information in this review can be used by health care providers when counseling women with liver disease about the safe use of contraception. Copyright © 2025 Elsevier Inc.

**Access or request full text:** <https://libkey.io/10.1016/j.contraception.2025.111012>



## 5. Contraception in patients with liver disease and liver transplant

**Item Type:** Journal Article

**Authors:** Garriga M.;Zhang G. and Sarkar M.

**Publication Date:** 2024

**Journal:** Clinical Liver Disease 23(1), pp. e0104

**Access or request full text:** <https://libkey.io/10.1097/CLD.0000000000000104>

## 6. FSRH Guideline (August 2022) Progestogen-only Pills

**Item Type:** Journal Article

**Authors:** .

**Publication Date:** 2022

**Journal:** BMJ Sexual and Reproductive Health 48, pp. 1–86

**Access or request full text:** <https://libkey.io/10.1136/bmjsexrh-2022-PoP>

## 7. Contraceptive vaginal ring-induced cholestasis in a patient with a history of intrahepatic cholestasis of pregnancy

**Item Type:** Journal Article

**Authors:** Perrault F.;Echelard P.;Viens D. and Borduas M.

**Publication Date:** 2021

**Journal:** Clinics and Research in Hepatology and Gastroenterology 45(4), pp. 101475

**Abstract:** Introduction: Intrahepatic cholestasis of pregnancy (ICP) is a heterogeneous group of liver disorders with a high recurrence rate. Patients with a history of ICP are at risk of developing contraceptive-induced cholestasis, especially if they harbour a biliary transporter mutation. We report the first case of drug-induced cholestasis associated with a contraceptive vaginal ring (CVR) in a patient with a prior history of ICP. Presentation: Our patient was a women with a history of multiple pregnancies and spontaneous abortions and early and severe ICP. Two to four weeks after initiation of CVR, she developed signs and symptoms of cholestasis, which resolved after discontinuation of the CVR. A thorough investigation to exclude other plausible causes of cholestasis was performed, including a liver biopsy. Genetic testing revealed pathogenic mutations in both the ABCB11 and ABCB4 genes. Discussion(s): Although a history of ICP used to be an absolute contraindication for oral contraceptive pills (OCP), recent studies suggest a lower risk of cholestasis associated with low-dose oestrogen pills (20-35 mcg compared to the original 50 mcg). No previous case report could confirm the theoretical risk associated with the use of a CVR, which delivers a very low estrogen dose (15 mcg). The two biliary transporter mutations identified



in our case could potentially explain the patient's susceptibility to the cholestatic effect of oestrogen. Conclusion(s): This case illustrates that CVR can trigger drug-induced cholestasis in a susceptible patient. While such cases should not discourage the trial of low-dose hormonal contraception in women with prior ICP, an appropriate follow-up is necessary to ensure early detection and treatment of drug-induced cholestasis. Copyright © 2020 Elsevier Masson SAS

**Access or request full text:** <https://libkey.io/10.1016/j.clinre.2020.06.002>

## 8. Reproductive Health and Liver Disease: Practice Guidance by the American Association for the Study of Liver Diseases

