**Appendix D. Evidence Table: Diagnostic Accuracy Studies of Ultrasound Imaging**

**Table D1. Characteristics of diagnostic accuracy studies of ultrasound imaging**

| **Author, Year** | **Reason for Ultrasound Imaginga** | **Contrast** | **Imaging Start Date** | **Reference Standardb** | **Country** | **Sample Size** | **Population Characteristicsc** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Alaboudy, 2011[4](#_ENREF_4) | 2 | Perflurobutane | 2008 | 2 | Japan | 32 | Age: 68 Male: 72% HBV: 22% Cirrhosis: NR |
| Bennett, 2002[11](#_ENREF_11) | 2 | No contrast | 1991 | 1 | United States | 200 | Age: 50 Male: 67% BV: 4.5% Cirrhosis: 100% |
| Catala, 2007[14](#_ENREF_14) | 3 | Sulfur hexafluoride | 2002 | 2 | Spain | 77 | NR |
| Chalasani, 1999[16](#_ENREF_16) | 1 | No contrast | 1994 | 4 | United States | 285 | Age: 49 Male: 56% HBV: NR Cirrhosis: 100% |
| Dai, 2008[26](#_ENREF_26) | 3 | Sulfur hexafluoride | 2004 | 2 | China | 72 | Age: 59 Male: 82% HBV: NR Cirrhosis: 100% |
| Di Martino, 2010[31](#_ENREF_31) | 2 | No contrast | 2007 | 4 | Italy | 140 | Age: 59 Male: 74% HBV: NR Cirrhosis: 100% |
| D'Onofrio, 2005[32](#_ENREF_32) | 3 | Sulfur hexafluoride | 2002 | 4 | Italy | NR | NR |
| Egger, 2012[35](#_ENREF_35) | 3 | Sulfur hexafluoride | 2008 | 2 | Germany | 19 | Age: median 63 Male: 84% HBV: NR Cirrhosis: 100% |
| Forner, 2008[37](#_ENREF_37) | 3 | Sulfur hexafluoride | 2003 | 2 | United States | 89 | Age: 65 Male: 60% HBV: 6.7% Cirrhosis: 100% |
| Fracanzani, 2001[39](#_ENREF_39) | 3 | Galacatose | 1998 | 2 | Italy | 41 | Age: 62 Male: 73% HBV: NR Cirrhosis: 100% |
| Freeman, 2006[40](#_ENREF_40) | 2, 5 | NR | 2003 | 1 | United States | 789 | Age: 56 Male: 77% HBV: NR Cirrhosis: NR |
| Furuse, 2000[42](#_ENREF_42) | 1 | No contrast | 1996 | 2 | Japan | 37 | Age: 64 Male: 86% HBV: 3% Cirrhosis: 89%  |
| Gaiani, 2004[43](#_ENREF_43) | 3 | Sulfur hexafluoride | 2001 | 4 | Italy | 79 | Age: 66 Male: 68% HBV: 6% Cirrhosis: NR |
| Gambarin-Gelwan, 2000[44](#_ENREF_44) | 2 | No contrast | NR | 1 | United States | 106 | Age: 50 Male: 65% HBV: 5.7% Cirrhosis: 100% |
| Giorgio, 2004[47](#_ENREF_47) | 3 | Sulfur hexafluoride | 2002 | 2 | Italy | 74 | Age: 67 Male: 81% HBV: 7% Cirrhosis: 100% |
| Giorgio, 2007[46](#_ENREF_46) | 3 | Sulfur hexafluoride | 2003 | 4 | Italy | 73 | Age: 63 Male: 67% HBV: 4.1% Cirrhosis: 100% |
| Goto, 2012[50](#_ENREF_50) | 2 | No contrast or perflurobutane | 2007 | 3 | Japan | 100 | Age: 68 Male: 60% HBV: 9% Cirrhosis: NR |
| Hatanaka, 2008 (2)[56](#_ENREF_56) | 3 | Perfluorobutane  | 2007 | 4 | Japan | 214 | Age: 68 Male: 63% HBV: NR Cirrhosis: NR |
| Iavarone, 2010[68](#_ENREF_68) | 2 | Sulfur hexafluoride | 2006 | 2 | Italy | 59 | Age: 66 Male: 69% HBV: 12% Cirrhosis: 100% |
| Imamura, 1998[72](#_ENREF_72) | 2 | No contrast | 1995 | 2 | Japan | 114 | Age: NR Male: NR HBV: 7.9% Cirrhosis: 57% |
| Inoue, 2008[75](#_ENREF_75) | 2 | Perflurobutane | NR | 4 | Japan | 77 | Age: 62 Male: 71% HBV: 10% Cirrhosis: 71% |
| Inoue, 2009[74](#_ENREF_74) | 3 | No contrast | 2002 | 2 | Japan | 50 | Age: median 67 Male: 76% HBV: 12% Cirrhosis: 100% |
| Jang, 2009[80](#_ENREF_80) | 3 | Perflurobutane | NR | 4 | Canada | 59 | Age: 56 Male: 73% HBV: 47% Cirrhosis: NR  |
