1236C>T, 2677G>A/T and 3435C>T, and the *ABCB1*13* haplotype involves the 1236, 2677 and 3435 (TTT) SNPs and 3 intronic SNPs (in intron 9, 13, and 14).[23] The *ABCB1* C1236T, G2677T/A and C3435T SNPs influence blood–brain barrier (BBB) *P*-glycoprotein function. AD patients with one or more T in C1236T, G2677T and C3435T have significantly higher binding potential values than patients without a T. Genetic variations in *ABCB1* might contribute to the progression of Aβ deposition in the brain[131] and some *ABCB1* SNPs (C1236T in exon 12, G2677T/A in exon 21 and C3435T in exon 26) and inferred haplotypes might represent novel biomarkers of AD.[132] ABCB1 directly transports Aβ from the brain into the blood circulation, whereas the cholesterol transporter ABCA1 neutralizes Aβ aggregation capacity in an APOE-dependent manner, facilitating subsequent Aβ elimination from the brain.[133] Some *ABCB1* variants are frequent in AD cases over 65 years of age and among females. This association of *ABCB1* 2677G>T (rs2032582) is more pronounced in *APOE4*-negative cases.[131]

Some other ABCs have shown potential association with AD.[129,134] The G allele of the *ABCA7* rs115550680 SNP is associated with AD in Europeans. The effect size for the SNP in *ABCA7* was comparable with that of the *APOE ε4*-determining SNP rs429358.[135] ABCG2 is involved in Aβ transport and is up-regulated in AD brains. The *ABCG2* gene (C421A; rs2231142) (*ABCG2* C/C genotype) is associated with AD and the *ABCG2* C/C genotype and the *APOE ε4* allele may exert an interactive effect on AD risk.[136] Also of importance for AD pharmacogenomics are transporters encoded by genes of the solute carrier superfamily (*SLC*) and solute carrier organic (*SLCO*) transporter family, responsible for the transport of multiple endogenous and exogenous compounds, including folate (*SLC19A1*), urea (*SLC14A1–2*), monoamines (*SLC29A4*, *SLC22A3*), amino-acids (*SLC1A5*, *SLC3A1*, *SLC7A3*, *SLC7A9*, *SLC38A1*, *4–5*, *7*, *SLC43A2*, *SLC45A1*), nucleotides (*SLC29A2–3*), fatty acids (*SLC27A1–6*), neurotransmitters (*SLC6A2* (noradrenaline transporter), *SLC6A3* (dopamine transporter), *SLC6A4* (serotonin transporter, SERT), *SLC6A5–6*, *9*, *11*, *12*, *14–19*), glutamate (*SLC1A6–7*), and others.[129,137] Some organic anion transporters (OAT), which belong to the solute carrier (SLC) 22A family, are also expressed at the BBB, and regulate the excretion of endogenous and exogenous organic anions and cations.[138] The transport of amino acids and di- and tripeptides is mediated by a number of different transporter families, and the bulk of oligopeptide transport is attributable to the activity of members of the SLC15A superfamily (SLC15A1-2, SLC15A2, SLC15A3-4). ABC and SLC transporters expressed at the BBB may cooperate to regulate the passage of different molecules into the brain.[11,13,18,139]

5.4 Epigenomics

Epigenomic regulation is a universal phenomenon of gene expression control during development, maturation and aging in physiological conditions. When this mechanism of control is altered by endogenous and/or exogenous factors, probably acting as an interface between the genome and the environment (nature *vs*. nurture),[140,141] then epigenomic changes become pathogenic due to the abnormal expression of genes under epigenetic control.