**Item Type:** Journal Article

**Authors:** Sarkar M.;Brady C.W.;Fleckenstein J.;Forde K.A.;Khungar V.;Molleston J.P.;Afshar Y. and Terrault N.A.

**Publication Date:** 2021

**Journal:** Hepatology 73(1), pp. 318–365

**Access or request full text:** <https://libkey.io/10.1002/hep.31559>

## 9. Contraception in the patient with liver disease, a review of the literature

**Item Type:** Journal Article

**Authors:** Velez-Cuervo S.M. and de los Angeles Villegas-Ortiz M.

**Publication Date:** 2021

**Journal:** Ginecologia Y Obstetricia De Mexico 89(12), pp. 963–970

**Abstract:** OBJECTIVE: To describe updated contraceptive recommendations for patients with liver disease, based on a literature review. METHODOLOGY: Bibliographic search in PubMed, LILACS and Google Scholar; between the years 1960 to December 2020, with the keywords (Mesh): "Contraception", "Liver Diseases", "Hepatitis", "Liver Cirrhosis", "Cholelithiasis", "Cholestasis", "Liver Neoplasms", "Adenoma", "Focal Nodular Hyperplasia", "Hepatolenticular Degeneration", "Liver Transplantation". RESULT(S): 127 results were obtained, 92 were excluded due to duplicity, language other than English and Spanish, lack of relevance to the topic and lack of available text. Finally, 35 articles were included with information regarding the effects of hormonal and non-hormonal contraceptives on the appearance, evolution and treatment of liver diseases, which motivated the review and analysis in order to establish recommendations for the choice of the best contraceptive method in women with specific liver diseases. CONCLUSION(S): Contraceptive counseling for women with liver disease is a challenge that involves balancing the risk of the contraceptive method versus a high-risk pregnancy. While sex hormones appear to have a negative effect in some liver diseases, there are safe and effective methods of contraception for women with liver disease. Copyright © 2021 Asociacion Mexicana de Ginecologia y Obstetricia. All rights reserved.



**Access or request full text:** <https://libkey.io/10.24245/gom.v89i12.6853>

10. **Unnecessary confusion about family planning after intrahepatic cholestasis of pregnancy**

**Item Type:** Journal Article

**Authors:** Molsa, Anni; Turunen, Kaisa; Mattila, Kari J. and Sumanen, Markku

**Publication Date:** 2012

**Journal:** Contraception 86(6), pp. 639–44

**Abstract:** BACKGROUND: As conceptions have changed regarding the suitability of oral contraceptives for women with a history of intrahepatic cholestasis of pregnancy (ICP), we studied whether the contraindications formerly in force had affected family planning decisions and mode of contraception among women with such a history., STUDY DESIGN: ICP women and their controls who gave birth in 1969-1988 in Tampere University Hospital, Finland, were sent a questionnaire in 2010. The inquiry covered items concerning contraception, deliveries, menstruation and sex life. RESULTS: ICP women had limited their number of children for health reasons more often than the controls. They also more often had a single child compared to the controls. The use of oral contraceptives was less common among ICP women. Deliveries were equally successful in both groups. CONCLUSION: Physicians should provide sufficient and accurate information on ICP to the patients. Proper introduction of suitable contraception methods and successful communication with the patients would also reduce unnecessary problems and confusion regarding future family planning practices. Copyright © 2012 Elsevier Inc. All rights reserved.

**Access or request full text:** <https://libkey.io/10.1016/j.contraception.2012.05.149>



## 11. Hormonal contraception after intrahepatic cholestasis of pregnancy

**Item Type:** Journal Article

**Authors:** Kascak, P. and Korbel, M.

**Publication Date:** 2011

**Journal:** Ceska Gynekologie 76(5), pp. 374–8

**Abstract:** OBJECTIVE: Comparing the use of oral contraception (OC), treatment side effects and the incidence of cholecystolithiasis in women with a history of intrahepatic cholestasis of pregnancy (ICP), before and after introducing ursodeoxycholic acid (UDCA) in the treatment., DESIGN: Regional epidemiological., SETTING: Department of Obstetrics and Gynecology, General Hospital, Trencin, Slovak Republic., METHODS: Retrospective analysis of 79 deliveries with ICP between 1992 and 2004. Group 1 included 36 women who delivered between 1992 and 1996 and were not treated by UDCA. Group 2 included 43 women who delivered between 1997 and 2004 and were managed with a 500-750 mg daily dose of UDCA administered orally. In 2008, the questionnaire was sent to all treated women with ICP. The analysis was focused on OC use and presence of cholecystolithiasis, or cholecystectomy in individual groups. The incidence of difficulties comparable to ICP was analyzed in OC users. RESULTS: The frequency of ICP was the same in both groups (0.4% of deliveries). The questionnaire response rate was 71%. Analysis was conducted in 56 women with ICP--in Groups 1 and 2 it was 26 and 30 women, respectively (the difference statistically insignificant,  $p=0.81$ ). In the observed population, 15 women (26.8%) used hormonal contraception--in Groups 1 and 2 it was 42.3% and 13.3%, respectively (statistically significant difference,  $p=0.015$ ). Only one woman in Group 1 reported pruritus during the use of OCs. The frequency of cholecystolithiasis or cholecystectomy occurrence was 26.8% in the entire population--in Groups 1 and 2 it was 38.5% and 16.7%, respectively (statistically significant difference,  $p=0.043$ )., CONCLUSION: Based on our results it is possible to consider the use of OC in women with a history of ICP as safe. Only a minimum of side effects have been recorded in relatively high percentage of OC users.