| Kawada, 2010[89](#_ENREF_89) | 2 | Perflurobutane | 2008 | 2 | Japan | 13 | Age: median 67 Male: 77% HBV: 7.7% Cirrhosis: NR |
| Khalili, 2011[92](#_ENREF_92) | 3 | Perflutren lipid microsphere | 2006 | 4 | Canada |  84 | Age: 58 Male: 63% HBV: 50% Cirrhosis: 100% |
| Kim CK, 2001[95](#_ENREF_95) | 2 | No contrast | 1996 | 1 | South Korea | 52 | Age: 45 Male: 77% HBV: 94% Cirrhosis: 100% |
| Kim PN, 2012[99](#_ENREF_99) | 2 | No contrast | 2008 | 3 | South Korea | 898 | Age: 59 Male: 76% HBV: 73% Cirrhosis: 89% |
| Korenaga, 2009[122](#_ENREF_122) | 2 | Perflurobutane | 2007 | 2 | Japan | 43 | Age: 67 Male: 70% HBV: 9.3% Cirrhosis: 81% |
| Kunishi, 2012[127](#_ENREF_127) | 2 | No contrast or perflurobutane | 2009 | 4 | Japan | 50 | Age: 71 Male: 70% HBV: 10% Cirrhosis: 100% |
| Lee MW, 2010[139](#_ENREF_139) | 3 | No contrast | 2005 | 3 | South Korea | 93 | Age: 59 Male: 70% HBV: NR Cirrhosis: NR |
| Li, 2007[140](#_ENREF_140) | 3 | Sulfur hexafluoride | NR | 2 | China | 109 | Age: 46 Male: 66% HBV: NR Cirrhosis: NR |
| Libbrecht, 2002[144](#_ENREF_144) | 2, 5 | No contrast | 2000 | 1 | Belgium | 49 | Age: 53 Male: 65% HBV: 19% Cirrhosis: 100% |
| Lim JH, 2006 (2)[145](#_ENREF_145) | 2 | No contrast | 1999 | 2 | South Korea | 103 | Age: 53 Male: 83% HBV: NR Cirrhosis: 59% |
| Liu, 2003[152](#_ENREF_152) | 2 | No contrast | 1996 | 1 | South Korea | 118 | Age: 47 Male: 73% HBV: 81% Cirrhosis: 100% |
| Luo, 2005[155](#_ENREF_155) | 3 | Galactose | 2002 | 2 | China | 36 | Age: 52 Male: 81% HBV: 42% Cirrhosis: NR |
| Luo W 2009 (3)[158](#_ENREF_158) | 3 | Perfluorobutane | 2007 | 4 | Japan | 84 | Age: 70 Male: 66% HBV: NR Cirrhosis: 100% |
| Luo W, 2009[156](#_ENREF_156) | 3 | Perfluorobutane  | 2007 | 4 | Japan | 152 | Age: 71 Male: 55% HBV: NR Cirrhosis: NR  |
| Luo W, 2009 (2)[157](#_ENREF_157) | 3 | Perflurobutane | 2007 | 2 | Japan | 139 | Age: 62 Male: 65% HBV: NR Cirrhosis: 53% |
| Mita, 2010[166](#_ENREF_166) | 3 | Perfluorobutane | 2008 | 2 | Japan | 29 | Age: 70 Male: 45% HBV: 3.4% Cirrhosis: 100% |
| Mok, 2004[167](#_ENREF_167) | 1 | No contrast | 1997 | 2 | China | 103 | Age: median 48 Male: 78% HBV: 100% Cirrhosis: NR |
| Moriyasu, 2009[170](#_ENREF_170) | 3 | No contrast or perflurobutane  | NR | 4 | Japan | 190 | Age: 63 Male: 67% HBV: NR Cirrhosis: NR |
| Numata, 2014[181](#_ENREF_181) | 2 | Perflurobutane | 2010 | 2 | Japan | 43 | Age: 70 Male: 65% HBV: 9.3% Cirrhosis: 100% |
| Ooi, 2010[183](#_ENREF_183) | 3 | Sulfur hexafluoride | 2006 | 4 | Singapore | 73 | Age: 64 Male: 75% HBV: NR Cirrhosis: NR |
| Paul, 2007[191](#_ENREF_191) | 1 | No contrast | 2001 | 4 | India | 301 (291 under-went US) | Age: NR Male: NR HBV: NR Cirrhosis: 100% |
| Pei, 2012[193](#_ENREF_193) | 4 | Sulfur hexafluoride | 2005 | 2 | China | 100 | Age: 51 Male: 86% HBV: NR Cirrhosis: NRNote: HCC group only |
| Quaia, 2003[201](#_ENREF_201) | 3 | Sulfur hexafluoride | NR | 2 | Italy | 39 | Age: 54 Male: 62% HBV: NR Cirrhosis: 100% |
| Quaia, 2009[200](#_ENREF_200) | 3 | Sulfur hexafluoride | 2009 | 2 | Italy | 106 | Age: 70 Male: 64% HBV: 80% Cirrhosis: 100% |
| Rickes, 2003[203](#_ENREF_203) | 3 | No contrast or galactose  | 1998 | 4 | Germany | 87 | Age: 60 Male: 71% HBV: 14% Cirrhosis: 100% |
