**Supplemental table.** Review of all the studies concerning IHC and molecular markers of primary PAEDs.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References** | **N. of cases** | **Sex (M/F)** | **age/**  **average age** | **Country** | **CK-7** | **TT-F1** | **CK-20** | **CDX2** | **Napsin A** | **Muc2** | **MUC5A5** | **Villin** | **CEA** | **SP-A** | ***KARS*** | ***EGFR*** | ***EML4*-*ALK*** | ***BRAF*** | ***NRAS*** | ***ERBB2 (HER2)*** | ***MMR*** |
| *Tsao 1991* | **1** | **M** | **40** | Canada | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Weidner 1992* | **1** | **F** | **44** | USA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Inamura 2005* | **7** | **6/1** | ND | Japan | **7+** | **3+/4-** | **3+/4-** | **5+/2-** | **7-** | **3+/4-** | ND | ND | ND | **1+/6-** | ND | ND | ND | ND | ND | ND | ND |
| *Yousem 2005* | **6** | **2/4** | **69.8** | USA | **6+** | **6+** | **6-** | **6-** | ND | **1+/5-** | **2+/4-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *satoh 2006* | **5** | **4/1** | **67** | Japan | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Tominaga 2006* | **1** | **M** | **66** | Japan | **1-** | **1-** | **1+** | ND | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Maeda 2007* | **1** | **M** | **69** | Japan | **1+** | **1+** | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Canney 2009* | **1** | **M** | **54** | Ireland | **1+** | **1+** | **1-** | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | **1+** |
| *Li 2009* | **1** | **F** | **51** | USA | **1-** | **1-** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Wei 2010* | **4** | **ND** | **ND** | China | **4+** | **2+/2-** | **4-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Fujita 2011* | **1** | **M** | **74** | Japan | **1-** | **1-** | **1+** | **1+** | ND | **1+** | ND | ND | ND | **1-** | ND | ND | ND | ND | ND | ND | ND |
| *Hatanaka 2011* | **1** | **F** | **51** | Japan | **1-** | **1-** | **1+** | **1+** | **1-** | **1+** | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Lee 2012* | **10** | ND | ND | Korea | ND | ND | ND | ND | **2+/8-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Kimura 2012* | **1** | **M** | **73** | Japan | **1+** | **1-** | **1+** | **1+** | **1-** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Lin 2013* | **1** | **F** | **61** | China | **1+** | **1-** | **1+** | **1-** | ND | ND | ND | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Qureshi 2013* | **1** | **F** | **61** | Oman | **1+** | **1-** | **1+** | **1+** | ND | ND | ND | **1-** | ND | ND | ND | **1-** | ND | ND | ND | ND | ND |
| *László 2014* | **1** | **M** | **65** | Hungary | **1-** | **1-** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | **1+** | **1-** | ND | ND | ND | ND | ND |
| *Stojsic 2014* | **2** | **1/1** | **25** | Serbia | **2-** | **2-** | **2+** | **2+** | **2-** | **2-** | ND | **2+** | ND | ND | **1+/1-** | **2-** | ND | ND | ND | ND | ND |
| *Wang 2014* | **9** | **4/5** | **60,1** | China | **9+** | **4+/5-** | **2+/7-** | **6+/3-** | **3+/6-** | **4+/5-** | ND | **3+/6-** | ND | ND | **9-** | **9-** | **9-** | ND | ND | ND | ND |
| *Garajová 2015* | **3** | **2/1** | **70** | Netherland | **1+/1-** | **2-** | **1+/1-** | **2+** | **1-** | **1-** | **1+** | ND | ND | ND | **2+** | **2-** | **2-** | ND | ND | ND | **1-** |
| *Ishida 2015* | **1** | **M** | **66** | Japan | **1+** | **1-** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Metro 2015* | **1** | **M** | **74** | Italy | **1+** | **1-** | **1-** | **1+** | ND | ND | ND | ND | ND | ND | **1+** | **1-** | ND | ND | ND | ND | ND |
| *Suzuki M 2015* | **2** | **1/1** | **71** | Japan | ND | ND | ND | **2+** | ND | **2+** | ND | ND | ND | ND | **1-** | **1-** | **1-** | ND | ND | ND | ND |
| *Toyazaki 2015* | **1** | **M** | **66** | Japan | **1+** | **1-** | **1+** | **1+** | **1-** | ND | ND | ND | ND | **1-** | ND | ND | ND | ND | ND | ND | ND |
| *Mizoguchi 2015* | **1** | **F** | **62** | Japan | **1+** | **1+** | **1-** | ND | **1+** | ND | ND | ND | ND | **1+** | ND | ND | ND | ND | ND | ND | ND |
| *Nojima 2015* | **1** | **M** | **81** | Japan | **1-** | **1-** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Saito 2015* | **1** | **F** | **65** | Japan | **1-** | **1-** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *De Castria 2016* | **5** | **3/2** | **57.6** | Brazil | **4+/1-** | **5-** | **3+/2-** | **4+/1-** | **2-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *El Hammoumi 2016* | **1** | **M** | **50** | Morocco | **1+** | **1+** | **1-** | **1-** | ND | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Handa 2016* | **1** | **M** | **70** | Japan | **1+** | **1+** | **1-** | **1-** | ND | ND | ND | ND | ND | **1+** | ND | **1+** | ND | ND | ND | ND | ND |
