

$$p(\theta, w | \mathbf{y}) \propto p(\mathbf{y} | \theta, w) p(\theta | w) p(w)$$

$$p(\theta | w, \mathbf{y}) = \frac{p(\theta, w, \mathbf{y})}{p(w, \mathbf{y})} = \frac{p(\theta, w | \mathbf{y}) p(\mathbf{y})}{p(w | \mathbf{y}) p(\mathbf{y})}$$

$$\propto p(\mathbf{y} | \theta, w) p(\theta | w)$$

$$p(\theta, w | \mathbf{y}) \propto w^{(d+1)/2-1} \exp \left( -w(n+\kappa) \frac{\left( \theta - \frac{n\bar{y} + \mu\kappa}{n+\kappa} \right)^2}{2} \right) \exp \left( -w \frac{\eta}{2} \right)$$

$$p(\theta | w, \mathbf{y}) \propto \exp \left( -w(n+\kappa) \frac{\left( \theta - \frac{n\bar{y} + \mu\kappa}{n+\kappa} \right)^2}{2} \right)$$