| Rode, 2001[206](#_ENREF_206) | 2 | No contrast | 1996 | 1 | France | 43 | Age: 51 Male: 70% HBV: 9.3% Cirrhosis: 100% |
| Sangiovanni, 2010[208](#_ENREF_208) | 3 | Sulfur hexafluoride | 2006 | 2 | Italy | 64 | Age: NR Male: NR HBV: NR Cirrhosis: 100% |
| Seitz, 2009[212](#_ENREF_212) | 3 | Sulfur hexafluoride | 2004 | 4 | Germany | 267 | Age: 60 Male: 45% HBV: NR Cirrhosis: NR |
| Seitz, 2010[213](#_ENREF_213) | 3 | Sulfur hexafluoride | 2004 | 4 | Germany | 269 | Age: 53 Male: 41% HBV: NR Cirrhosis: NR |
| Shah SA, 2006 (2)[215](#_ENREF_215) | 5 | NR | NR | 1 | Canada | 118 | Age: NR Male: 80% HBV: 19% Cirrhosis: NR |
| Singh, 2007[217](#_ENREF_217) | 1 | No contrast | 2005 | 2 | United States | 17 | Age: 56 Male: NR HBV: NR Cirrhosis: 100% |
| Strobel, 2003[220](#_ENREF_220) | 3 | Octafluoropropane | 1998 | 4 | Germany | 90 | NR |
| Sugimoto, 2012[221](#_ENREF_221) | 4 | Perflurobutane | 2008 | 2 | Japan | 66 | Age: 69 Male: 70% HBV: 12% Cirrhosis: NR |
| Sugimoto, 2012 (2) [222](#_ENREF_222) | 2 | Perflurobutane | 2008 | 2 | Japan | 54 | Age: 70 Male: 54% HBV: 5.6% Cirrhosis: NR |
| Suzuki, 2004 (2)[227](#_ENREF_227) | 3 | Galactose | 2000 | 2 | Japan | 46 | Age: 66 Male: 67% HBV: NR Cirrhosis: NR |
| Takahashi, 2013[228](#_ENREF_228) | 4 | Perflurobutane | 2008 | 2 | Japan | 56 | Age: 66 Male: 71% HBV: 14% Cirrhosis: 79% |
| Tanaka, 2001[232](#_ENREF_232) | 3 | Galactose | 1999 | 2 | Japan | 107 | Age: 62 Male: 75% HBV: NR Cirrhosis: NR |
| Teefey, 2003[235](#_ENREF_235) | 2 | No contrast | 1996 | 2 | United States | 25 | Age: 47 Male: 65% HBV: NR Cirrhosis: 100% |
| Trojan, 1999[237](#_ENREF_237) | 2 | No contrast | 1996 | 2 | Germany | 14 | Age: median 60 Male: 71% HBV: 21% Cirrhosis: NR |
| Van Thiel, 2004[240](#_ENREF_240) | 1 | No contrast | 1998 | 1 | United States | 100 | Age: 52 Male: 68% HBV: 2% Cirrhosis: NR |
| Wang, 2006[245](#_ENREF_245) | 3 | Galactose | 2003 | 4 | Taiwan | 30 | Age: 55 Male: 67% HBV: 73% Cirrhosis: 100% |
| Wang, 2008[244](#_ENREF_244) | 3 | Sulfur hexafluoride  | 2005 | 4 | China | 52 | Age: 45 Male: 65% HBV: NR Cirrhosis: 0% |
| Xu, 2008[253](#_ENREF_253) | 3 | No contrast or sulfur hexafluoride (for HCC <2 cm) | 2005 | 4 | China | 104 | Age: 48 Male: 78% HBV: NR Cirrhosis: NR |
| Xu, 2012[250](#_ENREF_250) | 3 | No contrast or sulfur hexafluoride  | 2004 | 4 | China | 133 | Age: 52 Male: 83% HBV: 95% Cirrhosis: 100% |
| Yamamoto, 2002[255](#_ENREF_255) | 3 | Galactose | NR | 4 | Japan | 41 | Age: 65 Male: 54% HBV: 2.4% Cirrhosis: 95% |
| Yu, 2011[265](#_ENREF_265) | 2 | No contrast | 1999 | 1 | United States | 638 | Age: 53 Male: 64% HBV: 10% Cirrhosis: NR |
| Zhou, 2002[275](#_ENREF_275) | 2 | No contrast  | 1995 | 2 | China | 49 | Age: NR Male: 90% HBV: NR Cirrhosis: NR |

HBV = hepatitis B virus; NR = not reported

a Reason for imaging key: 1=surveillance, 2=detection rate in patients undergoing surgery or with known HCC; 3=evaluation/characterization of liver mass; 4=differentiation between HCC and another type of lesion mass; 5=staging

b Reference standard key: 1=explanted livers only, 2=histological specimen (may include some explanted livers), 3=imaging and clinical criteria, 4=mixed histological and imaging/clinical criteria

c Age reported as mean (years), unless otherwise indicated