**Supplementary file 9.** Expression and function of the top 20 genes in TC 121

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| **Symbol** | **Common name** | **Tissue expression & function** |
| LHX8 | LIM homeobox 8 | Essential transcription factor for the development of neurons, teeth and oocytes. Appears to be regulated by methylation.22 LHX8 methylation is an important marker for precancerous cervical lesions.23 |
| DMRTC2 | DMRT like family C2 | Related to male and female germ cell development, downstream of cyclin E.24,25 |
| EN1 | engrailed homeobox 1 | Plays a role in central nervous system development and is hypermethylated in HGSOC, colorectal, prostate and breast cancer.26,27 |
| ESC1 | ESX homeobox 1 | X-linked, germ cell-specific gene. It is related to cell cycle progression and transcription during spermatogenesis.28 Suppresses KRAS signaling in xenograft models, resulting in growth inhibition.29 |
| SOX30 | SRY-box 30 | Epigenetically regulated transcription factor overexpressed in oocytes.30 Related to better survival of advanced lung, bladder, and ovarian cancer.31–33 Activates p53-signaling.34 |
| FOXE3 | forkhead box E3 | Methylation is related to survival of clear cell renal cell carcinoma patients.35 |
| CARTPT | CART prepropeptide | Methylation-regulated inhibitor of follicle development.36  |
| BEND4  | BEN domain containing 4 | Hypermethylated in oropharyngeal , colorectal, and lung cancer.37–39 |
| SOGA3 | SOGA family member 3 | - |
| ZNF536 | zinc finger protein 536 | Induces neuronal differentiation.40 |
| TMEM151B | transmembrane protein 151B | - |
| TAF7L | TATA-box binding protein associated factor 7 like | Germ cell-specific and plays a role in spermatogenesis41 |
| OTP | orthopedia homeobox | Key player in hypothalamus development. Expression is related to better OS of pulmonary carcinoid patients.42 |
| ZIC3 | Zic family member 3 | Upregulated by EN1 in breast cancer cells.43 Negatively regulated by miR-564, resulting in proliferation and motility.44 |
| DRAXIN | dorsal inhibitory axon guidance protein | Important for neuron development, inhibits axonal growth through Akt.45 Potentially plays a role in proliferation and apoptosis of lung cancer cells.46  |
| LRRC14B | leucine rich repeat containing 14B | - |
| ELAVL4 | ELAV like RNA binding protein 4 | Marker of neuronal phenotype and essential for neuronal development.47 It is highly immunogenic, possibly related to SCLC-autoimmunity and proliferation of NSCLC.48,49 |
| GSC | goosecoid homeobox | Transcription factor related to neural crest development. Increased in ovarian cancer stem-like cells and related to poor drug response and OS.50,51 |
| CCDC144NL-AS1 | CCDC144NL antisense RNA 1 | Related to OS of BRCA-wild type ovarian and colorectal cancer.52,53 In endometriosis cell line models related to vimentin expression and migration.54 Prevents conversion of pluripotent stem cells back to naïve-like state.55 |
| LECT1 | leukocyte cell derived chemotaxin 1 | Angiogenesis inhibitor, increases chondrocyte growth.56 |