**URL:** <https://libkey.io/libraries/2828/openurl?genre=article&sid=OVID:medline&id=pmid:22132639&id=doi:&issn=1210-7832&isbn=&volume=76&issue=5&spage=374&pages=374-8&date=2011&title=Ceska+Gynekologie&atitle=Hormonal+contraception+after+intrahepatic+cholestasis+of+pregnancy.&aulast=Kascak&pid=%3Cauthor%3EKascak+P%3BKorbel%27+M%3C%2Fauthor%3E%3CAN%3E22132639%3C%2FAN%3E%3CDT%3EJournal+Article%3C%2FDT%3E>



## 12. Progressive familial intrahepatic cholestasis type 3 revealed by oral contraceptive pills

**Item Type:** Journal Article

**Authors:** Ganne-Carrie, Nathalie;Baussan, Christiane;Grando, Veronique;Gaudelus, Joel;Cresteil, Daniele and Jacquemin, Emmanuel

**Publication Date:** 2003

**Journal:** Journal of Hepatology 38(5), pp. 693–4

**Access or request full text:** [https://libkey.io/10.1016/s0168-8278\(03\)00049-7](https://libkey.io/10.1016/s0168-8278(03)00049-7)

## 13. Contraception in the patient with liver disease

**Item Type:** Journal Article

**Authors:** Connolly, T. J. and Zuckerman, A. L.

**Publication Date:** 1998

**Journal:** Seminars in Perinatology 22(2), pp. 178–82

**Abstract:** Selection of a method of contraception in patients with liver disease can be complicated. Tubal ligation should be considered in the setting of chronic liver disease for those patients who have completed families. Multiple reversible methods of contraception are currently available but may affect hepatic disease. Estrogen-containing contraceptive methods are contraindicated in patients with acute liver disease. Progestin contraceptives appear to be safe and multiple delivery systems are available. With rare exception, barrier methods and the intrauterine device may be offered as alternative methods.

**Access or request full text:** [https://libkey.io/10.1016/s0146-0005\(98\)80050-5](https://libkey.io/10.1016/s0146-0005(98)80050-5)

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## Search Strategy

### Ovid MEDLINE(R) ALL <1946 to January 09, 2026>

- 1 MDR3 deficien\*.tw,kw. 26
- 2 Multidrug-resistant P-glycoprotein 3.tw,kw. 3
- 3 (multidrug resistance protein 3 adj3 deficien\*).tw,kw. 3
- 4 (MDR3 adj3 deficien\*).tw,kw. 29
- 5 Progressive familial intrahepatic cholestatic.tw,kw. 1
- 6 exp Cholestasis, Intrahepatic/ 14931
- 7 intrahepatic cholestasis.tw,kw. 4611
- 8 1 or 2 or 3 or 4 or 5 or 6 or 7 16814
- 9 exp Contraception/ 31170
- 10 (contraception or contraceptive\*).tw,kw. 86904
- 11 9 or 10 96955
- 12 8 and 11 79
- 13 from 12 keep 2,9,21-23,34-35 7
- 14 exp Contraceptive Agents/ and exp Progestins/ 10277
- 15 (Progestin or progesterone).tw,kw. 105674
- 16 14 or 15 110927
- 17 8 and 16 87
- 18 from 17 keep 3,21 2



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**Embase <1974 to 2026 January 08>**

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5 Progressive familial intrahepatic cholestasis.tw,kw. 1584  
6 (MDR3 adj3 deficien\*).tw,kw. 61  
7 exp intrahepatic cholestasis/ 9285  
8 intrahepatic cholestasis.tw,kw. 6694  
9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 12302  
10 exp hormonal contraception/ 7878  
11 (contraception or contraceptive\*).tw,kw. 103094  
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13 9 and 12 106  
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15 limit 14 to "remove clinical trial (clinicaltrials.gov) records" 75  
16 from 15 keep 15,43,59,65,75 5  
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20 from 19 keep 1,6,12,18,33,37,41 7  
21 exp contraceptive agent/ 182891  
22 9 and 21 270  
23 limit 22 to english language 225  
24 from 20 keep 1-2,4-7 6  
25 from 23 keep 32 1  
26 exp progesterone/ and exp contraception/ 11040  
27 9 and 26 2  
28 exp progesterone/ and exp contraceptive agent/ 14740  
29 9 and 28 15