| *Lin 2016* | **1** | **F** | **53** | China | **1-** | **1-** | **1+** | **1+** | **1-** | **1-** | ND | **1+** | **1+** | ND | **1-** | **1-** | **1-** | **1-** | ND | ND | ND |
| *Shiina 2016* | **1** | **M** | **66** | Japan | **1+** | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | 1- | ND | ND | ND | ND | ND |
| *Yang 2016* | **3** | ND | ND | China | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Bian 2017* | **13** | **6/7** | **62.6** | China | **10+/3-** | **7+/6-** | **8+/5-** | **8+/5-** | **6+/7-** | ND | ND | **10+/3-** | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Caliò 2017* | **7** | **ND** | **ND** | Italy | **7+** | **2+/5-** | **2+/5-** | **7+** | **1+/6-** | **4+/3-** | **6+/1-** | **7+** | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Fujiwara 2017* | **1** | **M** | **60** | Japan | **1+** | **1-** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Gómez-Hernández 2017* | **1** | **F** | **76** | Spain | **1-** | **1-** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Lin 2017* | **11** | **5/6** | **58.8** | China | **3+/7-** | **3+/8-** | **7+/3-** | **9+/1-** | **1+/4-** | ND | ND | 8+/2- | ND | ND | ND | ND | **2+/5-** | ND | ND | ND | **3+/4-** |
| *Matsubara 2017* | **2** | **ND** | **ND** | Japan | ND | ND | **1+** | **1+** | **1-** | ND | 1- | ND | ND | ND | **1+/1-** | **2-** | **2-** | ND | ND | ND | ND |
| *Matsushima 2017* | **7** | **5/2** | **65.5** | Japan | **6+/1-** | **1+/6-** | **6+/1-** | **4+/3-** | **6-** | **1+/5-** | **2+/5-** | ND | ND | ND | **1+/6-** | **6-** | ND | **6-** | ND | ND | ND |
| *Nottegar 2017* | **8** | **6/2** | **72** | Italy | **8+** | **1+/7-** | **1+/7-** | **8+** | ND | ND | ND | ND | ND | ND | **4+/4-** | **8-** | **1+/7-** | **8-** | **8-** | ND | ND |
| *Prakobkit 2017* | **1** | **M** | **81** | USA | **1+** | **1+** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Shomura 2017* | **1** | **M** | **59** | Japan | **1+** | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Sun 2017* | **1** | **M** | **62** | China | **1+** | **1-** | **1-** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Zhao 2017* | **28** | **22/6** | **64.8** | China | **18+/9-** | **10+/18-** | **9+/16-** | **16+/12-** | 6+/20- | ND | ND | **25+/3-** | ND | ND | **3+/24-** | **3+/28-** | ND | ND | ND | ND | ND |
| *Chen 2018* | **18** | **6/12** | **63.2** | China | **16+/2-** | **7+/11-** | **17+/1-** | **13+/5-** | ND | ND | ND | ND | ND | ND | **1+/4-** | **1+/4-** | **5-** | **5-** | **1+/4-** | **2+/3-** | **4+/1-** |
| *Feng 2018* | **30** | **9/21** | **13<60 17>60** | China | ND | ND | **9+/21-** | **26+/4-** | ND | ND | ND | **6+/4-** | **28+/2**- | ND | ND | **13+/17-** | ND | ND | ND | ND | ND |
| *Hayama 2018* | **1** | **M** | **70** | Japan | **1-** | **1-** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Miura 2018* | **1** | **M** | **73** | Japan | **1+** | ND | **1+** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Miyaoka 2018* | **1** | **M** | **75** | Japan | **1-** | **1-** | **1-** | **1+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Nottegar 2018* | **46** | **NA** | **NA** | Italy | **46+** | **21+/25-** | **15+/31-** | **46+** | **21+/25-** | **15+/31-** | ND | **35+/11-** | ND | **21+/25-** | **28+/18-** | **1+/45-** | **6+/40-** | **46-** | ND | ND | ND |
| *Ogihara 2018* | **1** | **NA** | **NA** | Japan | **1+** | **1-** | **1+** | **1+** | **1-** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Suzuki M 2018* | **2** | **NA** | **NA** | Japan | ND | ND | **2+** | **2+** | ND | **2+** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| *Zhang 2018* | **13** | **7/6** | **61.2** | China | **13+** | **7+/6-** | **7+/6-** | **4+/3-** | ND | ND | ND | ND | ND | ND | **1+/12-** | **5+/8-** | **2+/11-** | **2+/11-** | **13-** | **6+/7-** | **3+/10**- |
| *Jurmeister 2019* | **15** | **ND** | **ND** | Germany | **11+/4-** | **2+/13-** | **8+/7-** | **15+** | ND | ND | ND | ND | ND | ND | **9+/6-** | **15-** | **15-** | **15-** | **15-** | **15-** | ND |
| *Palmirotta 2019* | **1** | **M** | **63** | Italy | **1+** | **1-** | **1-** | **1+** | **1-** | ND | ND | ND | ND | ND | **1+** | **1-** | **1-** | **1-** | **1-** | ND | ND |
| *Jurmeister 2019* | **7** | **4/3** | **59.8** | Germany | **5+/2-** | **1+/6-** | **2+/5-** | **7+** | ND | ND | ND | ND | ND | ND | **3+/4-** | **7-** | **7-** | **7-** | **7-** | **1+/6-** | **7-** |