Definitions: $\quad s_\mu = \frac{1}{a}\sin(p_\mu a) \qquad \hat{p}_\mu = \frac{2}{a}\sin(p_\mu a/2)$

$$\hat{p}^2 = \frac{4}{a^2}\sum_\mu \sin^2(p_\mu a/2) \qquad \sum_\mu \left[1-\cos(p_\mu a)\right] = \frac{1}{2}\,a\,\hat{p}^2$$

Wilson propagator ($r=1$):

$$\tilde{D}_W(p) = \frac{i}{a}\gamma_\mu \sin(p_\mu a) + \frac{1}{a}\sum_\mu \left[1-\cos(p_\mu a)\right] + m_0$$

$$= i\not{s} + m_0 + \frac{r}{2}\,a\,\hat{p}^2$$

$$\tilde{D}_W(\vec{p}, p_0) = \frac{i}{a}\gamma^0 \sin(p_0 a) + m_0 + \frac{1}{a}\left[1-\cos(p_0 a)\right] + i\vec{\gamma}\cdot\vec{s} + \frac{r}{2}\,a\,\hat{p}_i^2$$

$$C_W(\vec{p}, t) = \int_{-\pi}^{\pi} \frac{dp_0}{2\pi}\, e^{-ip_0 t}\, \tilde{D}_W^{-1}(\vec{p}, p_0) \qquad (a=1)$$